Preliminary Staff Assessment
Volume 1

PALMDALE HYBRID POWER PROJECT

Application For Certification (08-AFC-9)

CALIFORNIA ENERGY COMMISSION

STAFF REPORT

DECEMBER 2009
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CALIFORNIA ENERGY COMMISSION

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PALMDALE HYBRID POWER PROJECT
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(08-AFC-9)
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INTRODUCTION

Felicia Miller

PURPOSE OF THIS REPORT

The Preliminary Staff Assessment (PSA) presents the California Energy Commission (Energy Commission) staff's independent analysis of the Palmdale Hybrid Power Project (PHPP) Application for Certification (AFC). This PSA is a staff document. It is neither a Committee document, nor a draft decision. The PSA describes the following:

- the existing environmental setting;
- the proposed project;
- whether the facilities can be constructed and operated safely and reliably in accordance with applicable laws, ordinances, regulations and standards (LORS);
- the environmental consequences of the project including potential public health and safety impacts;
- cumulative analysis of the potential impacts of the project, along with potential impacts from other existing and known planned developments;
- mitigation measures proposed by the applicant, staff, interested agencies and intervenors that may lessen or eliminate potential impacts;
- the proposed conditions under which the project should be constructed and operated, if it is certified;
- project alternatives; and
- project closure requirements.

The analyses contained in this PSA are based upon information from: 1) the AFC; 2) subsequent submittals; 3) responses to data requests; 4) supplementary information from local and state agencies and interested individuals; 5) existing documents and publications; and 6) independent field studies and research. The analyses for most technical areas include discussions of proposed conditions of certification. Each proposed condition of certification is followed by a proposed means of "verification." The verification is not part of the proposed condition, but is the owner's and Energy Commission Compliance Unit's method of ensuring post-certification compliance with adopted conditions of certification.

The Energy Commission staff's analyses were prepared in accordance with Public Resources Code section 25500 et seq. and Title 20, California Code of Regulation section 1701 et seq., and the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.).

ORGANIZATION OF THE STAFF ASSESSMENT

The PSA contains an Executive Summary, Introduction, Project Description, and Project Alternatives. The environmental, engineering, and public health and safety analysis of the proposed project is contained in a discussion of 19 technical areas. Each technical area is addressed in a separate chapter. They include the following: air quality, public health, worker safety and fire protection, transmission line safety and nuisance, hazardous material management, waste management, land use, traffic and transportation, noise, visual resources, cultural resources, socioeconomics, biological resources, soil and water resources, geological and paleontological resources, facility design, power plant reliability, power plant efficiency, and transmission system engineering. These chapters are followed by a discussion of facility closure, project construction and operation compliance monitoring plans, and a list of staff that assisted in preparing this report.

Each of the 19 technical area assessments includes a discussion of:

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

ENERGY COMMISSION SITING PROCESS

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

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

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

Staff conducts its environmental analysis in accordance with the requirements of the California Environmental Quality Act. No Environmental Impact Report (EIR) is required because the Energy Commission's site certification program has been certified by the Resources Agency (Pub. Resources Code, §21080.5 and Cal. Code Regs., tit. 14, §15251 (k)). The Energy Commission is the CEQA lead agency and is subject to all portions of CEQA applicable to certified regulatory activities.

Staff typically prepares both a preliminary and final staff assessment. The Preliminary Staff Assessment (PSA) presents for the applicant, intervenors, agencies, other interested parties and members of the public, the staff's preliminary analysis, conclusions, and recommendations.

Staff uses the PSA to resolve issues between the parties and to narrow the scope of adjudicated issues in the evidentiary hearings. During the period between publishing the PSA and the Final Staff Assessment (FSA), staff will conduct one or more workshops to discuss their findings, proposed mitigation, and proposed compliance monitoring requirements. Based on the workshops and written comments, staff will refine their analysis, correct errors, and finalize conditions of certification to reflect areas where staff has reached agreement with the parties. This refined analysis, along with responses to comments on the PSA, will be published in the FSA. The FSA serves as staff's testimony.

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

Following the hearings, the Committee's recommendation to the full Energy Commission on whether or not to approve the proposed project will be contained in a document entitled the Presiding Members' Proposed Decision (PMPD). Following publication, the PMPD is circulated in order to receive public comments. At the conclusion of the comment period, the Committee may prepare a revised PMPD. A revised PMPD will be circulated for a comment period to be determined by the Committee. At the close of the comment period for the revised PMPD, the PMPD is submitted to the full Energy Commission for a decision. Within 30 days of the Energy Commission decision, any intervenor may request that the Energy Commission reconsider its decision.

A Compliance Monitoring Plan and General Conditions will be assembled from conditions contained in the FSA and other evidence presented at the hearings. The Compliance Monitoring Plan and General Conditions will be presented in the PMPD. Commission staff's implementation of the plan ensures that a certified facility is constructed, operated, and closed in compliance with the conditions adopted by the Energy Commission. Staff's proposed description of the contents of the Compliance Monitoring Plan and proposed General Conditions are included in the **GENERAL CONDITIONS** section of this PSA.

AGENCY COORDINATION

As noted above, the Energy Commission certification is in lieu of any permit required by state, regional, or local agencies, and federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). However, the Commission typically seeks comments from and works closely with other regulatory agencies that administer LORS that may be applicable to proposed projects. These agencies may include the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, California Coastal Commission, State Water Resources Control Board/Regional Water Quality Control Board, California Department of Fish and Game, and the California Air Resources Board.

ENVIRONMENTAL ASSESSMENT

HAZARDOUS MATERIALS MANAGEMENT

Alvin J. Greenberg, Ph.D. and Rick Tyler

SUMMARY OF CONCLUSIONS

Staff's evaluation of the proposed project, along with staff's proposed mitigation measures, indicate that hazardous materials use at the proposed Palmdale Hybrid Power Project (PHPP) would not present a significant impact on the public. With adoption of the proposed conditions of certification, the proposed project will comply with all applicable laws, ordinances, regulations and standards (LORS). In response to Health and Safety Code, section 25531 et seq., the applicant would be required to develop a Risk Management Plan (RMP). To ensure the adequacy of this plan, staff's proposed conditions of certification require that it be submitted for concurrent review by the Los Angeles County Fire Department, Health Hazardous Materials Division and the California Energy Commission (Energy Commission) staff. Other proposed conditions of certification address the transportation, storage, and use of aqueous ammonia and engineering controls on the pipes containing the heat transfer fluid in the solar generating system.

INTRODUCTION

The purpose of this **HAZARDOUS MATERIALS MANAGEMENT** analysis is to determine if the proposed PHPP could potentially cause significant impacts on the public from the use, handling, storage, or transportation of hazardous materials at the proposed project site. If significant adverse impacts on the public are identified, Energy Commission staff must evaluate facility design alternatives and additional mitigation measures to reduce those impacts to an insignificant level.

This analysis does not address the potential exposure of workers to hazardous materials used at the proposed project site. Employers must inform employees of hazards associated with their work and provide those employees with special protective equipment and training to reduce the potential of health impacts from the handling of hazardous materials. The **WORKER SAFETY AND FIRE PROTECTION** section of this document describes the protection of workers from those risks.

Aqueous ammonia (<20% ammonia in aqueous solution) is the only acutely hazardous material proposed for use or storage at the PHPP in quantities exceeding the reportable amounts defined in California Health and Safety Code, section 25532 (j) (COP 2008a, section 5.6.3.3). Aqueous ammonia will be used for controlling oxides of nitrogen (NO_x) emissions through selective catalytic reduction. The use of aqueous ammonia significantly reduces the risk that would otherwise be associated with use of the more hazardous anhydrous form of ammonia. Use of the aqueous form eliminates the high internal energy associated with the anhydrous form, which is stored as a liquefied gas at elevated pressure. The high internal energy associated with the anhydrous form of ammonia can act as a driving force in an accidental release, which can rapidly introduce large quantities of the material to the ambient air and cause high down-wind concentrations. Spills associated with the aqueous form are much easier to contain than those associated with anhydrous ammonia, and emissions from these spills are limited by the slow mass transfer from the surface of the spilled material.

Other hazardous materials such as mineral and lubricating oils, corrosion inhibitors, water treatment chemicals, catalyst panels, acids and bases to control pH, and a heat transfer fluid (HTF) will be present at the proposed project site. No acutely toxic hazardous materials will be used on-site during construction. None of these materials pose a significant potential for off-site impacts as a result of the quantities on-site, their relative toxicity, their physical states, and/or their environmental mobility.

Although no natural gas is stored, the project will involve the handling of large amounts of natural gas. Natural gas poses some risk of both fire and explosion. Natural gas will be delivered via a new gas pipeline that would travel about 8.7 miles south from the project site to an interconnection with the Southern California Gas Company line (COP 2008a, section 5.6.3.3). PHPP will also require the transportation of aqueous ammonia to the facility, as well as other liquid and solid hazardous materials. This document addresses all potential impacts associated with the use, storage, and transport of hazardous materials.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

The following federal, state, and local laws and policies apply to the protection of public health and hazardous materials management. Staff's analysis examines the project's compliance with these requirements.

HAZARDOUS MATERIALS MANAGEMENT Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
The Superfund Amendments and Reauthorization Act of 1986 (42 USC §9601 et seq.)	Contains the Emergency Planning and Community Right To Know Act (also known as SARA Title III).
The Clean Air Act (CAA) of 1990 (42 USC 7401 et seq. as amended)	Establishes a nationwide emergency planning and response program, and imposes reporting requirements for businesses that store, handle, or produce significant quantities of extremely hazardous materials.
The CAA Section on Risk Management Plans (42 USC §112(r)	Requires states to implement a comprehensive system to inform local agencies and the public when a significant quantity of such materials is stored or handled at a facility. The requirements of both SARA Title III and the CAA are reflected in the California Health and Safety Code, section 25531, et seq.
49 CFR 172.800	Requires that the suppliers of hazardous materials prepare and implement security plans in accordance with U.S. Department of Transportation (DOT) regulations.

49 CFR Part 1572, Subparts A and B	Requires that suppliers of hazardous materials ensure that their hazardous material drivers comply with personnel background security checks.
The Clean Water Act (CWA) (40 CFR 112)	Aims to prevent the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Requires a written spill prevention, control, and countermeasures (SPCC) plan to be prepared for facilities that store oil that could leak into navigable waters.
Title 49, Code of Federal Regulations, Part 190	Outlines gas pipeline safety program procedures.
Title 49, Code of Federal Regulations, Part 191	Addresses the transportation of natural and other gases by pipeline. Requires preparation of annual reports, incident reports, and safety-related condition reports. Also requires operators of pipeline systems to notify the U.S. Department of Transportation DOT) of any reportable incident by telephone and submit a follow-up written report within 30 days.
Title 49, Code of Federal Regulations, Part 192	Addresses transportation of natural and other gases by pipeline: Requires minimum federal safety standards, specifies minimum safety requirements for pipelines, and includes material selection, design requirements, and corrosion protection. The safety requirements for pipeline construction vary according to the population density and land use that characterize the surrounding land. This part also contains regulations governing pipeline construction, which must be followed for Class 2 and Class 3 pipelines, and requirements for preparing a pipeline integrity management program.
6 CFR Part 27	The CFATS (Chemical Facility Anti-Terrorism Standard) regulation of the U.S. Department of Homeland Security (DHS) that requires facilities that use or store certain hazardous materials to submit information to the DHS so that a vulnerability assessment can be conducted to determine what certain specified security measures shall be implemented.
State	
California Health and Safety Code, section 25531 to 25543.4	The California Accidental Release Program (Cal-ARP) requires the preparation of a Risk Management Plan (RMP) and Off-site Consequence Analysis (OCA) and submittal to the local Certified Unified Program Authority (CUPA) for approval.
Title 8, California Code of Regulations, Section 5189	Requires facility owners to develop and implement effective safety management plans to ensure that large quantities of hazardous materials are handled safely. While these requirements primarily provide for the protection of workers, they also indirectly improve public safety and are coordinated with the RMP process.
Title 8, California Code of Regulations, Section 5189	Sets forth requirements for design, construction, and operation of the vessels and equipment used to store and transfer ammonia. These sections generally codify the requirements of several industry codes including the American Society for Material Engineering (ASME) Pressure Vessel Code, the American National Standards Institute (ANSI) K61.1, and the National Boiler and Pressure Vessel Inspection Code. These codes apply to anhydrous ammonia but are also used to design storage facilities for aqueous ammonia.
California Health and Safety Code,	Requires that “No person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury,

Section 41700	detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property.”
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)	Prevents certain chemicals that cause cancer and reproductive toxicity from being discharged into sources of drinking water.
Local	
California Fire Code, Title 8 City of Palmdale Code Section 8.04.400	Adopts the California Fire Code, 2007 Edition, into City of Palmdale regulations.

The Los Angeles County Fire Department, Health Hazardous Materials Division acts as the Certified Unified Program Authority (CUPA), and is responsible for reviewing RMPs and Hazardous Materials Business Plans. With regard to seismic safety issues, the proposed PHPP site is located in Seismic Risk Zone 4. The construction and design of buildings and vessels storing hazardous materials will meet the seismic requirements of the California Building Code (COP 2008a, section 5.6.3.3).

SETTING

Several characteristics of an area in which a project is located affect its potential for an accidental release of a hazardous material. These include:

- Local meteorology;
- terrain characteristics; and
- location of population centers and sensitive receptors relative to the project.

METEOROLOGICAL CONDITIONS

Meteorological conditions, including wind speed, wind direction, and air temperature, affect both the extent to which accidentally released hazardous materials would be dispersed into the air and the direction in which they would be transported. This affects the potential magnitude and extent of public exposure to such materials, as well as their health risks. When wind speeds are low and the atmosphere is stable, dispersion is severely reduced and can lead to increased localized public exposure.

Recorded wind speeds and ambient air temperatures are described in the Air Quality section (5.2.2.1) and Appendix G.1 of the Application for Certification (AFC) (COP 2008a). Staff agrees with the applicant that use of F stability (stagnated air, very little mixing), wind speed of 1.5 meters per second, and the highest recorded temperature in the project area over a recent three-year period (108°F) are excessive and thus very conservative input variables for conducting the worst case modeling for the offsite consequence analysis (COP 2008a, section 5.6.3.3). Staff believes this represents an overstated conservative scenario and thus truly reflects worst-case atmospheric conditions.

TERRAIN CHARACTERISTICS

The location of elevated terrain is often an important factor in assessing potential exposure. An emission plume from an accidental release may impact high elevations before it impacts lower elevations. The topography of the PHPP site and immediate vicinity is generally flat at about 2,500 feet above sea level. Elevated terrain exists to the west and south of the project where the Tehachapi Mountains reach an elevation of about 5,000 feet within 10 miles (COP 2008a, Section 5.2.2).

LOCATION OF EXPOSED POPULATIONS AND SENSITIVE RECEPTORS

The general population includes many sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding a project site may have a large bearing on health risk. Sensitive receptors and residences in the project vicinity (within a 3-mile radius) are listed in **Appendix G.7** and shown in **Figure 5.10-2** (COP 2008a). The nearest sensitive receptor is an adult care center located approximately 0.4 miles west of the site boundary, and the nearest residence is approximately 0.25 miles north of the site boundary (COP 2008a, Section 5.6.2.1 and Figure 5.10-2).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Staff reviewed and assessed the potential for the transportation, handling, and use of hazardous materials to impact the surrounding community. All chemicals and natural gas were evaluated. Staff's analysis examines the potential impacts on all members of the population including the young, the elderly, and people with existing medical conditions that may make them more sensitive to the adverse effects of hazardous materials. In order to accomplish this goal, staff utilizes the most current acceptable public health exposure levels (both acute and chronic) to protect the public from the effects of an accidental chemical release.

In order to assess the potential of released hazardous materials traveling off-site and affecting the public, staff analyzed several aspects of the proposed use of materials at the facility. Staff recognizes that some hazardous materials must be used at power plants. Therefore, staff conducted its analysis by focusing on the choice and amount of chemicals to be used, the manner in which the applicant will use the chemicals, the manner by which it will be transported to the facility and transferred to facility storage tanks, and the way in which the applicant plans to store those materials on-site.

Staff reviewed the applicant's proposed engineering and administrative controls for hazardous material use. Engineering controls are physical or mechanical systems such as storage tanks or automatic shut-off valves that can prevent a spill of hazardous material from occurring, or that can limit the spill to a small amount or confine it to a small area. Administrative controls are rules and procedures that workers must follow to help either prevent accidents or keep them small if they do occur. Both engineering and administrative controls can act as either methods of prevention or methods of response and minimization. In both cases, the goal is to prevent a spill from moving off-site and harming the public.

Staff reviewed and evaluated the proposed use of hazardous materials, as described by the applicant (COP 2008a, section 5.6). Staff's assessment followed the five steps listed below:

- Step 1: Staff reviewed the chemicals and amounts proposed for on-site use, as listed in Table 5.6-3 of the AFC and Table DR-27 of the Data Responses (AECOM 2009a) and determined the need and appropriateness of their use. Only those that are needed and appropriate are allowed to be used. If staff feels that a safer alternative chemical can be used, staff will recommend or require its use, depending upon the impacts posed.
- Step 2: Those chemicals, proposed for use in small amounts or whose physical state is such that there is virtually no chance that a spill would migrate off the site and impact the public, were removed from further assessment.
- Step 3: Measures proposed by the applicant to prevent spills were reviewed and evaluated. These included engineering controls such as automatic shut-off valves and different size transfer-hose couplings and administrative controls such as worker training and safety management programs.
- Step 4: Measures proposed by the applicant to respond to accidents were reviewed and evaluated. These measures also included engineering controls such as catchment basins and methods to keep vapors from spreading, and administrative controls such as training emergency response crews.
- Step 5: Staff analyzed the theoretical impacts on the public of a worst-case spill of hazardous materials even with the mitigation measures proposed by the applicant. When mitigation methods proposed by the applicant are sufficient, no further mitigation is recommended. If the proposed mitigation is not sufficient to reduce the potential for adverse impacts to an insignificant level, staff will propose additional prevention and response controls until the potential for causing harm to the public is reduced to an insignificant level. It is only at this point that staff can recommend that the project be allowed to use hazardous materials.

DIRECT/INDIRECT IMPACTS AND MITIGATION

<u>Small Quantity Hazardous Materials</u>

In conducting this analysis, staff determined in Steps 1 and 2 that some materials, although present at the proposed facility, pose a minimal potential for off-site impacts since they will be stored in either solid form or in small quantities, have low mobility, low vapor pressure, or low levels of toxicity. These hazardous materials, which were eliminated from further consideration, are discussed briefly below.

During the construction phase of the project, the only hazardous materials proposed for use include paint, cleaners, solvents, gasoline, diesel fuel, motor oil, and lubricants. Any impact of spills or other releases of these materials would be limited to the site because of the small quantities involved, the infrequent use and hence reduced chances of release, and/or the temporary containment berms used by contractors. Petroleum hydrocarbon-based motor fuels, mineral oil, lube oil, and diesel fuel all have very low volatility and would represent limited off-site hazards, even in larger quantities.

During operations, hazardous chemicals such as cleaning agents, lube oil, sulfuric acid, sodium hydroxide, sodium hypochlorite, and other various chemicals (see **Hazardous Materials Appendix B** for a list of all chemicals proposed to be used and stored at PHPP) would be used and stored on-site and represent limited off-site hazard due to their small quantities, low volatility, and/or low toxicity.

After removing from consideration those chemicals that pose no risk of off-site impact in Steps 1 and 2, staff continued with Steps 3, 4, and 5 to review the remaining hazardous materials: natural gas, the heat transfer fluid Therminol , and aqueous ammonia.

Large Quantity Hazardous Materials

Natural Gas

Natural gas poses a fire and/or possible explosion risk because of its flammability. Natural gas is composed mostly of methane, but it also contains ethane, propane, nitrogen, butane, isobutene, and isopentane. It is colorless, odorless, tasteless, and lighter than air. Natural gas can cause asphyxiation when methane's concentration exceeds 90%. Methane is flammable when mixed in air at concentrations of 5-14%, which is also its detonation range. Natural gas therefore poses a risk of fire and/or explosion if a release were to occur under certain specific conditions. However, it should be noted that, due to its tendency to disperse rapidly (Lees 1998), natural gas is less likely to result in an unconfined vapor cloud explosion than many other fuel gases such as propane or liquefied petroleum gas although an unconfined vapor cloud of natural gas can explode under certain conditions (as demonstrated by the natural gas explosion in Belgium in July 2004).

While natural gas will be used in significant quantities, it will not be stored on-site. It will be delivered via a new 8.7-mile gas pipeline to be constructed by the Southern California Gas Company (SCG) running south from the project site. The gas pipeline route would follow existing rights-of-ways through the City of Palmdale (COP 2008a, Section 2.1).The risk of a fire and/or explosion on-site can be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices. The National Fire Protection Association (NFPA 85A) requires the use of double block and bleed valves for gas shut-off and automated combustion controls. These measures will significantly reduce the likelihood of an explosion in gas-fired equipment. Additionally, start-up procedures would require air purging of the gas turbines prior to start-up, thus precluding formation of an explosive mixture. The Safety Management Plan proposed by the applicant would address both the handling and use of natural gas and significantly reduce the potential for equipment failure due to either improper maintenance or human error.

The natural gas pipeline must be designed to meet California Public Utilities Commission General Order 112 standards, and 49 CFR 192 standards for pipelines located in populated areas. CPUC General Order 112-E, Section 125.1 requires that at least 30 days prior to the construction of a new pipeline, the owner must file a report with the commission that will include a route map for the pipeline. The natural gas pipeline must be constructed and operated in accordance with the Federal Department of Transportation (DOT) regulations, Title 49, Code of Federal Regulations (CFR), Parts 190, 191, and 192 (see Table 1 LORS). Staff concludes that existing LORS are sufficient to ensure minimal risks of pipeline failure.

Therminol VP-1

Therminol VP1 is the HTF that will be used in the solar panels to collect solar heat and transfer it in order to generate steam to run the steam turbine. Approximately 260,000 gallons of HTF will be contained in the pipes and heat exchanger. Therminol is a mixture of 73.5% diphenyl ether and 26.5% biphenyl, and is a solid at temperatures below ~54 °F. Therminol can therefore be expected to remain liquid if a spill occurs. While the risk of off-site migration is minimal, Therminol is highly flammable and fires have occurred at other solar generating stations that use it. Staff has assessed the properties of Therminol, and reviewed the record of its use at Solar Electric Generating Stations 8 and 9 at Harper Lake, California. Past leaks, spills, and fires involving this HTF were examined and assessed. It appears that the placement of additional isolation valves in the HTF pipe loops throughout the solar array would add significantly to the safety and operational integrity of the entire system by allowing a loop to be closed if a leak develops in a ball joint, flex-hose, or pipe, instead of closing off the entire HTF system and shutting down the plant. Staff therefore proposes Condition of Certification **HAZ-7,** which would require the project owner to install a sufficient number of isolation valves that can be either manually or remotely activated. The contaminated soil that results from a spill is discussed below in the section entitled **On-site Spill Response.**

Aqueous Ammonia

Aqueous ammonia would be used to control the emission of oxides of nitrogen (NO_x) from the combustion of natural gas at the PHPP. The accidental release of aqueous ammonia, without proper mitigation, can cause significant down-wind concentrations of ammonia gas. The PHPP would store 19% aqueous ammonia solution in a stationary aboveground storage tank, with an approximate 30,000-gallon capacity (COP 2008a, section 5.6.3.3).

Based on staff's analysis, aqueous ammonia is the only hazardous material that may pose a significant off-site risk. The use of aqueous ammonia can result in the formation and release of toxic gases in the event of a spill, even without interaction with other chemicals. This is the result of its moderate vapor pressure and the large amounts of aqueous ammonia to be used and stored on-site. However, as with the example of using aqueous sodium hypochlorite as a substitute for the very hazardous chlorine gas, the use of aqueous ammonia instead of the much more hazardous anhydrous ammonia (in other words, ammonia that is not diluted with water) poses far less risk.

Staff believes that the transfer of liquid hazardous materials such as aqueous ammonia from a tanker truck to an on-site storage tank would pose the predominant risk involving hazardous materials use. Proposed condition **HAZ-3** requires the development of a Safety Management Plan for the delivery of all liquid hazardous materials, including aqueous ammonia. The development of a Safety Management Plan that addresses the delivery of all liquid hazardous materials during the construction, commissioning, and operation of the project will further reduce the risk of any accidental release not specifically addressed by the proposed spill prevention mitigation measures and the required RMP, and further prevent the mixing of incompatible materials that could result in the generation of toxic vapors.

To assess the potential impacts of an accidental release of aqueous ammonia from the storage tank, staff uses four “bench mark” exposure levels of ammonia gas These include: 1) the lowest concentration that poses a lethal risk, 2,000 ppm; 2) the Immediately Dangerous to Life and Health (IDLH) level of 300 ppm; 3) the Emergency Response Planning Guideline l(ERPG) level 2 of 150 ppm, which is also the RMP level 1 criterion used by US EPA and California; and 4) the level considered by Energy Commission staff to be without serious adverse effects to the public for a one-time exposure of 75 ppm (considered by staff to be a *level above which significant impact may occur and thus requires further analysis*). If exposure to a potential release exceeds 75 ppm at any public receptor, staff will assess the probability of occurrence of the release and/or the nature of the potentially exposed population in determining if the likelihood and extent of potential exposure are sufficient to support a finding of potentially significant impact. A detailed discussion of the exposure criteria considered by staff, and their applicability to different populations and exposure-specific conditions, is provided in **Hazardous Materials Appendix A**.

Section 5.6.3.3 of the AFC (COP 2008a) describes the modeling parameters used for the worst-case and alternative accidental releases of aqueous ammonia in the applicant’s Off-site Consequence Analysis (OCA). The OCA was conducted by the applicant and based on the proposed design configuration for the PHPP ammonia storage tank. The OCA considered tank size, the surface area of the containment structure, the location of the storage area relative to potential off-site receptors, local climatology, and the type of release. Pursuant to the California Accidental Release Program (CalARP) regulations (federal Risk Management Plan regulations do not apply to sources that store/use aqueous ammonia solutions below 20%), the OCA was performed for the worst-case release scenario, which involved the failure and complete discharge of the storage tank, as well as an alternative release scenario which assumed a contained 10-minute release from a loading hose separation during ammonia delivery.

Ammonia emissions from two potential release scenarios were calculated, following methods provided in the RMP *Offsite Consequence Analysis Guidance*, US EPA, April 1999. The default meteorological data necessary for emission and dispersion calculations were supplemented with daily temperature data, as required by Title 19, California Code of Regulations, section 2750.2. The maximum temperature recorded in the area between 2002 and 2004 (108°F) was used for emission and dispersion calculations.

Results from the OCA were tabulated showing the distance from the point of release (the source) to four benchmark concentrations for both release scenarios. These results are summarized in Table 5.6-4 of the AFC and reproduced here as **Hazardous Materials Management Table 2.**

Hazardous Materials Management Table 2
Distance to EPA/CalARP and CEC Toxic Endpoints

Release Scenario	Distance in Feet to 2,000 ppm	Distance in Feet to 500 ppm	Distance in Feet to 200 ppm	Distance in Feet To 75 ppm
Worst Case	~53	~106	~158	~264
Alternative	~11	~53	~53	~106

(Source: COP 2008a, Table 5.6-4)

The applicant's modeling predicts that concentrations exceeding staff's level of concern (75 ppm) would only extend 80 meters (about 264 feet) from the ammonia storage tank. Due to these results, which show that significant concentrations of ammonia would not extend beyond the site boundaries for either scenario, staff did not conduct its own modeling. Staff believes that the engineering controls proposed by the applicant and staff will be adequate and will ensure that no significant risk would be posed to off-site receptors should a spill of aqueous ammonia occur.

Mitigation

Staff believes that this project's use of hazardous materials poses no significant risk but only if mitigation measures are used. These mitigation measures are discussed in this section. The potential for accidents resulting in the release of hazardous materials is greatly reduced by the implementation of a Safety Management Program, which includes both engineering and administrative controls. Elements of facility controls and the safety management plan are summarized below.

Engineering Controls

Engineering controls help prevent accidents and releases (spills) from moving off-site and impacting the community by incorporating engineering safety design criteria into the project's design. Engineering safety features proposed by the applicant include:

- Construction of secondary containment areas surrounding each of the hazardous materials storage areas, designed to contain accidental releases during storage or delivery plus the rainfall associated with a 25-year, 24-hour storm event;
- Physical separation of stored chemicals in isolated containment areas to prevent the accidental mixing of incompatible materials, which may in turn cause the formation and release of toxic gases or fumes;
- Use of flow and/or pressure sensors in the HTF system loops to detect even slight leaks;
- Construction of a steel-reinforced concrete containment structure surrounding the aqueous ammonia tank, capable of holding 110 percent of the tank volume and which drains into an underground sump through a 4 ft^2 opening;
- Construction of a curbed and paved containment area surrounding the ammonia truck unloading area that drains into the ammonia tank secondary containment structure and from there into the underground sump; and

- Process protective systems, including continuous tank level monitors, temperature and pressure monitors, ammonia vapor monitors, alarms, check valves, and emergency block valves.

Administrative Controls

Administrative controls help prevent accidents and releases (spills) from moving off-site and impacting the community by establishing worker training programs and process safety management programs.

A Worker Health and Safety Program will be prepared by the applicant and include (but not be limited to) the following elements (see the **WORKER SAFETY/FIRE PROTECTION** section in this PSA for specific regulatory requirements):

- Worker training on chemical hazards, health and safety issues, and hazard communication;
- Procedures to ensure the proper use of personal protective equipment;
- Safety operating procedures for the operation and maintenance of systems that use hazardous materials;
- Fire safety and prevention; and
- Emergency response actions including facility evacuation, hazardous material spill cleanup, and fire prevention.

At the PHPP, the project owner will be required to designate an individual who will have the responsibility and authority to ensure a safe and healthful workplace. This project health and safety official will oversee the health and safety program and will have the authority to halt any action or modify any work practice in order to protect the workers, facility, and the surrounding community in the event that the health and safety program is violated.

The applicant will also prepare a Risk Management Plan (RMP) for aqueous ammonia as required by CalARP regulations and Condition of Certification **HAZ-2** that would include a program for prevention of accidental releases and responding to an accidental release of aqueous ammonia. A Hazardous Materials Business Plan (HMBP) will also be prepared by the applicant that would incorporate state requirements that a list the hazardous materials that will be used and stored at the power plants provided (see also proposed condition **HAZ-1** which will ensure that no hazardous material would be used at the facility except as listed in Appendix B of this staff assessment, unless there is prior approval by the Energy Commission Compliance Project Manager), locations of storage that aid fire-fighters' in immediately locating spills, proper precautions to take to avoid spills and keep spills from migrating off-site, and other approaches for the handling of hazardous materials (COP 2008a, section 5.6.1.2). The information required in a HMBP serves to mitigate the presence of stored hazardous materials by ensuring that they are stored in a safe manner.

On-site Spill Response

In order to address spill response, the facility will prepare and implement an emergency response plan which includes information on hazardous materials contingency and emergency response procedures, spill containment and prevention systems, personnel training, spill notification, on-site spill containment, prevention equipment and capabilities, etc. Emergency procedures will be established which include evacuation, spill cleanup, hazard prevention, and emergency response.

The Los Angeles County Fire Department (LACFD) Station No. 129, located about one mile west of the proposed PHPP site, would be the responder for hazardous materials incidents. The hazmat unit at this station includes nine personnel per shift and is fully equipped to handle any type of hazardous materials spill. The response time to a hazmat emergency call from PHPP would be approximately 4 minutes (LACFD 2008). Staff concludes that the hazardous material response time is excellent, and that the LACFD HazMat Response Team is adequately trained and equipped to respond to an emergency at PHPP in a timely manner.

Additionally, past experience at other solar generating stations in existence has shown that HTF will be spilled on a rather routine basis and that proper handling and disposal of the soil containing the HTF is required. This matter is discussed in the **WASTE MANAGEMENT** section of this PSA.

Transportation of Hazardous Materials

Hazardous materials including aqueous ammonia will be transported to the facility via tanker truck. While many types of hazardous materials may be transported to the site, staff believes that the transport of aqueous ammonia poses the predominant risk associated with hazardous materials transport.

Hazardous materials would be delivered to the project site via SR-14, East Avenue M, and the facility's access road (COP 2008a, section 5.6.3.3).

Ammonia or other liquid hazardous materials can be released during a transportation accident, and the extent of their impact in the event of a release would depend on the location of the accident and the rate of vapor dispersion from the surface of the spilled pool. The likelihood of an accidental release during transport is dependent upon three factors:

- The skill of the tanker truck driver;
- The type of vehicle used for transport; and
- Accident rates.

To address this concern, staff evaluated the risk of an accidental transportation release in the project area. Staff's analysis focused on the project area after the delivery vehicle leaves the main highway (SR-14). Staff believes it is appropriate to rely upon the extensive regulatory program that applies to shipment of hazardous materials on California Highways to ensure safe handling in general transportation (see the Federal Hazardous Materials Transportation Law 49 USC §5101 et seq, the U.S. Department of Transportation Regulations 49 CFR Subpart H, §172-700, and the California DMV Regulations on Hazardous Cargo). These regulations also address issues of driver competence. See AFC section 5.13 for additional information on regulations governing the transportation of hazardous materials.

To address tank truck safety, aqueous ammonia will be delivered to the proposed facility in Department of Transportation (DOT) certified vehicles with a design capacity of 8,000 gallons. These vehicles will be designed to DOT Code MC-307. These are high-integrity vehicles designed for hauling caustic materials such as ammonia. Staff has, therefore, proposed Condition of Certification **HAZ-5** to ensure that, regardless of which vendor supplies the aqueous ammonia, delivery will be made in a tanker that meets or exceeds the specifications described in these regulations.

To address the issue of accident rates, staff reviewed the technical and scientific literature on hazardous materials transportation (including tanker trucks) accident rates in both the United States and California. Staff relied on six references and three federal government databases to assess the risks of a hazardous materials transportation accident. Staff used the data from the Davies and Lees (1992) article, which references the 1990 Harwood et al., study, to determine that the frequency of release of all transportation of hazardous materials (not just from tanker trucks) in the U.S. is between 0.06 and 0.19 releases per million miles traveled on well-designed roads and highways. The maximum annual use of aqueous ammonia for operation of the proposed PHPP will require about 14 deliveries each month (COP 2008a, Section 5.6.3.3), for a total of 168 annual tanker truck deliveries of aqueous ammonia, each delivering about 8,000 gallons. Each delivery will travel approximately 3.5 miles from SR-14 via E Avenue M to the project site.

This would result in an estimated 590 miles of delivery tanker truck travel in the project area per year (with a full load). Staff believes that the risk over this distance is insignificant over a period of one year or over the expected life of the power plant (0.003 accidents predicted over a 30-year period). Data from the U.S. DOT show that the actual risk of a fatality (not an accident) over the past five years from all modes of hazardous material transportation (rail, air, boat, and truck) is approximately 0.1 in one million with many of the fatalities due to the physical impact of the accident itself rather than from exposure to spilled hazardous materials.

Staff therefore believes that the risk of exposure to significant concentrations of aqueous ammonia during transportation to the facility is insignificant because of the remote possibility of accidental release of a sufficient quantity to present a danger to the public. The transportation of similar volumes of hazardous materials on the nation’s highways is neither unique nor an infrequent occurrence. Staff’s analysis of the transportation of aqueous ammonia to the proposed facility (along with data from the DOT) demonstrates that the risk of accident and exposure are less than significant.

Based on the environmental mobility, toxicity, quantities present, and frequency of delivery, it is staff’s opinion that aqueous ammonia poses the predominate risk associated with hazardous materials transportation and use at the proposed facility. Staff concludes that the risk associated with the transportation of other hazardous materials to the proposed facility does not significantly increase the risk of impact beyond that associated with ammonia transportation.

Seismic Issues

The possibility exists that an earthquake could cause the failure of a hazardous materials storage tank. A quake could also cause the failure of the secondary containment system (berms and dikes), as well as electrically controlled valves and pumps. The failure of all these preventive control measures might then result in a vapor cloud of hazardous materials that could move off-site and impact residents and workers in the surrounding community. The effects of the Loma Prieta earthquake of 1989, the Northridge earthquake of 1994, and the earthquake in Kobe, Japan, in January 1995, heighten concerns about earthquake safety.

Information obtained after the January 1994 Northridge earthquake showed that some damage was caused to several large and small storage tanks at the water treatment system of a cogeneration facility. The tanks with the greatest damage, including seam leakage, were older tanks, while newer tanks sustained lesser damage with displacements and attached line failures. Therefore, staff conducted an analysis of the codes and standards, which should be followed to adequately design and build storage tanks and containment areas that could withstand a large earthquake. Staff also reviewed the impacts of the February 2001 Nisqually earthquake near Olympia, Washington, a state with similar seismic design codes as California. No hazardous materials storage tanks were impacted by this quake. Referring to the sections on **GEOLOGIC HAZARDS AND RESOURCES** and **HAZARDOUS MATERIALS MANAGEMENT** in the AFC, staff notes that the proposed facility will be designed and constructed to the applicable standards of the 2007 California Building Code for Seismic Zone 4 (COP 2008a, Section 5.6.3.3). Therefore, on the basis of occurrences at Northridge with older tanks and the lack of failures during the Nisqually earthquake with newer tanks, staff determined that tank failures during seismic events are not likely and do not represent a significant risk to the public.

Site Security

PHPP proposes to use hazardous materials identified by the US EPA as materials where special site security measures should be developed and implemented to prevent unauthorized access. US EPA published a *Chemical Accident Prevention Alert* regarding site security (EPA 2000a), the U.S. Department of Justice published a special report on Chemical Facility Vulnerability Assessment Methodology (US DOJ 2002), the North American Electric Reliability Corporation (NERC) published *Security Guidelines for the Electricity Sector* in 2002 (NERC 2002), and the U.S. Department of Energy published a draft *Vulnerability Assessment Methodology for Electric Power Infrastructure* in 2002 (DOE 2002). The energy generation sector is one of 14 areas of critical Infrastructure listed by the U.S. Department of Homeland Security. On April 9, 2007, the U.S Department of Homeland Security published, in the Federal Register (6 CFR Part 27), an Interim Final Rule requiring facilities that use or store certain hazardous materials to conduct vulnerability assessments and implement certain specified security measures. This rule was implemented with the publication of Appendix A, the list of chemicals, on November 2, 2007. While the rule applies to aqueous ammonia solutions of 20% or greater and this proposed facility plans to utilize less than 20% aqueous ammonia, staff still believes that all power plants under the jurisdiction of the Energy Commission should implement a minimum level of security consistent with the guidelines listed here.

In order to ensure that this facility (or a shipment of hazardous material) is not the target of unauthorized access, staff's proposed conditions of certification **HAZ-8** and **HAZ-9** address both construction security and operations security plans. These plans would require the implementation of site security measures that are consistent with both the above-referenced documents and Energy Commission guidelines.

The goal of these conditions of certification is to provide the minimum level of security for power plants needed to protect California's electrical infrastructure from malicious mischief, vandalism, or domestic/foreign terrorist attacks. The level of security needed for this power plant is dependent upon the threat imposed, the likelihood of an adversarial attack, the likelihood of success in causing a catastrophic event, and the severity of consequences of that event. The results of the off-site consequence analysis prepared as part of the RMP will be used, in part, to determine the severity of the consequences of a catastrophic event.

In order to determine the level of security, the Energy Commission staff used an internal vulnerability assessment decision matrix modeled after the U.S. Department of Justice Chemical Vulnerability Assessment Methodology (July 2002), the NERC 2002 guidelines, the U.S. Department of Energy VAM-CF model, and U.S. Department of Homeland Security regulations published in the Federal Register (Interim Final Rule 6 CFR Part 27). Staff determined that the PHPP would fall into the "low vulnerability" category, so staff proposes that certain security measures be implemented but does not propose that the project owner conduct its own vulnerability assessment.

These security measures include perimeter fencing and breach detectors, possibly guards, alarms, site access procedures for employees and vendors, site personnel background checks, and law enforcement contact in the event of a security breach.

Site access for vendors will be strictly controlled. Consistent with current state and federal regulations governing the transport of hazardous materials, hazardous materials vendors will have to maintain their transport vehicle fleets and employ only drivers who are properly licensed and trained. The project owner will be required, through its contractual language with vendors, to ensure that vendors supplying hazardous materials strictly adhere to the U.S. DOT requirements that hazardous materials vendors prepare and implement security plans per 49 CFR 172.800 and ensure that all hazardous materials drivers are in compliance with personnel background security checks per 49 CFR Part 1572, Subparts A and B. The compliance project manager (CPM) may authorize modifications to these measures, or may require additional measures in response to additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or NERC, after consultation with appropriate law enforcement agencies and the applicant.

CUMULATIVE IMPACTS AND MITIGATION

Staff considered the potential for impacts due to a simultaneous release of aqueous ammonia from the proposed PHPP and existing or planned facilities in the immediate vicinity of the project. Section 5.1.1 of the AFC describes future projects in the Cities of Palmdale and Lancaster. None of the listed projects would store or use hazardous materials and therefore they do not pose a risk of hazardous materials-related cumulative impacts.

The applicant will develop and implement a hazardous materials handling program for the PHPP independent of any other projects considered for potential cumulative impacts. Staff believes that the facility, as proposed by the applicant and with the additional mitigation measures proposed by staff, poses a minimal risk of accidental release that could result in off-site impacts. It is unlikely that an accidental release that has very low probability of occurrence (about one in one million per year) would independently occur at the PHPP site and another facility at the same time. Therefore, staff concludes that the facility would not contribute to a significant hazardous materials-related cumulative impact.

COMPLIANCE WITH LORS

Staff concludes that construction and operation of the PHPP would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of hazardous materials management.

AGENCY AND PUBLIC COMMENTS

No comments were received relative to **Hazardous Materials Management** issues.

CONCLUSIONS

Staff's evaluation of the proposed project (with proposed mitigation measures) indicates that hazardous material use, storage, and transportation will not pose a significant impact on the public. Staff's analysis also shows that there will be no significant cumulative impact. With adoption of the proposed conditions of certification, the proposed project will comply with all applicable LORS. In response to Health and Safety Code, section 25531 et seq., the applicant will be required to develop an RMP. To ensure adequacy of the RMP, staff's proposed conditions of certification require that the RMP be submitted for concurrent review by US EPA, the Health Hazardous Materials Division of the Los Angeles County Fire Department, and Energy Commission staff. In addition, staff's proposed conditions of certification require the review and approval by staff of the RMP prior to delivery of any hazardous materials to the facility. Other proposed conditions of certification address the issues of the transportation, storage, and use of aqueous ammonia, and other site security matters.

Staff recommends that the Energy Commission impose the proposed conditions of certification, presented below, to ensure that the project is designed, constructed, and operated in compliance with applicable LORS, and will protect the public from significant risk of exposure to an accidental ammonia release. If all mitigation proposed by the applicant and by staff are implemented, the use, storage, and transportation of hazardous materials will not present a significant risk to the public.

Staff proposes nine conditions of certification, some of which are mentioned in the text (above), and listed below. **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in the AFC, unless there is prior approval by the Energy Commission Compliance Project Manager. **HAZ-2** requires that an RMP be prepared and submitted prior to the delivery of aqueous ammonia.

Staff believes that an accidental release of aqueous ammonia during transfer from the delivery tanker to the storage tank is the most probable accident scenario, and therefore proposes Condition of Certification **HAZ-3**, which requires the development of a Safety Management Plan for the delivery of all liquid hazardous materials, including aqueous ammonia. The development of a Safety Management Plan that addresses the delivery of all liquid hazardous materials during the construction, commissioning, and operation of the project will further reduce the risk of any accidental release not specifically addressed by the proposed spill prevention mitigation measures and the required RMP, and further prevent the mixing of incompatible materials that could result in the generation of toxic vapors. **HAZ-4** requires that the aqueous ammonia storage tank be designed to certain rigid specifications. The transportation of hazardous materials is addressed in **HAZ-5** and **6**. The placement of isolation valves in the HTF loops near the solar panels is addressed in **HAZ-7**. Site security during both the construction and operation phases is addressed in **HAZ-8** and **HAZ-9.**

PROPOSED CONDITIONS OF CERTIFICATION

HAZ-1 During commissioning and operations, the project owner shall not use any hazardous materials not listed in **Appendix B**, below, or in greater quantities than those identified by chemical name in **Appendix B,** unless approved in advance by the Compliance Project Manager (CPM).

Verification: The project owner shall provide to the CPM, in the Annual Compliance Report, a list of hazardous materials contained at the facility.

HAZ-2 The project owner shall provide a Business Plan and a Risk Management Plan (RMP) to the Health Hazardous Materials Division of the Los Angeles County Fire Department and the CPM for review. After receiving comments from the Health Hazardous Materials Division of the Los Angeles County Fire Department and the CPM, the project owner shall reflect all recommendations in the final documents. Copies of the final Business Plan and RMP shall then be provided to the Health Hazardous Materials Division of the Los Angeles County Fire Department for information and to the CPM for approval.

Verification: At least 60 days prior to receiving any hazardous material on the site for commissioning or operations, the project owner shall provide a copy of a final Business Plan to the CPM for approval.

At least sixty (60) days prior to delivery of aqueous ammonia to the site, the project owner shall provide the final RMP to the CUPA for information and to the CPM for approval.

HAZ-3 The project owner shall develop and implement a Safety Management Plan for delivery of aqueous ammonia and other liquid hazardous materials by tanker truck. The plan shall include procedures, protective equipment requirements, training and a checklist. It shall also include a section describing all measures to be implemented to prevent mixing of incompatible hazardous materials including provisions to maintain lockout control by a power plant employee not involved in the delivery or transfer operation. This plan shall be applicable during construction, commissioning, and operation of the power plant.

Verification: At least sixty (60) days prior to the delivery of any liquid hazardous material via tanker truck to the facility, the project owner shall provide a Safety Management Plan as described above to the CPM for review and approval.

HAZ-4 The aqueous ammonia storage facility shall be designed to either the ASME Pressure Vessel Code and ANSI K61.6 or to API 620. In either case, the storage tank shall be protected by a secondary containment basin capable of holding 125% of the storage volume or the storage volume plus the volume associated with 24 hours of rain assuming the 25-year storm. The final design drawings and specifications for the ammonia storage tank and secondary containment basins shall be submitted to the CPM.

Verification: At least sixty (60) days prior to delivery of aqueous ammonia to the facility, the project owner shall submit final design drawings and specifications for the ammonia storage tank and secondary containment basin to the CPM for review and approval.

HAZ-5 The project owner shall direct all vendors delivering aqueous ammonia to the site to use only tanker truck transport vehicles which meet or exceed the specifications of DOT Code MC-307.

Verification: At least sixty (60) days prior to receipt of aqueous ammonia on site, the project owner shall submit copies of the notification letter to supply vendors indicating the transport vehicle specifications to the CPM for review and approval.

HAZ-6 The project owner shall direct all vendors delivering any hazardous material to the site for use during commissioning and commercial operations to use only the route approved by the CPM. Trucks and tankers will travel on SR-14 and exit onto East Avenue M and from which they will enter the plant site via the access road. If the route must be changed for any reason, the project owner shall obtain the review and approval of the CPM not later than ten (10) days before the next shipment of hazardous materials is due to arrive at the facility and shall notify the Los Angeles County Fire Department at the same time a request for route change is submitted to the CPM.

Verification: At least sixty (60) days prior to receipt of any hazardous materials on site, the project owner shall submit copies of the required transportation route limitation direction to the CPM for review and approval. Any change to the route must be reviewed and approved by the CPM and must be made in writing not less than ten (10) days prior to the next shipment of hazardous materials to the facility.

HAZ-7 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 loop in the event of a leak of fluid. These valves shall be actuated manually and remotely. The engineering design drawings showing the number, location, and type of isolation valves shall be provided to the CPM for review and approval prior to the commencement of the solar array construction.

Verification: At least sixty (60) days prior to the commencement of solar array construction, the project owner shall provide the design drawings as described above to the CPM for review and approval.

HAZ-8 At least thirty (30) days prior to commencing construction, a site-specific Construction Site Security Plan for the construction phase shall be prepared and made available to the CPM for review and approval. The Construction Security Plan shall include the following:

1. Perimeter security consisting of fencing enclosing the construction area;
2. Security guards;
3. Site access control consisting of a check-in procedure or tag system for construction personnel and visitors;
4. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;
5. Protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency; and
6. Evacuation procedures.

Verification: At least thirty (30) days prior to commencing construction, the project owner shall notify the CPM that a site-specific Construction Security Plan is available for review and approval.

HAZ-9 The project owner shall prepare a site-specific Security Plan for the operational phase and shall be made available to the CPM for review and approval. The project owner shall implement site security measures addressing physical site security and hazardous materials storage. The level of security to be implemented shall not be less than that described as below (as per NERC 2002).

The Operation Security Plan shall include the following:

1. Permanent full perimeter fence or wall, at least eight feet high around the Power Block and Solar Field and extend below ground surface consistent with the Desert Tortoise exclusion fencing requirements specified in Condition of Certification **BIO-11**.
2. Main entrance security gate, either hand operable or motorized;
3. Evacuation procedures;
4. Protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency;
5. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;
6.
   a. A statement (refer to sample, attachment “A”) signed by the project owner certifying that background investigations have been conducted on all project personnel. Background investigations shall be restricted

to ascertain the accuracy of employee identity and employment history, and shall be conducted in accordance with state and federal law regarding security and privacy;

b. A statement(s) (refer to sample, attachment “B”) signed by the contractor or authorized representative(s) for any permanent contractors or other technical contractors (as determined by the CPM after consultation with the project owner) that are present at any time on the site to repair, maintain, investigate, or conduct any other technical duties involving critical components (as determined by the CPM after consultation with the project owner) certifying that background investigations have been conducted on contractor personnel that visit the project site.

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

8. A statement(s) (refer to sample, attachment “C”) signed by the owners or authorized representative of hazardous materials transport vendors certifying that they have prepared and implemented security plans in conformity with 49 CFR 172.880, and that they have conducted employee background investigations in accordance with 49 CFR Part 1572, subparts A and B;

9. Closed Circuit TV (CCTV) monitoring system, recordable, and viewable in the power plant control room and security station (if separate from the control room) capable of viewing, at a minimum, the main entrance gate and the ammonia storage tank; and

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

    a. Security guard present 24 hours per day, seven days per week, **OR**

    b. Power plant personnel on-site 24 hours per day, seven days per week and **all** of the following:

        1) The CCTV monitoring system required in number 9 above shall include cameras that are able to pan, tilt, and zoom (PTZ), have low-light capability, are recordable, and are able to view 100% of the power block perimeter fence, the ammonia storage tank, the outside entrance to the control room, and the front gate from a monitor in the power plant control room; **AND**

        2) Power block perimeter breach detectors **<u>or</u>** on-site motion detectors.

        3) The entire perimeter fence around the solar array shall be viewable by the CCTV system **<u>or</u>** have perimeter breach detectors **<u>or</u>** on-site motion detectors.

The project owner shall fully implement the security plans and obtain CPM approval of any substantive modifications to the security plans. The CPM may authorize modifications to these measures, or may require additional measures, such as protective barriers for critical power pant components (e.g., transformers, gas lines, compressors, etc.) depending on circumstances unique to the facility or in response to industry-related standards, security concerns, or additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or the North American Electrical Reliability Council, after consultation with appropriate law enforcement agencies and the applicant.

Verification: At least 30 days prior to the initial receipt of hazardous materials on-site, the project owner shall notify the CPM that a site-specific Operations Site Security Plan is available for review and approval. In the Annual Compliance Report, the project owner shall include a statement that all current project employee and appropriate contractor background investigations have been performed, and updated certification statements are appended to the Operations Security Plan. In the Annual Compliance Report, the project owner shall include a statement that the Operations Security Plan includes all current hazardous materials transport vendor certifications for security plans and employee background investigations.

SAMPLE CERTIFICATION (Attachment "A")

Affidavit of Compliance for Project Owners

I, ____
(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

____
(Company Name)

for employment at

____
(Project name and location)

have been conducted as required by the California Energy Commission Decision for the above-named project.

____
(Signature of Officer or Agent)

Dated this ____________________ day of ____________________, 20 _______.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

SAMPLE CERTIFICATION (Attachment "B")

Affidavit of Compliance for Contractors

I, ____
(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

____
(Company Name)

for contract work at

____
(Project name and location)

have been conducted as required by the California Energy Commission Decision for the above-named project.

____
(Signature of Officer or Agent)

Dated this ____________________ day of ____________________, 20 _______.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

SAMPLE CERTIFICATION (Attachment "C")

Affidavit of Compliance for Hazardous Materials Transport Vendors

I, ____

(Name of person signing affidavit)(Title)

do hereby certify that the below named company has prepared and implemented security plans in conformity with 49 CFR 172.880 and has conducted employee background investigations in conformity with 49 CFR 172, subparts A and B,

____

(Company Name)

for hazardous materials delivery to

____

(Project name and location)

as required by the California Energy Commission Decision for the above- named project.

____

(Signature of Officer or Agent)

Dated this ___________________ day of ___________________, 20 _______.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

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Hazardous Materials
Appendix A

Basis for Staff's Use of 75 PPM Ammonia Exposure Criteria

BASIS FOR STAFF'S USE OF 75 PPM AMMONIA EXPOSURE CRITERIA

Staff uses a health-based airborne concentration of 75 PPM to evaluate the significance of impacts associated with potential accidental releases of ammonia. While this level is not consistent with the 200-ppm level used by EPA and Cal/EPA in evaluating such releases pursuant to the Federal Risk Management Program and State Accidental Release Program, it is appropriate for use in staff's analysis of the proposed project. The Federal Risk Management Program and the State Accidental Release Program are administrative programs designed to address emergency planning and ensure that appropriate safety management practices and actions are implemented in response to accidental releases. However, the regulations implementing these programs do not provide clear authority to require design changes or other major changes to a proposed facility. The preface to the Emergency Response Planning Guidelines (ERPGs) states that "these values have been derived as planning and emergency response guidelines, **not** exposure guidelines, they do not contain the safety factors normally incorporated into exposure guidelines. Instead they are estimates, by the committee, of the thresholds above which there would be an unacceptable likelihood of observing the defined effects." It is staff's contention that these values apply to healthy adult individuals and are levels that should not be used to evaluate the acceptability of avoidable exposures for the entire population. While these guidelines are useful in decision making in the event that a release has already occurred (for example, prioritizing evacuations), they are not appropriate for and are not binding on discretionary decisions involving proposed facilities where many options for mitigation are feasible. CEQA requires permitting agencies making discretionary decisions to identify and mitigate potentially significant impacts through feasible changes or alternatives to the proposed project.

Staff has chosen to use the National Research Council's 30-minute Short Term Public Emergency Limit (STPEL) for ammonia to determine the potential for significant impact. This limit is designed to apply to accidental unanticipated releases and subsequent public exposure. Exposure at this level should not result in serious effects but would result in "strong odor, lacrimation, and irritation of the upper respiratory tract (nose and throat), but no incapacitation or prevention of self-rescue." It is staff's opinion that exposures to concentrations above these levels pose significant risk of adverse health impacts on sensitive members of the general public. It is also staff's position that these exposure limits are the best available criteria to use in gauging the significance of public exposures associated with potential accidental releases. It is, further, staff's opinion that these limits constitute an appropriate balance between public protection and mitigation of unlikely events, and are useful in focusing mitigation efforts on those release scenarios that pose real potential for serious impacts on the public. Table 1 provides a comparison of the intended use and limitations associated with each of the various criteria that staff considered in arriving at the decision to use the 75-ppm STPEL. **Hazardous Materials Appendix B** provides a summary of adverse effects, which might be expected to occur at various airborne concentrations of ammonia

Hazardous Materials Appendix A Table-1
Acute Ammonia Exposure Guidelines

Guideline	Responsible Authority	Applicable Exposed Group	Allowable Exposure Level	Allowable* Duration of Exposures	Potential Toxicity at Guideline Level/Intended Purpose of Guideline
IDLH[2]	NIOSH	Workplace standard used to identify appropriate respiratory protection.	300 ppm	30 min.	Exposure above this level requires the use of “highly reliable” respiratory protection and poses the risk of death, serious irreversible injury or impairment of the ability to escape.
IDLH/10[1]	EPA, NIOSH	Work place standard adjusted for general population factor of 10 for variation in sensitivity	30 ppm	30 min.	Protects nearly all segments of general population from irreversible effects
STEL[2]	NIOSH	Adult healthy male workers	35 ppm	15 min. four times per 8 hr day	No toxicity, including avoidance of irritation
EEGL[3]	NRC	Adult healthy workers, military personnel	100 ppm	Generally less than 60 min.	Significant irritation but no impact on personnel in performance of emergency work; no irreversible health effects in healthy adults. Emergency conditions one time exposure
STPEL[4]	NRC	Most members of general population	50 ppm 75 ppm 100 ppm	60 min. 30 min. 10 min.	Significant irritation but protects nearly all segments of general population from irreversible acute or late effects. One time accidental exposure
TWA[2]	NIOSH	Adult healthy male workers	25 ppm	8 hr.	No toxicity or irritation on continuous exposure for repeated 8 hr. Work shifts
ERPG-2[5]	AIHA	Applicable only to emergency response planning for the general population (evacuation) (not intended as exposure criteria) (see preface attached)	200 ppm	60 min.	Exposures above this level entail** unacceptable risk of irreversible effects in healthy adult members of the general population (no safety margin)

1) (EPA 1987) 2) (NIOSH 1994) 3) (NRC 1985) 4) (NRC 1972) 5) (AIHA 1989)

* The (NRC 1979), (WHO 1986), and (Henderson and Haggard 1943) all conclude that available data confirm the direct relationship to increases in effect with both increased exposure and increased exposure duration.

** The (NRC 1979) describes a study involving young animals, which suggests greater sensitivity to acute exposure in young animals. The (WHO 1986) warns that the young, elderly, asthmatics, those with bronchitis and those that exercise should also be considered at increased risk based on their demonstrated greater susceptibility to other non-specific irritants.

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NRC. 1972. Guideline for short-term Exposure of The Public To Air Pollutants. IV. Guide for Ammonia, NRC, Washington, D.C.

NIOSH. 1994. National Institute of Occupational Safety and Health, Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, Washington D.C., Publication numbers 94-116.

WHO. 1986. World health Organization, Environmental Health Criteria 54, Ammonia, WHO, Geneva, Switzerland.

Abbreviations for Hazardous Materials Appendix A, Table 1

ACGIH	American Conference of Governmental and Industrial Hygienists
AIHA	American Industrial Hygienists Association
EEGL	Emergency Exposure Guidance Level
EPA	Environmental Protection Agency
ERPG	Emergency Response Planning Guidelines
IDLH	Immediately Dangerous to Life and Health Level
NIOSH	National Institute of Occupational Safety and Health
NRC	National Research Council
STEL	Short Term Exposure Limit
STPEL	Short Term Public Emergency Limit
TLV	Threshold Limit Value
WHO	World Health Organization

Hazardous Materials
Appendix B

Hazardous Materials Proposed for Use
At the
Palmdale Hybrid Power Project

Hazardous Materials Appendix B
Hazardous Materials Proposed for Use at the PHPP[a]

Material	CAS No.	Application	Hazardous Characteristics	Maximum Quantity On Site	Federal Reportable Quantity
Acetylene	74-86-2	Welding gas	Health: moderate toxicity Physical: toxic	800 cubic feet	NA
Argon	7440-37-1	Welding gas	Health: low toxicity Physical: nonflammable	800 cubic feet	NA
Aqueous Ammonia <20% solution	7664-41-7	NO_X Emissions Control	Health: high toxicity Physical: corrosive, irritant	30,000 gallons	100 pounds
Boiler Water Treatment Chemicals; may include: Carbohydrazide Diethylhydroxylamine Sodium bisulfite Sodium metabisulfite Sodium sulfite Morpholine, Cyclohexamine, Diethylaminoethanol Aminomethylpropanol Methoxypropylamine	Various 497-18-7 3710-84-7 7631-90-5 7681-57-4 7757-83-7 110-91-8 108-91-8 100-37-8 124-68-5 5332-73-0	Oxygen scavenger and neutralizing amine for boiler water treatment.	Health: low to moderate toxicity Physical: varies by ingredient, may be flammable, combustible, and/or corrosive	660 gallons	NA except for Sodium bisulfite: 5,000 pounds
Calcium Oxide (Lime)	1305-78-8	pH Adjustment	Health: low toxicity	4,000 pounds	NA
Carbon Dioxide	124-38-9	Fire suppression	Health: low toxicity Physical: non-flammable gas	24 tons	NA
Diesel Fuel	68476-34-6	Black-start generator fuel, fire-water pump engine	Health: low toxicity Physical: combustible liquid	1,200 gallons (generator), 300 gallons (fire-water pump engine)	NA
Hydrogen	1333-74-0	Generator coolant	Health: low toxicity Physical: flammable gas	320 pounds stored in a tube trailer plus 320 pounds in the cooling loop.	NA
Hydraulic Fluid	None		Health: low to moderate toxicity Physical: Class IIIB combustible liquid	500 gallons in equipment, 110 gallons in storage	NA
Lubrication Oil	64742-65-0	Lubricate rotating equipment	Health: low toxicity	4,000 gallons	NA
Mineral Insulation Oil	8042-47-5		Health: low toxicity	65,000 gallons	NA
Monopotassium Phosphate	7778-77-0	Fertilizer	Health: low toxicity Physical: irritant	250 pounds	NA

NALCO Tri-Act 1800 Cyclohexlyamine (5 – 10%) Monoehtonolamine (10 – 30%) Methoxyproplyamnie (10 – 30%)	108-91-8 141-43-5 5332-73-0	Water Treatment Chemical	Health: high toxicity Physical: corrosive, Class II combustible liquid	Plastic Totes, 2 x 400 gallons	NA
NALCO Elimin-Ox Carbohydazide (5 – 10%)	497-18-7	Water Treatment Chemical	Health: moderate toxicity Physical: sensitizer	Plastic Totes, 2 x 400 gallons	NA
NALCO 3D Trasar 3DT185 Phosphoric Acid (60 – 100%)	7664-38-2	Water Treatment Chemical	Health: high toxicity Physical: corrosive	Plastic Totes, 2 x 400 gallons	5,000 pounds
NALCO 3D Trasar 3DT177 Phosphoric Acid (30%)	7664-38-2	Water Treatment Chemical	Health: moderate toxicity Physical: irritant	Plastic Totes, 2 x 400 gallons	5,000 pounds
NALCO 3D Trasar 3DT190 Substituted aliphatic aldehyde	None	Water Treatment Chemical	Health: low toxicity Physical: irritant	Plastic Totes, 2 x 400 gallons	NA
NALCO Acti-Brom ® 7342 Sodium Bromide	7647-15-6	Water Treatment Chemical	Health: low toxicity Physical: irritant	Plastic Totes, 2 x 400 gallons	NA
NALCO pHreedom® 5200M Sodium salt of phosphonomethylated diamine	None	Water Treatment Chemical	Health: low to moderate toxicity Physical: irritant	Plastic Totes, 2 x 400 gallons	NA
NALCO PCL-1346	None	Water Treatment Chemical	Health: low toxicity Physical: irritant	Plastic Totes, 2 x 400 gallons	NA
NALCO Permacare ® PC-7408 Sodium Bisulfite	7631-90-5	Water Treatment Chemical	Health: low toxicity Physical: irritant	Plastic Totes, 2 x 400 gallons	5,000 pounds
NALCO BT-3000 Sodium Hydroxide Sodium Tripolyphosphate	1310-73-2 7758-29-4	Water Treatment Chemical	Health: high toxicity Physical: corrosive	Plastic Totes, 2 x 400 gallons	1,000 pounds NA
NALCO 8338 Sodium Nitrite Sodium Tolytriazole Sodium Hydroxide	7632-00-0 64665572 1310-73-2	Water Treatment Chemical	Health: moderate toxicity Physical: toxic	Plastic Totes, 2 x 400 gallons	100 pounds NA 1,000 pounds
Natural Gas (methane)	74-82-8	Fuel for the CTGs	Health: low toxicity Physical: flammable gas	140 pounds in equipment and piping	NA
Nitrogen	7727-37-9		Health: low toxicity Physical: non-flammable gas	7,500 pounds	NA
Oxygen	7782-44-7	Welding gas	Health: low toxicity Physical: oxidizer	800 cubic feet	NA
Roundup ® or Equivalent	38641-94-0	Herbicide	Health: low toxicity Physical: irritant	No onsite storage, brought onsite by licensed contractor, used immediately	NA
Sodium Hydroxide (50%)	1310-73-2	pH control	Health: high toxicity Physical: corrosive	7,500 gallons	1,000 pounds

Sodium Hypochlorite (12.5%)	7681-52-9	biocide	Health: high toxicity Physical: poison-b, corrosive	2,500 gallons	100 pounds
Soil Stabilizer Active Ingredient: Acrylic or Vinyl Acetate Polymer or Equivalent	None	Soil stabilizer	Health: non-toxic	No onsite storage, supplied in 55-gallon drums or 400-gallon totes, used immediately	NA
Sulfuric Acid (93%)	7664-93-9	pH control	Health: high toxicity Physical: corrosive, water reactive	10,000 gallons	1,000 pounds
Therminol VP-1: Diphenyl Ether (73.5%) Biphenyl (26.5%)	 101-84-8 92-52-4	Heat transfer fluid	Health: moderate toxicity Physical: irritant, combustible liquid (Class III-B)	260,000 gallons	 NA 100 pounds
Urea	57-13-6	Fertilizer	Health: low toxicity	250 pounds	NA

a. Source: COP 2008a Table 5.6-3 and AECOM 2009a Table DR-27

NOISE AND VIBRATION

Steve Baker

SUMMARY OF CONCLUSIONS

California Energy Commission staff concludes that the Palmdale Hybrid Power Project can be built and operated in compliance with all applicable noise and vibration laws, ordinances, regulations, and standards and, if built in accordance with the conditions of certification proposed below, would produce no significant adverse noise impacts on sensitive receptors within the affected area, either direct or cumulative.

INTRODUCTION

The construction and operation of any power plant creates noise, or unwanted sound. The character and loudness of this noise, the times of day or night that it is produced, and the proximity of the facility to sensitive receptors combine to determine whether the facility would meet applicable noise control laws and ordinances and whether it would cause significant adverse environmental impacts. In some cases, vibration may be produced as a result of power plant construction practices, such as blasting or pile driving. The groundborne energy of vibration has the potential to cause structural damage and annoyance.

The purpose of this analysis is to identify and examine the likely noise and vibration impacts from the construction and operation of the Palmdale Hybrid Power Project (PHPP) and to recommend procedures to ensure that the resulting noise and vibration impacts would be adequately mitigated to comply with applicable laws, ordinances, regulations, and standards (LORS), and to avoid creation of significant adverse noise or vibration impacts. For an explanation of technical terms and acronyms employed in this section, please refer to **Noise Appendix A** immediately following.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Noise Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal (OSHA): 29 U.S.C. § 651 et seq.	Protects workers from the effects of occupational noise exposure
State (Cal/OSHA): Cal. Code Regs., tit. 8, §§ 5095-5099	Protects workers from the effects of occupational noise exposure
Local City of Palmdale General Plan, Noise Element City of Palmdale Municipal Code, Chapter 8.28	Establishes noise guidelines and policies. Restricts construction noise to specified hours.

Applicable Law	Description
City of Lancaster General Plan, Noise Element	Establishes acceptable noise levels and limits hours of construction.
City of Lancaster Municipal Code	Limits time of day during which loud construction noise may be created.

FEDERAL

Under the Occupational Safety and Health Act of 1970 (29 USC § 651 et seq.), the Department of Labor, Occupational Safety and Health Administration (OSHA) has adopted regulations designed to protect workers against the effects of occupational noise exposure (29 CFR § 1910.95). These regulations list permissible noise exposure levels as a function of the amount of time during which the worker is exposed (see **Noise Appendix A Table A4** immediately following this section). The regulations further specify a hearing conservation program that involves monitoring the noise to which workers are exposed, assuring that workers are made aware of overexposure to noise, and periodically testing the workers' hearing to detect any degradation.

There are no federal laws governing off-site (community) noise.

The only guidance available for evaluation of power plant vibration is guidelines published by the Federal Transit Administration (FTA) for assessing the impacts of groundborne vibration associated with construction of rail projects. These guidelines have been applied by other jurisdictions to assess groundborne vibration of other types of projects. The FTA-recommended vibration standards are expressed in terms of the "vibration level," which is calculated from the peak particle velocity measured from groundborne vibration. The FTA measure of the threshold of perception is 65 VdB,[1] which correlates to a peak particle velocity of about 0.002 inches per second (in/sec). The FTA measure of the threshold of architectural damage for conventional sensitive structures is 100 VdB, which correlates to a peak particle velocity of about 0.2 in/sec.

STATE

California Government Code section 65302(f) encourages each local governmental entity to perform noise studies and implement a noise element as part of its General Plan. In addition, the California Office of Planning and Research has published guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure.

The California Occupational Safety and Health Administration (Cal/OSHA) has promulgated Occupational Noise Exposure Regulations (Cal. Code Regs., tit. 8, §§ 5095-5099) that set employee noise exposure limits. These standards are equivalent to the federal OSHA standards (see the **Worker Safety and Fire Protection** section of this document and **Noise Appendix A Table A4**).

[1] VdB is the common measure of vibration energy.

LOCAL

City of Palmdale General Plan Noise Element

The General Plan Noise Element, Section 2: Goals, Objectives and Policies, lists the following policies for any development (COP1993):

> Policy N1.1.3: Require measures to reduce noise levels to no more than 65 dBA CNEL exterior.
>
> Policy N1.2.2: Restrict construction hours during the evening, early morning and Sundays.
>
> Policy N1.2.3: Utilize any of all of the following measures in order to maintain acceptable noise environments throughout the City:
>
> > 1. Control noise at its source, including noise barriers and other muffling devices built into the noise source.

Section 3, TABLE N-3 sets maximum acceptable exterior noise levels at different land uses. The maximum acceptable exterior noise level at residential uses is 65 dBA L_{eq}.

Section 3.C refers to the City Municipal Code, Chapter 8.28 and its provisions that restrict construction between the hours of 8:00 p.m. and 6:30 a.m.

City of Palmdale Municipal Code

Chapter 8.28, Building Construction Hours of Operation and Noise Control, includes Section 8.28.030, *Construction noise prohibited in residential zones*, which states (COP2009a):

> Except as otherwise provided in this chapter, no person shall perform any construction or repair work on any Sunday, or any other day after 8:00 p.m. or before 6:30 a.m., in any residential zone or within 500 feet of any residence, hotel, motel or recreational vehicle park… (Ord. 1335 §1, 2007; Ord. 584 §1, 1986).

City of Lancaster General Plan Noise Element

Section III of the General Plan comprises the Noise Element (COL2009a):

> Objective 4.3 requires the implementation of the noise standards identified in Table III-1. Table III-1, Noise Compatible Land Use Objectives, establishes maximum exterior noise levels in residential land uses at 65 dBA CNEL.
>
> Policy 4.3.1(h) requires that new noise sources comply with the maximum noise level standards of Table III-1 at the property line of adjacent uses.
>
> Policy 4.3.2(d) limits construction activities to daylight hours between sunrise and 8:00 p.m.

> Policy 4.3.3(b) requires the use, wherever feasible, of noise barriers (walls, berms, or a combination thereof) to reduce significant noise impacts.

City of Lancaster Municipal Code

Title 8 – Health and Safety includes Chapter 8.24 – Noise Regulations. Included in this chapter is subchapter 8.24.040 *Loud, unnecessary and unusual noises prohibited – Construction and building*, which states (COL2009b):

> Except as otherwise provided in this chapter, a person at any time on Sunday or any day between the hours of eight p.m. and seven a.m. shall not perform any construction or repair work of any kind upon any building or structure or perform any earth excavating, filling or moving where any of the foregoing entails the use of any air compressor, jack hammer, power-driven drill, riveting machine, excavator, diesel-powered truck, tractor or other earth-moving equipment, hard hammers on steel or iron or any other machine tool, device or equipment which makes loud noises within five hundred (500) feet of an occupied dwelling, apartment, hotel, mobile home or other place of residence (Ord. 693 §1 (part), 1995: prior code §4-1.4)(Ord. No. 916, §2, 2-10-09).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

California Environmental Quality Act

The California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified and that such impacts be eliminated or mitigated to the extent feasible. Section XI of Appendix G of CEQA Guidelines (Cal. Code Regs., tit. 14, App. G) sets forth some characteristics that may signify a potentially significant impact. Specifically, a significant effect from noise may exist if a project would result in:

1. exposure of persons to, or generation of, noise levels in excess of standards established in the local General Plan or noise ordinance or applicable standards of other agencies;

2. exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;

3. substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or

4. substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The Energy Commission staff, in applying item 3 above to the analysis of this and other projects, has concluded that a potential for a significant noise impact exists where the noise of the project plus the background exceeds the background by 5 dBA or more at the nearest sensitive receptor, including those receptors that are considered minority population.

Staff considers it reasonable to assume that an increase in background noise levels up to 5 dBA in a residential setting is insignificant; an increase of more than 10 dBA is considered significant. An increase between 5 and 10 dBA should be considered adverse, but may be either significant or insignificant, depending on the particular circumstances of the case.

Factors to be considered in determining the significance of an adverse impact as defined above include:

1. the resulting combined noise level;[2]
2. the duration and frequency of the noise;
3. the number of people affected;
4. the land use designation of the affected receptor sites; and
5. public concern or controversy as demonstrated at workshops or hearings or by correspondence.

Noise due to construction activities is usually considered to be insignificant in terms of CEQA compliance if:

- the construction activity is temporary;
- use of heavy equipment and noisy activities is limited to daytime hours; and
- all industry-standard noise abatement measures are implemented for noise-producing equipment.

Staff uses the above method and threshold to protect the most sensitive populations, including the minority population.

SETTING

The PHPP would be a nominal 570 MW combined cycle power plant, consisting of two General Electric (GE) Frame 7F gas turbine generators and one steam turbine generator configured as GE's Rapid Start Process. Additionally, a solar collector field consisting of parabolic trough collectors would provide up to ten percent of peak power during periods of peak demand. The PHPP would be constructed on 377 acres in a currently vacant, undeveloped industrial area in the northernmost portion of the City of Palmdale in Los Angeles County. The site is bounded on the north by E Avenue M; across this thoroughfare lies a portion of the City of Lancaster. To the north of the site, land is zoned Heavy Industrial (City of Lancaster) or Industrial (City of Palmdale); to the

[2] For example, a noise level of 40 dBA would be considered quiet in many locations. A noise limit of 40 dBA would be consistent with the recommendations of the California Model Community Noise Control Ordinance for rural environments and with industrial noise regulations adopted by European jurisdictions. If the project would create an increase in ambient noise no greater than 10 dBA at nearby sensitive receptors, and the resulting noise level would be 40 dBA or less, the project noise level would likely be insignificant.

west, land is zoned Light Industry, Office, Business Park and Commercial. Air Force Plant 42 lies to the south and east of the site (COP 2008a, AFC §§ 1.1, 1.2, 2.2, 2.3.1, 5.8.2.2).

The nearest land zoned residential lies in the City of Lancaster, one mile north of E Avenue M. The nearest existing sensitive noise receptors are homes in a residential neighborhood approximately 600 feet north of Avenue L and east of 10th Street, over 1.5 miles from the center of the PHPP plant site. In addition, ten residential structures (numbered R1 through R10), some apparently abandoned, lie in the industrial zone north of the site; the nearest of these is located approximately ¾ mile northwest of the center of the PHPP power block and approximately ¼ mile north of the plant site. Other noise sensitive receptors include hotels on the west side of Sierra Highway and north of E Avenue M, and the Lancaster Adult Day Center (numbered R11) on the northeast corner of E Avenue M and 4th Street, approximately one mile from the center of the power block and 1/3 mile from the northwest corner of the site boundary (COP 2008a, AFC §§ 1.4.7, 5.8.2.2). (See **Noise and Vibration Figures 1 and 2**, below.)

Existing noise sources in the area are vehicle noise on Sierra Highway and Avenue M, aircraft noise at Air Force Plant 42, rail traffic on the Union Pacific Railroad line west of the site, and industrial and commercial activity to the west and north of the project site (COP 2008a, AFC § 5.8.2.2).

Ambient Noise Monitoring

In order to establish a baseline for comparison of predicted project noise to existing ambient noise, the applicant has presented the results of an ambient noise survey (COP 2008a, AFC § 5.8.2.2; Tables 5.8-6, 5.8-7, 5.8-8, 5.8-9; Figure 5.8-2). The survey was performed May 29 through May 30, 2007.

The noise survey monitored existing noise levels at the following locations, shown on **Noise and Vibration Figure 1**:

1. Measurement Location 1: 42104 6th Street East, Lancaster. This lies in a residential neighborhood to the northwest of the project site, near the residence referred to as R2. This location represents the nearest residential receptor to the project site.

2. Measurement Location 2: West of the project site, and 85 feet east of the Union Pacific Railroad line.

3. Measurement Location 3: Southeast corner of the project site.

4. Measurement Location 4: East side of the project site.

Noise Table 2 summarizes these ambient noise measurements (COP 2008a, AFC Table 5.8-7):

Noise Table 2
Summary of Measured Ambient Noise Levels

Measurement Location	Measured Noise Levels, dBA			
	L_{eq} – Daytime[1]	L_{eq} – Nighttime[2]	L_{90} – Nighttime[3]	CNEL
1 – 42104 6th Street East, Lancaster (R2*)	58.6	54.8	39.2	62.6
2 – West of project site	66.5	65.2	39.5	73.5
3 – Southeast corner of site	61.6	44.9	34.4	61.6
4 – East side of site	61.9	49.3	34.5	62.0

Source: COP 2008a, AFC Table 5.8-7
* Numbering of residential receptors: see below, and COP 2008a, AFC Table 5.8-12
[1] Staff calculations of average of 15 daytime hours (1 p.m. to 1 p.m.)
[2] Staff calculations of average of nine nighttime hours
[3] Staff calculations of average of four consecutive quietest hours of the nighttime (Locations 1 & 2, 11 p.m. to 3 a.m.; Locations 3 & 4, 10 p.m. to 2 a.m.)

DIRECT IMPACTS AND MITIGATION

Noise impacts associated with the project can be created by short-term construction activities and by normal long-term operation of the power plant.

<u>Construction Impacts and Mitigation</u>

Construction noise is usually considered a temporary phenomenon. Construction of the PHPP is expected to last 27 months, typical of other combined cycle power plants in terms of schedule, equipment used, and other types of activities (COP 2008a, AFC §§ 1.2, 2.4.8, 5.8.3.2).

Compliance with LORS

Construction of an industrial facility such as a power plant is typically noisier than permissible under usual noise ordinances. In order to allow the construction of new facilities, construction noise during certain hours of the day is commonly exempt from enforcement by local ordinances.

The City of Palmdale General Plan Noise Element requires measures to reduce noise levels to no more than 65 dBA CNEL, and refers to the City of Palmdale Municipal Code. Section 8.28.030 of the Municipal Code restricts construction work within 500 feet of any residence, hotel, motel or recreational vehicle park to the hours between 6:30 a.m. and 8:00 p.m., Monday through Saturday (COP1993; COP2009a).

The City of Lancaster General Plan Noise Element establishes a maximum exterior noise level in residential land uses of 65 dBA CNEL and limits construction activities to the hours between sunrise and 8:00 p.m. Subchapter 8.24.040 of the City of Lancaster Municipal Code limits construction within 500 feet of an occupied dwelling, apartment, hotel, mobile home or other place of residence to the hours between 7:00 a.m. and 8:00 p.m., Monday through Saturday (COL2009a, COL2009b).

The applicant commits to limiting construction to the hours 6:00 a.m. and 6:00 p.m., Monday through Friday (COP 2008a, AFC § 5.8.3.2). Since the project lies more than 500 feet from any occupied residence, this schedule would comply with applicable LORS. Energy Commission staff proposes Condition of Certification **NOISE-6**, below, to ensure adherence to this schedule.

CEQA Impacts

Power Plant Site

To evaluate construction noise impacts, staff compares the projected noise levels to the ambient. Since construction noise typically varies continually with time, it is most appropriately measured by, and compared to, the L_{eq} (energy average) metric.

Aggregate construction noise can be expected to reach levels of 45 dBA L_{eq} at Measurement Location 1, also labeled R2, representing the nearest residence (COP 2008a, AFC Table 5.8-7). Comparing projected noise levels to the ambient noise levels at Measurement Location 1 (see **Noise Table 3**, below) shows an increase during daytime and during nighttime of zero dBA. Construction noise would thus be inaudible, even at night, when people are sleeping. No impacts would result.

Noise Table 3
Predicted Power Plant Construction Noise Impacts

Measurement Location	Average Construction Noise Level[1] (dBA L_{eq})	Measured Existing Ambient[2] (dBA L_{eq})	Cumulative (dBA L_{eq})	Change (dBA)
1 - Nearest residence, R2	45	59 daytime	59 daytime	+0 daytime
		55 nighttime	55 nighttime	+0 nighttime

1 Source: COP 2008a, AFC Table 5.8-12
2 Source: COP 2008a, AFC Table 5.8-7; and staff calculations of average of daytime and nighttime hours

As described above, the applicant commits to limiting noisy construction work to daytime hours. In order to avoid any chance for annoyance, staff proposes such a limit. Proposed Condition of Certification **NOISE-6**, below, would restrict noisy construction to the hours between 6:00 a.m. and 6:00 p.m.

In the event that actual construction noise should annoy nearby residents, staff proposes Conditions of Certification **NOISE-1** and **NOISE-2**, which would establish a Notification Process to make nearby residents aware of the project, and a Noise Complaint Process that requires the applicant to resolve any problems caused by noise from the project.

Linear Facilities

New off-site linear facilities would consist of the following (COP 2008a, AFC §§ 1.1, 2.1, 2.4.7.1, 2.4.7.2, 2.4.7.3; AECOM 2009b):

- a one-mile long potable water pipeline;
- a one-mile long sanitary wastewater pipeline;
- a 7.4-mile long reclaimed water supply pipeline;
- an 8.7-mile long natural gas supply pipeline; and
- an electrical transmission interconnection line approximately 36 miles long.

Construction of linears moves along rapidly, so no area is exposed to noise for more than a few days. Limiting noisy construction to daytime hours should provide adequate mitigation of impacts. To ensure compliance with this restriction, staff proposes Condition of Certification **NOISE-6**.

Pile Driving

Pile driving should not be required for the PHPP (COP 2008a, AFC § 5.8.3.2).

Steam Blows

Typically, the loudest noise encountered during construction, inherent in building any project incorporating a steam turbine, is created by the steam blows. After erection and assembly of the feed water and steam systems, the piping and tubing that comprises the steam path has accumulated dirt, rust, scale, and construction debris such as weld spatter, dropped welding rods, and the like. If the plant were started up without thoroughly cleaning out these systems, all this debris would find its way into the steam turbine, quickly destroying the machine.

In order to prevent this, before the steam system is connected to the turbine, the steam line is temporarily routed to the atmosphere. Traditionally, high-pressure steam is then raised in the heat recovery steam generator or a temporary boiler and allowed to escape to the atmosphere through the steam piping. This flushing action, referred to as a "high-pressure steam blow," is quite effective at cleaning out the steam system. A series of short steam blows, lasting two or three minutes each, is performed several times daily over a period of two or three weeks. At the end of this procedure, the steam lines are connected to the steam turbine, which is then ready for operation. Alternatively, high-pressure compressed air can be substituted for steam.

High-pressure steam blows, if unsilenced, can typically produce noise levels as high as 129 dBA at a distance of 50 feet. The applicant proposes to install a silencer on the steam blow piping; this would reduce noise levels to 92 dBA at 50 feet. This, in turn, would yield less than 55 dBA at residence R3, the nearest residential receptor, and slightly less at R2 (see **Noise Table 5**, below). This is less than the ambient noise level of 59 dBA, and would likely be unnoticeable. Further limiting steam blows to daytime hours would remove any potential for significant impacts.

Noise Table 5
Steam Blow Noise Impacts

Receptor	High-Pressure Steam Blow Noise Level (silenced) (dBA L_{eq})	Daytime Ambient Noise Level (dBA L_{eq})[1]	Cumulative Level (dBA L_{eq})	Change (dBA)
R3	55	59	60	+1

[1] See **Noise Table 2**, above

In order to ensure that steam blow noise does not produce significant adverse impacts, staff has proposed Condition of Certification **NOISE-7** below.

Vibration

The only construction operation likely to produce vibration that could be perceived off-site would be pile driving. As discussed above, pile driving should not be required for construction of the PHPP. Staff therefore believes there would be no significant impacts from construction vibration.

Worker Effects

The applicant has acknowledged the need to protect construction workers from noise hazards and has recognized those applicable LORS that would protect construction workers (COP 2008a, AFC § 5.8.3.2). To ensure that construction workers are, in fact, adequately protected, staff has proposed Condition of Certification **NOISE-3**.

Operation Impacts and Mitigation

The primary noise sources of the PHPP include the combustion turbine generator (CTG) air intakes and exhaust ducts, heat recovery steam generators and their exhaust stacks, steam turbine generator (STG), evaporative cooling tower, air compressors and electrical transformers, and various pumps and fans (COP 2008a, AFC §§ 1.1, 2.1, 2.4.2, 2.4.3.1, 2.4.3.2, 2.4.3.3). Staff compares the projected noise with applicable LORS. In addition, staff evaluates any increase in noise levels at sensitive receptors due to the project in order to identify any significant adverse impacts.

The applicant proposes to include appropriate noise mitigation measures to limit noise impacts from project operation (COP 2008a, AFC § 5.8.4.2). Such measures commonly include:

- CTG inlet air silencers with acoustically lined elbows;
- CTG and STG sound-attenuated enclosures;
- CTG exhaust diffuser and duct acoustical barriers; and
- locate natural gas compressors in an acoustical enclosure.

Compliance with LORS

The applicant performed noise modeling to determine the project's noise impacts on sensitive receptors. Project operating noise at Measurement Location 1 (the nearest noise-sensitive residences, northwest of the project site) is predicted to be approximately 40 dBA L_{eq} or 47 dBA CNEL (COP 2008a, AFC § Table 5.8-14). This figure complies with both the City of Palmdale General Plan Noise Element and the City of Lancaster General Plan Noise Element guideline of 65 dBA CNEL (see **Noise Table 1** above) Measurement Location 1; see **Noise Table 6**:

Noise Table 6
Plant Operating Noise LORS Compliance

Measurement Location	LORS	LORS Limit	Projected Noise Level[1]
ML 1	City of Palmdale General Plan Noise Element, Policy N1.1.3 and City of Lancaster General Plan Noise Element, Objective 4.3	65 dBA CNEL	47 dBA CNEL

[1] Source: COP 2008a, AFC § 5.8.3.3 and Table 5.8-14

CEQA Impacts

Power plant noise is unique. Essentially, a power plant operates as a steady, continuous, broadband noise source, unlike the intermittent sounds that comprise the majority of the noise environment. As such, power plant noise contributes to, and becomes part of, the background noise level, or the sound heard when most intermittent noises cease. Where power plant noise is audible, it will tend to define the background noise level. For this reason, staff compares the projected power plant noise to the existing ambient background (L_{90}) noise levels at the affected sensitive receptors. If this comparison identifies a significant adverse impact, then feasible mitigation must be incorporated in the project to reduce or remove the impact.

In most cases, a power plant will be intended to operate around the clock for much of the year. The applicant explains that the plant will be operated to serve electrical demand in Southern California (COP 2008a, AFC §§ 1.3, 2.4.2). As a worst case scenario, staff assumes the plant will operate 24 hours per day. Staff evaluates project noise emissions by comparing them to the nighttime ambient background level; this assumes the potential for annoyance due to power plant noise is greatest at night when residents are trying to sleep. Nighttime ambient noise levels are typically lower than the daytime levels; differences of 5 to 10 dBA are common. Staff believes it is prudent to average the lowest nighttime hourly background noise level values to arrive at a reasonable baseline for comparison with the project's predicted noise level.

Power plant noise levels at Measurement Location 1 are predicted to reach 40 dBA L_{eq}, and 47 dBA CNEL; see **Noise Table 7**.

Noise Table 7

Power Plant Noise Impacts at Nearest Sensitive Receptors

Measurement Location	Power Plant Noise Level, dBA L_{eq}[1]	Ambient Background Level, dBA L_{90}[2]	Cumulative Noise Level, dBA	Change from Ambient Background Level
1	40	39	43	+4

[1] Source: COP 2008a, AFC Table 5.8-14
[2] Source: COP 2008a, AFC Table5.8-7; and staff calculations of average of four quietest consecutive nighttime hours

As explained above, when evaluating noise impacts on residences, staff compares project noise to the average of the four quietest consecutive nighttime hours. At Measurement Location 1, representing the nearest sensitive receptors, this is the span from 11:00 p.m. to 3:00 a.m. (see AFC, Table 5.8-7). This value is 39 dBA L_{90} (see **Noise Table 7**).

When projected plant noise is added to the ambient value (as calculated by staff), the cumulative level is 4 dBA above the ambient value (see **Noise Table 7**). This increase is barely noticeable and is below the range that staff considers a potentially significant adverse impact. To ensure this noise level is not further exceeded, staff proposes Condition of Certification **NOISE-4** below.

Tonal Noises

One possible source of annoyance would be strong tonal noises. Tonal noises are individual sounds (such as pure tones) that, while not louder than permissible levels, stand out in sound quality. Typically, a power plant developer avoids the creation of annoying tonal (pure-tone) noises by balancing the noise emissions of various power plant features during plant design. While the applicant does not specifically address tonals, to ensure that tonal noises do not cause annoyance, staff proposes Condition of Certification **NOISE-4**.

Linear Facilities

New off-site linear facilities would consist of the following (COP 2008a, AFC §§ 1.1, 2.1, 2.4.7.1, 2.4.7.2, 2.4.7.3; AECOM 2009b):

- a one-mile long potable water pipeline;
- a one-mile long sanitary wastewater pipeline;
- a 7.4-mile long reclaimed water supply pipeline;
- an 8.7-mile long natural gas supply pipeline; and
- an electrical transmission interconnection line approximately 36 miles long.

The underground gas and water pipelines would be inaudible in operation, and therefore could cause no noise impacts. The electrical interconnection line could be expected to produce corona noise (COP 2009a, AFC § 5.8.3.3), but such noise is typically inaudible beyond the right-of-way of the line, and would thus cause no significant impacts.

Vibration

Vibration from an operating power plant could be transmitted by two chief means; through the ground (groundborne vibration) and through the air (airborne vibration).

The operating components of a combined cycle power plant consist of high-speed gas and steam turbine generators, compressors, and various pumps. All of these pieces of equipment must be carefully balanced in order to operate; permanent vibration sensors are attached to the turbines and generators. Based on experience with numerous previous projects employing similar equipment, Energy Commission staff believes that groundborne vibration from the PHPP would be undetectable by any likely receptor.

Airborne vibration (low frequency noise) can rattle windows and objects on shelves and can rattle the walls of lightweight structures. In staff's experience, airborne vibration impacts from a plant such as the PHPP are typically imperceptible 1,000 feet from the plant. The PHPP's chief source of airborne vibration would be the gas turbines' exhaust. In a power plant such as the PHPP, however, the exhaust must pass through the heat recovery steam generators (HRSGs) before it reaches the atmosphere. The HRSGs act as efficient mufflers; this makes it highly unlikely that the PHPP would cause perceptible airborne vibration effects.

Worker Effects

The applicant has acknowledged the need to protect plant operating and maintenance workers from noise hazards and has committed to comply with applicable LORS (COP 2008a, AFC § 5.8.3.3). Signs would be posted in areas of the plant with noise levels exceeding 85 dBA (the level that OSHA recognizes as a threat to workers' hearing), and hearing protection would be required. To ensure that plant operation and maintenance workers are, in fact, adequately protected, Energy Commission staff has proposed Condition of Certification **NOISE-5**.

CUMULATIVE IMPACTS AND MITIGATION

Section 15130 of the CEQA Guidelines (Cal. Code Regs., tit. 14) requires a discussion of cumulative environmental impacts. Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or increase other environmental impacts. The CEQA Guidelines require that the discussion reflect the severity of the impacts and the likelihood of their occurrence, but need not provide as much detail as the discussion of the impacts attributable to the project alone.

The applicant has identified four projects in the vicinity of the PHPP, but has concluded that, due to their distance from the PHPP site, none would likely pose a potential for cumulative noise impacts (COP 2008a, AFC § 5.8.3.4). Staff agrees with this assessment, and thus concludes that there is no likelihood of cumulative significant noise impacts.

FACILITY CLOSURE

In the future, upon closure of the PHPP, all operational noise from the project would cease, and no further adverse noise impacts from operation of the PHPP would be possible. The remaining potential temporary noise source is the dismantling of the structures and equipment and any site restoration work that may be performed. Since this noise would be similar to that caused by the original construction, it can be treated similarly. That is, noisy work could be performed during daytime hours, with machinery and equipment properly equipped with mufflers. Any noise LORS that were in existence at that time would apply. Applicable conditions of certification included in the Energy Commission decision would also apply unless modified.

CONCLUSIONS AND RECOMMENDATIONS

The PHPP, if built and operated in conformance with these proposed conditions of certification, would comply with all applicable noise and vibration LORS for both operation and construction and would produce no significant adverse noise impacts on people within the affected area, directly, indirectly, or cumulatively.

PROPOSED CONDITIONS OF CERTIFICATION

NOISE-1 At least 15 days prior to the start of ground disturbance, the project owner shall notify all residents within one-half mile of the site and one-quarter mile of the linear facilities, by mail or other effective means, of the commencement of project construction. At the same time, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction and operation of the project and include that telephone number in the above-mentioned notice. If the telephone is not staffed 24 hours per day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This telephone number shall be posted at the project site during construction in a manner visible to passersby. This telephone number shall be maintained until the project has been operational for at least one year.

<u>Verification:</u> Prior to ground disturbance, the project owner shall transmit to the Compliance Project Manager (CPM) a statement, signed by the project owner's project manager, stating that the above-mentioned notification has been performed and describing the method of that notification, verifying that the telephone number has been established and posted at the site, and giving that telephone number.

NOISE COMPLAINT PROCESS

NOISE-2 Throughout the construction and operation of the PHPP, the project owner shall document, investigate, evaluate, and attempt to resolve all project-related noise complaints. The project owner or authorized agent shall:

- use the Noise Complaint Resolution Form (below), or a functionally equivalent procedure acceptable to the CPM, to document and respond to each noise complaint;
- attempt to contact the person(s) making the noise complaint within 24 hours;
- conduct an investigation to determine the source of noise related to the complaint;
- take all feasible measures to reduce the noise at its source if the noise is project related; and
- submit a report documenting the complaint and the actions taken. The report shall include: a complaint summary, including final results of noise reduction efforts, and if obtainable, a signed statement by the complainant stating that the noise problem is resolved to the complainant's satisfaction.

Verification: Within five days of receiving a noise complaint, the project owner shall file a copy of the Noise Complaint Resolution Form with the CPM, documenting the resolution of the complaint. If mitigation is required to resolve a complaint, and the complaint is not resolved within a three-day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is implemented.

NOISE-3 The project owner shall submit to the CPM for review and approval a noise control program and a statement, signed by the project owner's project manager, verifying that the noise control program will be implemented throughout construction of the project. The noise control program shall be used to reduce employee exposure to high noise levels during construction and also to comply with applicable OSHA and Cal/OSHA standards.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit to the CPM the noise control program and the project owner's project manager's signed statement. The project owner shall make the program available to Cal/OSHA upon request.

NOISE RESTRICTIONS

NOISE-4 The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that operation of the project will not cause noise levels due solely to plant operation to exceed an average of 40 dBA L_{eq} measured at Measurement Location 1, near the residence identified as R2 in **Noise and Vibration Figure 2**. No new pure-tone components may be caused by the project. No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints.

The measurement of power plant noise for the purposes of demonstrating compliance with this condition of certification may alternatively be made at a location, acceptable to the CPM, closer to the plant (e.g., 400 feet from the plant boundary) and this measured level then mathematically extrapolated to determine the plant noise contribution at the affected residence. The character of the plant noise shall be evaluated at the affected residential locations to determine the presence of pure tones or other dominant sources of plant noise.

A. When the project first achieves a sustained output of 85 percent or greater of rated capacity, the project owner shall conduct a community noise survey at Measurement Location 1 or at closer locations acceptable to the CPM. This survey shall be performed during power plant operation and shall also include measurement of one-third octave band sound pressure levels to determine whether new pure-tone noise components have been caused by the project.

B. If the results from the noise survey indicate that the power plant average noise level (L_{eq}) at Measurement Location 1 exceeds the above value, mitigation measures shall be implemented to reduce noise to a level of compliance with this limit.

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

Verification: The survey shall take place within 30 days of the project's first achieving a sustained output of 85 percent or greater of rated capacity. Within 15 days after completing the survey, the project owner shall submit a summary report of the survey to the CPM. Included in the survey report will be a description of any additional mitigation measures necessary to achieve compliance with the above-listed noise limit and a schedule, subject to CPM approval, for implementing these measures. When these measures are in place, the project owner shall repeat the noise survey.

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

NOISE-5 Following the project's first achieving a sustained output of 85 percent or greater of rated capacity, the project owner shall conduct an occupational noise survey to identify the noise hazardous areas in the facility.

The survey shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations sections 5095–5099 and Title 29, Code of Federal Regulations section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure.

The project owner shall prepare a report of the survey results and, if necessary, identify proposed mitigation measures that will be employed to comply with the applicable California and federal regulations.

Verification: Within 30 days after completing the survey, the project owner shall submit the noise survey report to the CPM. The project owner shall make the report available to OSHA and Cal/OSHA upon request.

CONSTRUCTION TIME RESTRICTIONS

NOISE-6 Heavy equipment operation and noisy construction work relating to any project features shall be restricted to the times of day delineated below:

Monday through Friday	6:00 a.m. to 6:00 p.m.

Haul trucks and other engine-powered equipment shall be equipped with mufflers that meet all applicable regulations. Haul trucks shall be operated in accordance with posted speed limits. Truck engine exhaust brake use shall be limited to emergencies.

Verification: Prior to ground disturbance, the project owner shall transmit to the CPM a statement acknowledging that the above restrictions will be observed throughout the construction of the project.

STEAM BLOW RESTRICTIONS

NOISE-7 If a high-pressure steam blow is employed, the project owner shall equip steam blow piping with a temporary silencer that quiets the noise of steam blows to no greater than 92 dBA measured at a distance of 50 feet. The project owner shall conduct steam blows only during the hours of 8:00 a.m. to 5:00 p.m.

Verification: At least 15 days prior to the first steam blow, the project owner shall submit to the CPM drawings or other information describing the temporary steam blow silencer and the noise levels expected and a description of the steam blow schedule.

EXHIBIT 1 - NOISE COMPLAINT RESOLUTION FORM

Palmdale Hybrid Power Project

(08-AFC-9)

NOISE COMPLAINT LOG NUMBER ________________________

Complainant's name and address:

Phone number: ________________________

Date complaint received: ________________________

Time complaint received: ________________________

Nature of noise complaint:

Definition of problem after investigation by plant personnel:

Date complainant first contacted: ________________________

Initial noise levels at 3 feet from noise source _________ dBA Date: _____________

Initial noise levels at complainant's property: __________ dBA Date: ____________

Final noise levels at 3 feet from noise source: ________ dBA Date: _____________

Final noise levels at complainant's property: __________ dBA Date: ____________

Description of corrective measures taken:

Complainant's signature: ________________________ Date: ____________

Approximate installed cost of corrective measures: $ ____________

Date installation completed: ____________

Date first letter sent to complainant: ____________ (copy attached)

Date final letter sent to complainant: ____________ (copy attached)

This information is certified to be correct:

Plant Manager's Signature: ________________________

(Attach additional pages and supporting documentation, as required).

REFERENCES

AECOM2009b – AECOM / S. Head (tn: 50094). Applicant Supplemental Responses to CEC Data Request Set 1. Dated on 03/02/09. Submitted to CEC / Docket Unit on 03/03/09.

COL2009x – City of Lancaster General Plan, June 2009.

COL2009xx – City of Lancaster Municipal Code, August 25, 2009.

COP1993 – City of Palmdale General Plan, adopted January 25, 1993.

COP2009x – City of Palmdale Municipal Code, September 2, 2009.

COP2008a – City of Palmdale/ S. Williams (tn: 47383). Application for Certification for the Palmdale Hybrid Power Project. Dated on 07/30/08. Submitted to CEC/ Docket Unit on 08/04/08.

Noise Appendix A
FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

To describe noise environments and to assess impacts on noise sensitive area, a frequency weighting measure, which simulates human perception, is customarily used. It has been found that “A-weighting” of sound intensities best reflects the human ear’s reduced sensitivity to low frequencies and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. Decibels are logarithmic units that conveniently compare the wide range of sound intensities to which the human ear is sensitive. **Noise Table A1** provides a description of technical terms related to noise.

Noise environments and consequences of human activities are usually well represented by an equivalent A-weighted sound level over a given time period (L_{eq}), or by average day and night A-weighted sound levels with a nighttime weighting of 10 dBA (L_{dn}). Noise levels are generally considered low when ambient levels are below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. Outdoor day-night sound levels vary over 50 dBA depending on the specific type of land use. Typical L_{dn} values might be 35 dBA for a wilderness area, 50 dBA for a small town or wooded residential area, 65 to 75 dBA for a major metropolis downtown (e.g., San Francisco), and 80 to 85 dBA near a freeway or airport. Although people often accept the higher levels associated with very noisy urban residential and residential-commercial zones, those higher levels nevertheless are considered to be levels of noise adverse to public health.

Various environments can be characterized by noise levels that are generally considered acceptable or unacceptable. Lower levels are expected in rural or suburban areas than would be expected for commercial or industrial zones. Nighttime ambient levels in urban environments are about 7 decibels lower than the corresponding average daytime levels. The day-to-night difference in rural areas away from roads and other human activity can be considerably less. Areas with full-time human occupation that are subject to nighttime noise, which does not decrease relative to daytime levels, are often considered objectionable. Noise levels above 45 dBA at night can result in the onset of sleep interference effects. At 70 dBA, sleep interference effects become considerable (*Effects of Noise on People*, U.S. Environmental Protection Agency, December 31, 1971).

To help the reader understand the concept of noise in decibels (dBA), **Noise Table A2** illustrates common noises and their associated sound levels, in dBA.

Noise Table A1 **Definition of Some Technical Terms Related to Noise**	
Terms	**Definitions**
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a Sound Level Meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this testimony are A-weighted.
L_{10}, L_{50}, & L_{90}	The A-weighted noise levels that are exceeded 10%, 50%, and 90% of the time, respectively, during the measurement period. L_{90} is generally taken as the background noise level.
Equivalent Noise Level, L_{eq}	The energy average A-weighted noise level during the Noise Level measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 4.8 decibels to levels in the evening from 7:00 p.m. to 10:00 p.m., and after addition of 10 decibels to sound levels in the night between 10:00 p.m. and 7:00 a.m.
Day-Night Level, L_{dn} or DNL	The Average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 p.m. and 7:00 a.m.
Ambient Noise Level	The composite of noise from all sources, near and far. The normal or existing level of environmental noise at a given location.
Intrusive Noise	That noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Pure Tone	A pure tone is defined by the Model Community Noise Control Ordinance as existing if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the two contiguous bands by 5 decibels (dB) for center frequencies of 500 Hz and above, or by 8 dB for center frequencies between 160 Hz and 400 Hz, or by 15 dB for center frequencies less than or equal to 125 Hz.

Source: Guidelines for the Preparation and Content of Noise Elements of the General Plan, *Model Community Noise Control Ordinance*, California Department of Health Services 1976, 1977.

Noise Table A2 Typical Environmental and Industry Sound Levels			
Noise Source (at distance)	A-Weighted Sound Level in Decibels (dBA)	Noise Environment	Subjective Impression
Civil Defense Siren (100')	140-130		Pain Threshold
Jet Takeoff (200')	120		Very Loud
Very Loud Music	110	Rock Music Concert	
Pile Driver (50')	100		
Ambulance Siren (100')	90	Boiler Room	
Freight Cars (50')	85		
Pneumatic Drill (50')	80	Printing Press Kitchen with Garbage Disposal Running	Loud
Freeway (100')	70		Moderately Loud
Vacuum Cleaner (100')	60	Data Processing Center Department Store/Office	
Light Traffic (100')	50	Private Business Office	
Large Transformer (200')	40		Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing

Source: Handbook of Noise Measurement, Arnold P.G. Peterson, 1980

Subjective Response to Noise

The adverse effects of noise on people can be classified into three general categories:

- subjective effects of annoyance, nuisance, dissatisfaction.
- interference with activities such as speech, sleep, and learning.
- physiological effects such as anxiety or hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Workers in industrial plants can experience noise effects in the last category. There is no completely satisfactory way to measure the subjective effects of noise or of the corresponding reactions of annoyance and dissatisfaction, primarily because of the wide variation in individual tolerance of noise.

One way to determine a person's subjective reaction to a new noise is to compare the level of the existing (background) noise, to which one has become accustomed, with the level of the new noise. In general, the more the level or the tonal variations of a new noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

With regard to increases in A-weighted noise levels, knowledge of the following relationships can be helpful in understanding the significance of human exposure to noise.

1. Except under special conditions, a change in sound level of 1 dB cannot be perceived.

2. Outside of the laboratory, a 3-dB change is considered a barely noticeable difference.

3. A change in level of at least 5 dB is required before any noticeable change in community response would be expected.

4. A 10-dB change is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response (Kryter, Karl D., *The Effects of Noise on Man*, 1970).

Combination of Sound Levels

People perceive both the level and frequency of sound in a non-linear way. A doubling of sound energy (for instance, from two identical automobiles passing simultaneously) creates a 3-dB increase (i.e., the resultant sound level is the sound level from a single passing automobile plus 3 dB). **Noise Table A3** indicates the rules for decibel addition used in community noise prediction.

Noise Table A3
Addition of Decibel Values

When two decibel values differ by:	Add the following amount to the larger value
0 to 1 dB	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0
Figures in this table are accurate to ± 1 dB.	

Source: Architectural Acoustics, M. David Egan, 1988.

Sound and Distance

Doubling the distance from a noise source reduces the sound pressure level by 6 dB.

Increasing the distance from a noise source 10 times reduces the sound pressure level by 20 dB.

Worker Protection

OSHA noise regulations are designed to protect workers against the effects of noise exposure and list permissible noise level exposure as a function of the amount of time to which the worker is exposed, as shown in **Noise Table A4**.

Noise Table A4
OSHA Worker Noise Exposure Standards

Duration of Noise (Hrs/day)	A-Weighted Noise Level (dBA)
8.0	90
6.0	92
4.0	95
3.0	97
2.0	100
1.5	102
1.0	105
0.5	110
0.25	115

Source: 29 CFR §1910.95.

Noise Appendix A
FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

To describe noise environments and to assess impacts on noise sensitive area, a frequency weighting measure, which simulates human perception, is customarily used. It has been found that “A-weighting” of sound intensities best reflects the human ear’s reduced sensitivity to low frequencies and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. Decibels are logarithmic units that conveniently compare the wide range of sound intensities to which the human ear is sensitive. **Noise Table A1** provides a description of technical terms related to noise.

Noise environments and consequences of human activities are usually well represented by an equivalent A-weighted sound level over a given time period (L_{eq}), or by average day and night A-weighted sound levels with a nighttime weighting of 10 dBA (L_{dn}). Noise levels are generally considered low when ambient levels are below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. Outdoor day-night sound levels vary over 50 dBA depending on the specific type of land use. Typical L_{dn} values might be 35 dBA for a wilderness area, 50 dBA for a small town or wooded residential area, 65 to 75 dBA for a major metropolis downtown (e.g., San Francisco), and 80 to 85 dBA near a freeway or airport. Although people often accept the higher levels associated with very noisy urban residential and residential-commercial zones, those higher levels nevertheless are considered to be levels of noise adverse to public health.

Various environments can be characterized by noise levels that are generally considered acceptable or unacceptable. Lower levels are expected in rural or suburban areas than would be expected for commercial or industrial zones. Nighttime ambient levels in urban environments are about 7 decibels lower than the corresponding average daytime levels. The day-to-night difference in rural areas away from roads and other human activity can be considerably less. Areas with full-time human occupation that are subject to nighttime noise, which does not decrease relative to daytime levels, are often considered objectionable. Noise levels above 45 dBA at night can result in the onset of sleep interference effects. At 70 dBA, sleep interference effects become considerable (*Effects of Noise on People*, U.S. Environmental Protection Agency, December 31, 1971).

To help the reader understand the concept of noise in decibels (dBA), **Noise Table A2** illustrates common noises and their associated sound levels, in dBA.

Noise Table A1
Definition of Some Technical Terms Related to Noise

Terms	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a Sound Level Meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this testimony are A-weighted.
L_{10}, L_{50}, & L_{90}	The A-weighted noise levels that are exceeded 10%, 50%, and 90% of the time, respectively, during the measurement period. L_{90} is generally taken as the background noise level.
Equivalent Noise Level, L_{eq}	The energy average A-weighted noise level during the Noise Level measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 4.8 decibels to levels in the evening from 7:00 p.m. to 10:00 p.m., and after addition of 10 decibels to sound levels in the night between 10:00 p.m. and 7:00 a.m.
Day-Night Level, L_{dn} or DNL	The Average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 p.m. and 7:00 a.m.
Ambient Noise Level	The composite of noise from all sources, near and far. The normal or existing level of environmental noise at a given location.
Intrusive Noise	That noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Pure Tone	A pure tone is defined by the Model Community Noise Control Ordinance as existing if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the two contiguous bands by 5 decibels (dB) for center frequencies of 500 Hz and above, or by 8 dB for center frequencies between 160 Hz and 400 Hz, or by 15 dB for center frequencies less than or equal to 125 Hz.

Source: Guidelines for the Preparation and Content of Noise Elements of the General Plan, *Model Community Noise Control Ordinance*, California Department of Health Services 1976, 1977.

Noise Table A2 Typical Environmental and Industry Sound Levels			
Noise Source (at distance)	A-Weighted Sound Level in Decibels (dBA)	Noise Environment	Subjective Impression
Civil Defense Siren (100')	140-130		Pain Threshold
Jet Takeoff (200')	120		Very Loud
Very Loud Music	110	Rock Music Concert	
Pile Driver (50')	100		
Ambulance Siren (100')	90	Boiler Room	
Freight Cars (50')	85		
Pneumatic Drill (50')	80	Printing Press Kitchen with Garbage Disposal Running	Loud
Freeway (100')	70		Moderately Loud
Vacuum Cleaner (100')	60	Data Processing Center Department Store/Office	
Light Traffic (100')	50	Private Business Office	
Large Transformer (200')	40		Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing

Source: Handbook of Noise Measurement, Arnold P.G. Peterson, 1980

Subjective Response to Noise

The adverse effects of noise on people can be classified into three general categories:

- subjective effects of annoyance, nuisance, dissatisfaction.
- interference with activities such as speech, sleep, and learning.
- physiological effects such as anxiety or hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Workers in industrial plants can experience noise effects in the last category. There is no completely satisfactory way to measure the subjective effects of noise or of the corresponding reactions of annoyance and dissatisfaction, primarily because of the wide variation in individual tolerance of noise.

One way to determine a person's subjective reaction to a new noise is to compare the level of the existing (background) noise, to which one has become accustomed, with the level of the new noise. In general, the more the level or the tonal variations of a new noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

With regard to increases in A-weighted noise levels, knowledge of the following relationships can be helpful in understanding the significance of human exposure to noise.

1. Except under special conditions, a change in sound level of 1 dB cannot be perceived.

2. Outside of the laboratory, a 3-dB change is considered a barely noticeable difference.

3. A change in level of at least 5 dB is required before any noticeable change in community response would be expected.

4. A 10-dB change is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response (Kryter, Karl D., *The Effects of Noise on Man*, 1970).

Combination of Sound Levels

People perceive both the level and frequency of sound in a non-linear way. A doubling of sound energy (for instance, from two identical automobiles passing simultaneously) creates a 3-dB increase (i.e., the resultant sound level is the sound level from a single passing automobile plus 3 dB). **Noise Table A3** indicates the rules for decibel addition used in community noise prediction.

Noise Table A3
Addition of Decibel Values

When two decibel values differ by:	Add the following amount to the larger value
0 to 1 dB	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0
Figures in this table are accurate to ± 1 dB.	

Source: Architectural Acoustics, M. David Egan, 1988.

Sound and Distance

Doubling the distance from a noise source reduces the sound pressure level by 6 dB.

Increasing the distance from a noise source 10 times reduces the sound pressure level by 20 dB.

Worker Protection

OSHA noise regulations are designed to protect workers against the effects of noise exposure and list permissible noise level exposure as a function of the amount of time to which the worker is exposed, as shown in **Noise Table A4**.

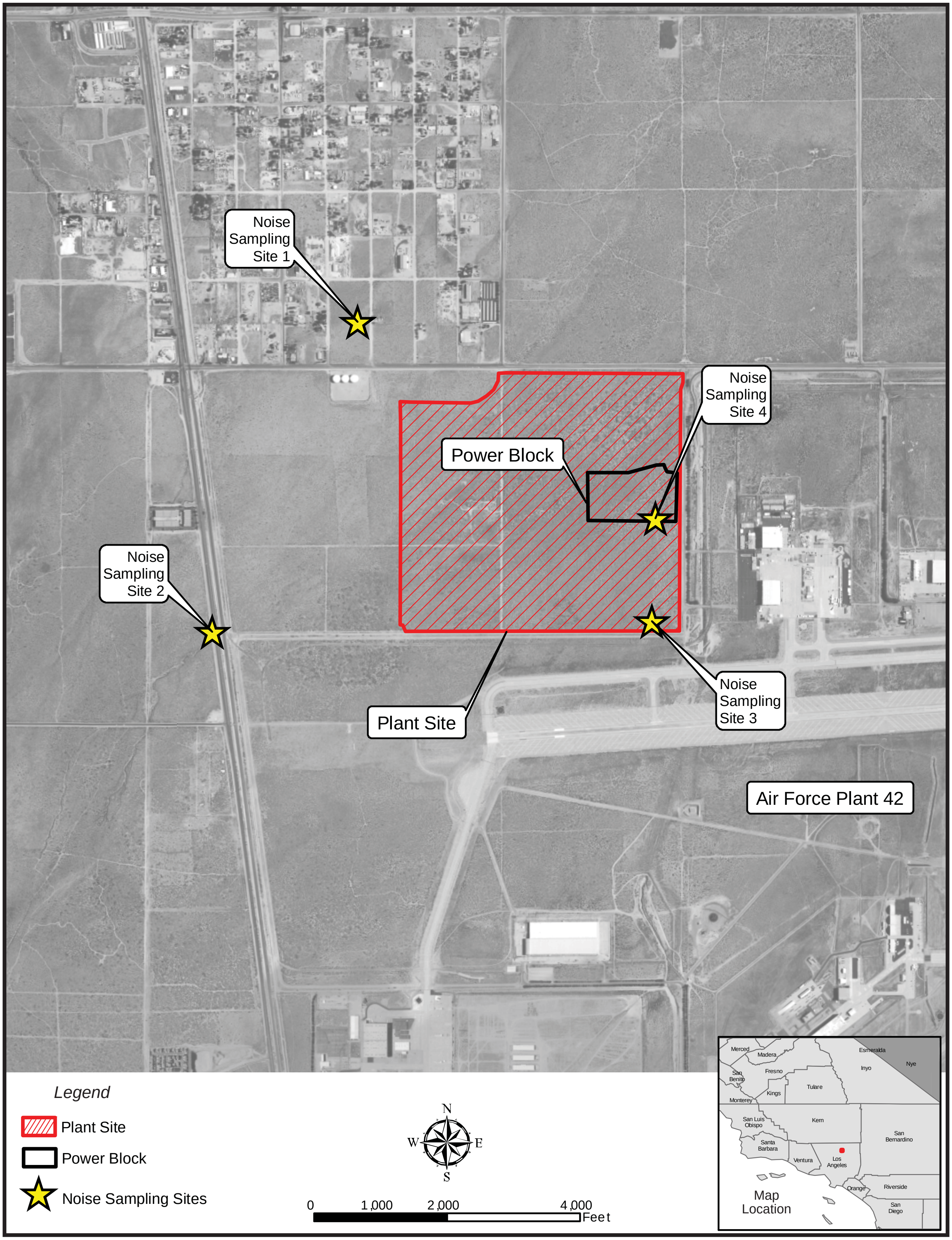
Noise Table A4
OSHA Worker Noise Exposure Standards

Duration of Noise (Hrs/day)	A-Weighted Noise Level (dBA)
8.0	90
6.0	92
4.0	95
3.0	97
2.0	100
1.5	102
1.0	105
0.5	110
0.25	115

Source: 29 CFR §1910.95.

NOISE AND VIBRATION - FIGURE 1

Palmdale Hybrid Power Project - Ambient Noise Measurement Locations

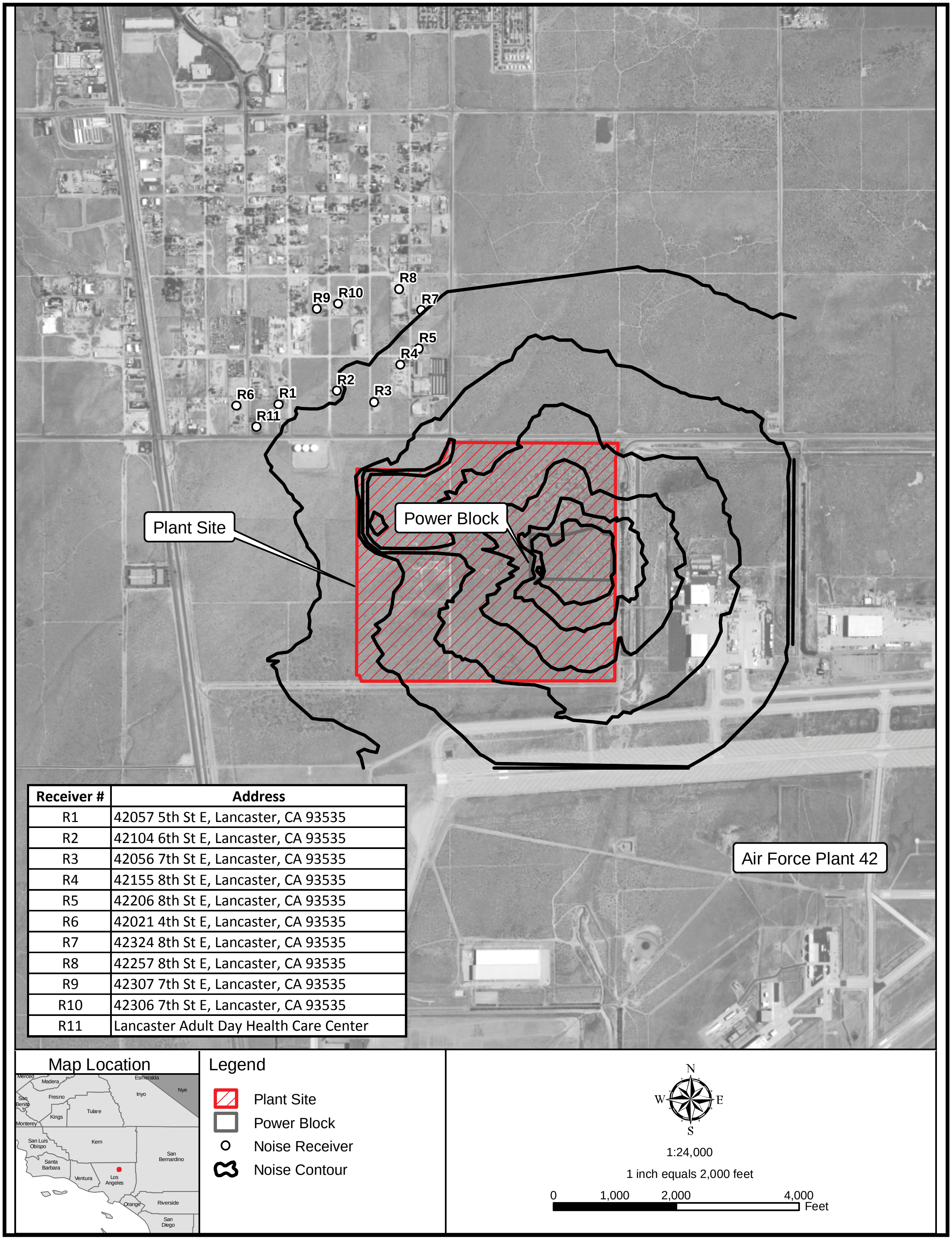


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, DECEMBER 2009

SOURCE: AFC Figure 5.8-2

NOISE AND VIBRATION - FIGURE 2

Palmdale Hybrid Power Project - Leq(1) Noise Contours - PHPP Operation



Receiver #	Address
R1	42057 5th St E, Lancaster, CA 93535
R2	42104 6th St E, Lancaster, CA 93535
R3	42056 7th St E, Lancaster, CA 93535
R4	42155 8th St E, Lancaster, CA 93535
R5	42206 8th St E, Lancaster, CA 93535
R6	42021 4th St E, Lancaster, CA 93535
R7	42324 8th St E, Lancaster, CA 93535
R8	42257 8th St E, Lancaster, CA 93535
R9	42307 7th St E, Lancaster, CA 93535
R10	42306 7th St E, Lancaster, CA 93535
R11	Lancaster Adult Day Health Care Center

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, DECEMBER 2009

SOURCE: AFC Figure 5.8-3

PUBLIC HEALTH

Alvin J. Greenberg, Ph.D.

SUMMARY OF CONCLUSIONS

Staff has analyzed potential public health risks associated with construction and operation of the Palmdale Hybrid Power Project (PHPP) and does not expect any significant adverse cancer or short- or long-term noncancer health effects from project toxic emissions. Staff's analysis of potential health impacts from the proposed PHPP uses a highly conservative methodology that accounts for impacts to the most sensitive individuals in a given population, including newborns and infants. According to the results of staff's health risk assessment, emissions from the PHPP would not contribute significantly to morbidity or mortality in any age or ethnic group residing in the project area.

INTRODUCTION

The purpose of this Preliminary Staff Assessment (PSA) is to determine if emissions of toxic air contaminants (TACs) from the proposed PHPP would have the potential to cause significant adverse public health impacts or to violate standards for public health protection. If potentially significant health impacts are identified, staff will evaluate mitigation measures to reduce such impacts to insignificant levels.

California Energy Commission (Energy Commission) staff addresses potential impacts of regulated or criteria air pollutants in the **Air Quality** section of this PSA, and impacts on public and worker health from accidental releases of hazardous materials are examined in the **Hazardous Materials Management** section. Health effects from electromagnetic fields are discussed in the **Transmission Line Safety and Nuisance** section. Pollutants released from the project in wastewater streams to the public sewer system are discussed in the **Soil and Water Resources** section. Plant releases in the form of hazardous and nonhazardous wastes are described in the **Waste Management** section.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

PUBLIC HEALTH Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Clean Air Act section 112 (Title 42, U.S. Code section 7412)	The National Emissions Standards for Hazardous Air Pollutants (NESHAP) requires new sources that emit more than 10 tons per year of any specified Hazardous Air Pollutant (HAP) or more than 25 tons per year of any combination of HAPs to apply Maximum Achievable Control Technology.

State	
California Health and Safety Code section 25249.5 et seq. (Proposition 65)	These sections establish thresholds of exposure to carcinogenic substances above which Prop 65 exposure warnings are required.
California Health and Safety Code section 41700	This section states that “no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property.”
California Code of Regulations, Title 22, Section 60306	Requires that whenever a cooling system uses recycled water in conjunction with an air conditioning facility and a cooling tower that creates a mist that could come into contact with employees or members of the public, a drift eliminator shall be used and chlorine, or other, biocides shall be used to treat the cooling system recirculating water to minimize the growth of Legionella and other micro-organisms.
California Public Resource Code section 25523(a); Title 20 California Code of Regulations (CCR) section 1752.5, 2300–2309 and Division 2 Chapter 5, Article 1, Appendix B, Part (1); California Clean Air Act, Health and Safety Code section 39650, et seq.	These regulations require a quantitative health risk assessment for new or modified sources, including power plants that emit one or more toxic air contaminants (TACs).
Local	
Antelope Valley Air Quality Management District (AVAQMD) Rule 212	This rule requires notification for projects with a predicted cancer risk greater than or equal to one-in-one-million.
AVAQMD Rule 402	This rule prohibits the discharge of air contaminants or other materials that can cause nuisance or injury.
AVAQMD Regulation X	This regulation notifies sources of the requirements, enforceability, and practices for the California ATCM and Federal MACT standards for control of California TACs and Federal HAP emissions, respectively. It assigns a prioritization score for toxics and requires the preparation of a HRA by high risk facilities.
AVAQMD Rule 1000	This rule implements the Federal NESHAP promulgated under 40 CFR Part 61.
AVAQMD Rule 1401	This rule discusses the requirements for new source review for air toxics.

AVAQMD CEQA and Federal Conformity Guidelines	This rule provides significance thresholds under CEQA for exposure of sensitive receptors to cancer and noncancer public health risk impacts.

SETTING

This section describes the environment in the vicinity of the proposed project site from the public health perspective. Characteristics of the natural environment, such as meteorology and terrain, affect the project's potential for causing impacts on public health. An emissions plume from a facility may affect elevated areas before lower terrain areas due to a reduced opportunity for atmospheric mixing. Consequently, areas of elevated terrain can often be subjected to increased pollutant impacts. Also, the types of land use near a site influence the surrounding population distribution and density, which, in turn, affect public exposure to project emissions. Additional factors affecting potential public health impacts include existing air quality and environmental site contamination.

SITE AND VICINITY DESCRIPTION

The project site is located in the City of Palmdale, California. Land in the vicinity of the proposed project is designated for Light Industry, Commercial, Office, and Business Park. There are several residential uses within a one-mile radius (COP 2008a, Section 5.10.2). The natural gas pipeline proposed for construction for this project would be approximately 8.7 miles long, running from the PHPP site along existing street right-of-ways to East Avenue S where it would connect with a Southern California Gas facility (COP 2008a, Section 2.4.7.1). Sensitive receptors and residences in the project vicinity (within a 3-mile radius) are listed in **Appendix G.7** and shown in **Figure 5.10-2** (COP 2008a). The nearest sensitive receptor is an adult day health care center located approximately 0.4 miles west of the site boundary (COP 2008a, Section 5.10.2).

The PHPP would have two stacks, one for each combustion turbine generator. The stack heights would be 145 feet (COP 2008a, Table 5.2-34). The location of elevated terrain (above the stack height) is important in assessing potential exposure, as an emission plume may impact high elevations before impacting lower elevations. The site's elevation is about 2,500 feet above mean sea level, and the topography of the immediate vicinity is generally flat. Terrain above stack height exists to the west and south of the project where the Tehachapi Mountains reach an elevation of about 5,000 feet within 10 miles (COP 2008a, Section 5.2.2).

METEOROLOGY

Meteorological conditions, including wind speed, wind direction, and atmospheric stability, affect the extent to which pollutants are dispersed into ambient air as well as the direction of pollutant transport. This, in turn, affects the level of public exposure to emitted pollutants and associated health risks. When wind speeds are low and the atmosphere is stable, for example, dispersion is reduced, and localized exposure may be increased.

The climate at the project site is characterized as high desert, with very hot summers and mild winters. Clear skies, extreme temperature changes, low precipitation, and strong seasonal winds are common features of the Mojave Desert climate. Seventy-four percent of the annual precipitation occurs between December and March with occasional summer thunderstorms producing flash flooding. The project area experiences transport winds from the northwest and southwest that bring pollutants from the Los Angeles Basin and the San Joaquin Valley causing periods of increased pollutant concentration in the Mojave Desert Air Basin (COP 2008a, Section 5.2.2). Quarterly wind roses for the region are provided in Appendix G.1 of the AFC (COP 2008a).

Atmospheric stability is a measure related to turbulence, or the ability of the atmosphere to disperse pollutants due to convective air movement. Mixing heights (the height above ground level through which the air is well mixed and in which pollutants can be dispersed) are lower during mornings due to temperature inversions and increase during the warmer afternoons. Staff's **Air Quality** section presents more detailed meteorological data.

EXISTING AIR QUALITY

The proposed site is within the jurisdiction of the Antelope Valley Air Quality Management District (AVAQMD). By examining average toxic concentration levels from representative air monitoring sites with cancer risk factors specific to each contaminant, lifetime cancer risk can be calculated to provide a background risk level for inhalation of ambient air. For comparison purposes, it should be noted that the overall lifetime cancer risk for the average individual in the United States is about 1 in 3, or 333,000 in 1 million.

The air monitoring site closest to the project is the Lancaster Division Street Monitoring Station, located approximately 1.5 miles northwest. However, this station does not monitor TACs. The nearest California Air Resources Board (CARB) air toxics monitoring station that actively reports values is located on Palm Avenue in Burbank, approximately 30 miles south-southwest of the project site. Although staff does not consider this location to be representative of air quality in the area of the proposed site, it does serve to show the upper-bound levels of toxic air contaminants found in the greater Los Angeles region. In 2008, the background cancer risk calculated by CARB for the Burbank site was 160 in one million (CARB 2009). The pollutants 1,3-butadiene and benzene, emitted primarily from mobile sources, were the two highest contributors to risk and together accounted for over half of the total risk. The risk from 1,3-butadiene was about 50 in one million, while the risk from benzene was about 53 in one million. Formaldehyde accounts for about 16% of the 2008 average calculated cancer risk based on air toxics monitoring results, with a risk of about 26 in one million. Formaldehyde is emitted directly from vehicles and other combustion sources, such as the proposed facility. The risk from hexavalent chromium was about 15 in one million, or ~9% of the total risk.

EXISTING PUBLIC HEALTH CONCERNS

When evaluating a new project, staff sometimes conducts a study and analysis of existing public health issues in the project vicinity. This analysis is prepared in order to identify the current status of respiratory diseases (including asthma), cancer, and childhood mortality rates in the population located near the proposed project. Assessing existing health concerns in the project area provides staff with a basis on which to evaluate the significance of any additional health impacts from the proposed PHPP project and evaluate any proposed mitigation. Three health studies were identified within a 6-mile radius: 1) an Air Resource Board (ARB) study of the relationship between asthma and air pollution that included the cities of Lancaster and Palmdale amongst 10 other communities in Southern California. This study was conducted over a period of 10 years and concluded that current levels of air pollution in Southern California are associated with chronic health effects. 2) A study by the Los Angeles County Department of Public Health (LACDPH) on lung cancer estimated that the Antelope Valley Service Planning Area 1 (AVSPA1) had a higher lung cancer death rate than surrounding areas. 3) A LACDPH health survey conducted in 2005 found that AVSPA1 had the highest asthma rate in the county (COP 2008a, Section 5.10.2). Staff has considered this information in its analysis.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The **PUBLIC HEALTH** section of this staff assessment discusses toxic emissions to which the public could be exposed during project construction and routine operation. Following the release of toxic contaminants into the air or water, people may come into contact with them through inhalation, dermal contact, or ingestion via contaminated food or water.

Air pollutants for which no ambient air quality standards have been established are called noncriteria pollutants. Unlike criteria pollutants such as ozone, carbon monoxide, sulfur dioxide, or nitrogen dioxide, noncriteria pollutants have no ambient (outdoor) air quality standards that specify levels considered safe for everyone.

Since noncriteria pollutants do not have such standards, a health risk assessment is used to determine if people might be exposed to those types of pollutants at unhealthy levels. The risk assessment consists of the following steps:

- identify the types and amounts of hazardous substances that PHPP could emit to the environment;
- estimate worst-case concentrations of project emissions in the environment using dispersion modeling;
- estimate amounts of pollutants that people could be exposed to through inhalation, ingestion, and dermal contact; and
- characterize potential health risks by comparing worst-case exposure to safe standards based on known health effects.

Staff relies upon the expertise of the California Environmental Protection Agency (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA) to identify contaminants that are known to the state to cause cancer or other noncancer toxicological endpoints and to calculate the toxicity and cancer potency factors of these contaminants. Staff also relies upon the expertise of the California Air Resources Board and the local air districts to conduct ambient air monitoring of toxic air contaminants and the state Department of Public Health to conduct epidemiological investigations into the impacts of pollutants on communities. It is not within the purview or the expertise of the Energy Commission staff to duplicate the expertise and statutory responsibility of these agencies.

Initially, a screening level risk assessment is performed using simplified assumptions that are intentionally biased toward protection of public health. That is, an analysis is designed that overestimates public health impacts from exposure to project emissions. In reality, it is likely that the actual risks from the power plant will be much lower than the risks as estimated by the screening level assessment. The risks for screening purposes are based on examining conditions that would lead to the highest, or worst-case, risks and then using those conditions in the study. Such conditions include:

- using the highest levels of pollutants that could be emitted from the plant;
- assuming weather conditions that would lead to the maximum ambient concentration of pollutants;
- using the type of air quality computer model which predicts the greatest plausible impacts;
- calculating health risks at the location where the pollutant concentrations are estimated to be the highest;
- assuming that an individual's exposure to cancer-causing agents occurs continuously for 70 years; and
- using health-based standards designed to protect the most sensitive members of the population (i.e., the young, elderly, and those with respiratory illnesses).

A screening level risk assessment will, at a minimum, include the potential health effects from inhaling hazardous substances. Some facilities may also emit certain substances that could present a health hazard from noninhalation pathways of exposure (OEHHA 2003, Tables 5.1, 6.3, 7.1). When these substances are present in facility emissions, the screening level analysis includes the following additional exposure pathways: soil ingestion, dermal exposure, and mother's milk (OEHHA 2003, p. 5-3).

The risk assessment process addresses three categories of health impacts: acute (short-term) health effects, chronic (long-term) noncancer effects, and cancer risk (also long-term). Acute health effects result from short-term (one-hour) exposure to relatively high concentrations of pollutants. Acute effects are temporary in nature and include symptoms such as irritation of the eyes, skin, and respiratory tract.

Chronic health effects are those that arise as a result of long-term exposure to lower concentrations of pollutants. The exposure period is considered to be approximately from 12 percent to 100 percent of a lifetime, or from 8 to 70 years (OEHHA 2003, p. 6-5). Chronic health effects include diseases such as reduced lung function and heart disease.

The analysis for noncancer health effects compares the maximum project contaminant levels to safe levels called *Reference Exposure Levels*, or RELs. These are amounts of toxic substances to which even sensitive people can be exposed and suffer no adverse health effects (OEHHA 2003, p. 6-2). These exposure levels are designed to protect the most sensitive individuals in the population, such as infants, the aged, and people suffering from illness or disease which makes them more sensitive to the effects of toxic substance exposure. The Reference Exposure Levels are based on the most sensitive adverse health effect reported in the medical and toxicological literature and include margins of safety. The margin of safety addresses uncertainties associated with inconclusive scientific and technical information available at the time of standard setting and is meant to provide a reasonable degree of protection against hazards that research has not yet identified. The margin of safety is designed to prevent pollution levels that have been demonstrated to be harmful, as well as to prevent lower pollutant levels that may pose an unacceptable risk of harm, even if the risk is not precisely identified as to nature or degree. Health protection is achieved if the estimated worst-case exposure is below the relevant reference exposure level. In such a case, an adequate margin of safety exists between the predicted exposure and the estimated threshold dose for toxicity.

Exposure to multiple toxic substances may result in health effects that are equal to, less than, or greater than effects resulting from exposure to the individual chemicals. Only a small fraction of the thousands of potential combinations of chemicals have been tested for the health effects of combined exposures. In conformity with the California Air Pollution Control Officers Association (CAPCOA) guidelines, the health risk assessment assumes that the effects of each substance are additive for a given organ system (OEHHA 2003, pp. 1-5, 8-12). Other possible mechanisms due to multiple exposures include those cases where the actions may be synergistic or antagonistic (where the effects are greater or less than the sum, respectively). For these types of substances, the health risk assessment could underestimate or overestimate the risks.

For carcinogenic substances, the health assessment considers the risk of developing cancer and assumes that continuous exposure to the cancer-causing substance occurs over a 70-year lifetime. The risk that is calculated is not meant to project the actual expected incidence of cancer, but rather a theoretical upper-bound number based on worst-case assumptions.

Cancer risk is expressed in chances per million and is a function of the maximum expected pollutant concentration, the probability that a particular pollutant will cause cancer (called *potency factors* and established by OEHHA), and the length of the exposure period. Cancer risks for each carcinogen are added to yield total cancer risk. The conservative nature of the screening assumptions used means that actual cancer risks due to project emissions are likely to be considerably lower than those estimated.

The screening analysis is performed to assess worst-case risks to public health associated with the proposed project. If the screening analysis predicts no significant risks, then no further analysis is required. However, if risks are above the significance level, then further analysis, using more realistic site-specific assumptions, would be performed to obtain a more accurate assessment of potential public health risks.

Significance Criteria

Energy Commission staff determines the health effects of exposure to toxic emissions based on impacts to the maximum exposed individual. This is a person hypothetically exposed to project emissions at a location where the highest ambient impacts were calculated using worst-case assumptions, as described above.

As described earlier, noncriteria pollutants are evaluated for short-term (acute) and long-term (chronic) noncancer health effects, as well as cancer (long-term) health effects. The significance of project health impacts is determined separately for each of the three categories.

Acute and Chronic Noncancer Health Effects

Staff assesses the significance of noncancer health effects by calculating a *hazard index*. A hazard index is a ratio comparing exposure from facility emissions to the reference (safe) exposure level. A ratio of less than 1.0 signifies that the worst-case exposure is below the safe level. The hazard index for every toxic substance that has the same type of health effect is added to yield a Total Hazard Index. The Total Hazard Index is calculated separately for acute and chronic effects. A Total Hazard Index of less than 1.0 indicates that cumulative worst-case exposures are less than the reference exposure levels. Under these conditions, health protection from the project is likely to be achieved, even for sensitive members of the population. In such a case, staff presumes that there would be no significant noncancer project-related public health impacts.

Cancer Risk

Staff relied upon regulations implementing the provisions of Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986, (Health & Safety Code, §§25249.5 et seq.) for guidance to determine a cancer risk significance level. Title 22, California Code of Regulations section 12703(b) states that "the risk level which represents no significant risk shall be one which is calculated to result in one excess case of cancer in an exposed population of 100,000, assuming lifetime exposure." This level of risk is equivalent to a cancer risk of 10 in 1 million, which is also written as 10×10^{-6}. An important distinction is that the Proposition 65 significance level applies separately to each cancer-causing substance, whereas staff determines significance based on the total risk from all cancer-causing chemicals. Thus, the manner in which the significance level is applied by staff is more conservative (health-protective) than that applied by Proposition 65. The significant risk level of 10 in 1 million is consistent with the level of significance adopted by many air districts. In general, these air districts would not approve a project with a cancer risk exceeding 10 in 1 million. The AVAQMD also uses 10 in 1 million as the level of "Significant Health Risk" (COP 2008a, Section 5.10.1.3).

As noted earlier, the initial risk analysis for a project is typically performed at a screening level, which is designed to overstate actual risks, so that health protection can be ensured. Staff's analysis also addresses potential impacts on all members of the population including the young, the elderly, people with existing medical conditions that may make them more sensitive to the adverse effects of toxic air contaminants, and any minority or low-income populations that are likely to be disproportionately affected by impacts. To accomplish this goal, staff uses the most current acceptable public health exposure levels (both acute and chronic) set to protect the public from the effects of airborne toxics. When a screening analysis shows cancer risks to be above the significance level, refined assumptions would likely result in a lower, more realistic risk estimate. Based on refined assumptions, if risk posed by the facility exceeds the significance level of 10 in 1 million, staff would require appropriate measures to reduce the risk to less than significant. If, after all risk reduction measures had been considered, a refined analysis identifies a cancer risk greater than 10 in 1 million, staff would deem such risk to be significant and would not recommend project approval.

DIRECT/INDIRECT IMPACTS AND MITIGATION

CONSTRUCTION IMPACTS AND MITIGATION

Potential risks to public health during construction may be associated with exposure to toxic substances in contaminated soil disturbed during site preparation, as well as diesel exhaust from heavy equipment operation. Criteria pollutant impacts from the operation of heavy equipment and particulate matter from earth moving are examined in staff's **Air Quality** analysis.

Site disturbances occur during facility construction from excavation, grading, and earth moving. Such activities have the potential to adversely affect public health through various mechanisms, such as the creation of airborne dust, material being carried off site through soil erosion, and uncovering buried hazardous substances. The Phase I Environmental Site Assessment conducted for this site in 2008 identified no "Recognized Environmental Conditions" per the American Society for Testing and Materials Standards (ASTM) definition. That is, there was no evidence or record of any use, spillage or disposal of hazardous substances on the site, nor any other environmental concern that would require remedial action (COP 2008a, Section 5.16.2.3). In the event that any unexpected contamination is encountered during construction of the PHPP, proposed Conditions of Certification **Waste-1** and **Waste-2** require a registered professional engineer or geologist to be available during soil excavation and grading to ensure proper handling and disposal of contaminated soil. See the staff assessment section on **Waste Management** for a more detailed analysis of this topic.

The operation of construction equipment will result in air emissions from diesel-fueled engines. Diesel emissions are generated from sources such as trucks, graders, cranes, welding machines, electric generators, air compressors, and water pumps. Although diesel exhaust contains criteria pollutants such as nitrogen oxides, carbon monoxide, and sulfur oxides, it also includes a complex mixture of thousands of gases and fine particles. These particles are primarily composed of aggregates of spherical carbon particles coated with organic and inorganic substances. Diesel exhaust contains over 40 substances that are listed by the U.S. Environmental Protection Agency (U.S. EPA) as hazardous air pollutants and by the California Air Resources Board (ARB) as toxic air contaminants.

Exposure to diesel exhaust may cause both short- and long-term adverse health effects. Short-term effects can include increased coughing, labored breathing, chest tightness, wheezing, and eye and nasal irritation. Long-term effects can include increased coughing, chronic bronchitis, reductions in lung function, and inflammation of the lung. Epidemiological studies also strongly suggest a causal relationship between occupational diesel exhaust exposure and lung cancer.

Based on a number of health effects studies, the Scientific Review Panel on Toxic Air Contaminants recommended a chronic reference exposure level (see discussion of reference exposure levels in Method of Analysis section above) for diesel exhaust particulate matter of 5 micrograms of diesel particulate matter per cubic meter of air ($\mu g/m^3$) and a cancer unit risk factor of $3x10^{-4}$ $(\mu g/m^3)^{-1}$ (SRP 1998, p. 6). The Scientific Review Panel did not recommend a value for an acute Reference Exposure Level since available data in support of a value was deemed insufficient. On August 27, 1998, ARB listed particulate emissions from diesel-fueled engines as a toxic air contaminant and approved the panel's recommendations regarding health effect levels.

Appendix G.3 and Tables 5.2-16 through 5.2-18 of the AFC (COP 2008a) present the maximum daily and annual on-site and off-site emissions from construction of all project components. The maximum annual onsite emissions estimated by the applicant are 14.3 tons per year of particulate matter 10 (PM10) and 4.2 tons per year of PM2.5 (COP 2008a, Table 5.2-17). In addition, off-site emissions from construction of the linear facilities would occur. Construction of all project components would occur concurrently over a period of about 27 months (COP 2008a, Section 5.2.4.1). As noted earlier, assessment of chronic (long-term) health effects assumes continuous exposure to toxic substances over a significantly longer time period, typically from 8 to 70 years. The applicant has stated that due to the short duration of construction for this project, health risks from construction emissions were not modeled (COP 2008a, Section 5.10.3).

Staff also did not conduct a quantitative assessment of construction impacts on public health because staff has found at numerous other siting cases using quantitative risk assessment tools that impacts due to construction vehicle diesel emissions are invariably less than significant even to close-in receptors. Staff has, however, proposed mitigation measures to ensure that the emissions are indeed reduced to the greatest extent possible. These measures include the use of extensive fugitive dust control measures and can be found in the **AIR QUALITY** section of this PSA. The fugitive dust control measures are assumed to result in 90 percent reductions of emissions. In order to further mitigate potential impacts from particulate emissions during the operation of diesel-powered construction equipment, Energy Commission staff recommends the use of ultra-low sulfur diesel fuel and Tier 2 or Tier 1 California Emission Standards for Off-Road Compression-Ignition Engines or the installation of an oxidation catalyst and soot filters on diesel equipment. The catalyzed diesel particulate filters are passive, self-regenerating filters that reduce particulate matter, carbon monoxide, and hydrocarbon emissions through catalytic oxidation and filtration. The degree of particulate matter reduction is comparable for both mitigation measures in the range of approximately 85–92 percent. Such filters will reduce diesel emissions during construction and reduce any potential for significant health impacts.

OPERATION IMPACTS AND MITIGATION

Emissions Sources

The emissions sources at the proposed PHPP include two combustion turbine generators, two duct burners, one auxiliary boiler, one HTF heater, one 10-cell cooling tower, one diesel-fueled emergency generator and one diesel-fueled emergency firewater pump. As noted earlier, the first step in a health risk assessment is to identify potentially toxic compounds that may be emitted from the facility.

AFC Appendix G.3 and Tables 5.10-5 through 5.10-8 (COP 2008a) list toxic air contaminants expected to be emitted from all sources listed above as combustion byproducts along with their anticipated amounts (emission factors). Toxic Air Contaminant emission factors were obtained from the Environmental Protection Agency (EPA) AP-42 database of emission factors. Table 5.10-4 of the AFC lists toxicity values used to characterize cancer and noncancer health impacts from project pollutants. The toxicity values include Reference Exposure Levels, which are used to calculate short-term and long-term noncancer health effects, and cancer unit risks, which are used to calculate the lifetime risk of developing cancer, as published in the OEHHA Guidelines (OEHHA 2003).

PUBLIC HEALTH Table 2 lists the toxic emissions potentially emitted by the PHPP and shows how each contributes to the health risk analysis.

PUBLIC HEALTH Table 2: Types of Health Impacts and Exposure Routes Attributed to Toxic Emissions

Substance	Oral Cancer	Oral Noncancer	Inhalation Cancer	Noncancer (Chronic)	Noncancer (Acute)
Acetaldehyde			✔	✔	
Acrolein				✔	✔
Ammonia				✔	✔
Arsenic	✔	✔	✔	✔	✔
Benzene			✔	✔	✔
Beryllium			✔	✔	✔
Benzo(a)anthracene			✔		
Benzo(a)pyrene			✔		
Benzo(b)fluoranthene			✔		
Benzo(k)fluoranthene			✔		
1,3-Butadiene			✔	✔	
Chrysene			✔		
Chloroform			✔	✔	✔
Copper				✔	✔
Cyanide				✔	✔
Dibenz(a,h)anthracene			✔		
Diesel Exhaust			✔	✔	
p-Dichlorobenzene			✔	✔	

Formaldehyde			✔	✔	✔
Hexane				✔	
Indenol(1,2,3-cd)anthracene			✔		
Napthalene		✔	✔	✔	
Perchloroethylene			✔	✔	✔
Phenol				✔	✔
Propylene				✔	
Propylene oxide			✔	✔	✔
Selenium				✔	✔
Toluene				✔	✔
Trichloroethylene			✔	✔	
Vanadium					✔
Xylene				✔	✔

Source: OEHHA 2003, Appendix L and COP 2008a, Table 5.10-4

Emissions Levels

Once potential emissions are identified, the next step is to quantify them by conducting a “worst case” analysis. Maximum hourly emissions are required to calculate acute (one-hour) noncancer health effects, while estimates of maximum emissions on an annual basis are required to calculate cancer and chronic (long-term) noncancer health effects.

The next step in the health risk assessment process is to estimate the ambient concentrations of toxic substances. This is accomplished by using a screening air dispersion model and assuming conditions that result in maximum impacts. The applicant’s screening analysis was performed using the ARB/OEHHA Hotspots Analysis and Reporting Program (HARP). Ambient concentrations were used in conjunction with Reference Exposure Levels and cancer unit risk factors to estimate health effects that might occur from exposure to facility emissions. Exposure pathways, or ways in which people might come into contact with toxic substances, include inhalation, dermal (through the skin) absorption, soil ingestion, consumption of locally grown plant foods, and mother’s milk.

The above method of assessing health effects is consistent with OEHHA’s Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA, 2003) referred to earlier and results in the following health risk estimates.

Impacts

The applicant’s screening health risk assessment for the project including emissions from all sources resulted in an acute Hazard Index (HI) of 0.028 and a chronic HI of 0.0008 at the location of the maximum exposed individual resident (using 51 residence identified in the project area). The maximum exposed individual residences for the acute and chronic HI were located approximately 3.6 miles and 3.2 miles southwest of the project, respectively (COP 2008a, Section 5.10.3.4). As **PUBLIC HEALTH Table 3** shows, both acute and chronic hazard indices are less than 1.0, indicating that no short- or long-term adverse health effects are expected.

As shown in **PUBLIC HEALTH Table 3**, cancer risk at the maximum exposed individual residence was calculated by the applicant to be 0.36 in 1 million (at a residence approximately 3.2 miles southwest of the project). The cancer risk and acute and chronic HI calculated for the maximum exposed individual worker and the maximum exposed sensitive receptor were also found to be well below the level of significance.

PUBLIC HEALTH Table 3
Operation Hazard/Risk at Maximum Exposed Individual Resident:

Type of Hazard/Risk	Hazard Index/Risk	Significance Level	Significant?
Acute Noncancer	0.028	1.0	No
Chronic Noncancer	0.0008	1.0	No
Individual Cancer	0.36 in a million	10.0 in a million	No

Source: COP 2008a, Table 5.10-9

Staff conducted a quantitative evaluation of the health risk assessment results presented in the PHPP AFC (COP 2008a). Emitting units include two natural gas-fired combustion turbine generators (CTGs), a diesel-fueled emergency generator, a diesel fire water pump, an auxiliary boiler, a high-temperature heat transfer fluid (HTF) heater, and a 10 cell cooling tower, for a total of 16 emitting sources evaluated at the proposed facility.

Two additional emitting sources that are not evaluated quantitatively in the AFC are:

- Construction equipment and vehicle emissions during construction of the proposed project.
- Vehicle emissions from maintenance vehicles performing routine maintenance such as mirror washing, inspections, repairs, herbicide application and dust suppressant application. Maintenance vehicle emissions were modeled by staff in a screening analysis (described below).

Staff’s quantitative analysis of facility operations included the following:

- Stack parameters, building parameters, emission rates and locations of sources were obtained from the AFC and modeling files provided by the applicant.
- Emissions from the 2 combustion turbine generator stacks, the diesel emergency generator, the diesel fire water pump, the auxiliary boiler, the HTF heater and the 10 cell cooling tower were included in the analysis.
- Used a receptor grid of -5000 to 5000 m east and -5000 to 5000 m north, at 200 m increments. Also modeled risks at residential, worker and sensitive receptors identified in the AFC located in the southwestern quadrant of the 3-mile radius from

the facility; this is the region in which the AFC identified the maximally impacted residential, worker and sensitive receptors to be located.

- Exposure pathways assessed include inhalation, ingestion of home-grown produce, dermal absorption, soil ingestion and mother's milk.

Atmospheric dispersion modeling was conducted using the CARB/OEHHA Hotspots Analysis and Reporting Program (HARP), Version 1.4a. Local meteorological data compatible for use in the HARP ISCST analysis for 2004 was used.

The emission factors used in staff's analysis of cancer risk and hazard were obtained from the AFC and are listed in **Public Health Table 4**. For cancer risk calculations using the HARP model, staff used the "Derived(Adjusted)Method" and for chronic noncancer hazard staff used the "Derived(OEHHA)Method". The location of the point of maximum impact, PMI, determined in the applicant's modeling was quantitatively evaluated in staff's analysis (70 year residential scenario).

Results of staff's analysis are summarized in **Public Health Table 5** and are compared to the results presented in the AFC for PHPP. Substance-specific cancer risks are presented in **Public Health Table 6** for the Point of Maximum Impact. Substance-specific chronic and acute noncancer hazards are presented in **Public Health Tables 7 and 8**, respectively, for the location of the PMI.

Public Health Table 4.
Emission Rates Used in the Cancer Risk and Hazard Analyses Conducted by Staff

Substance	Annual Average Emissions (lbs/year)	Maximum 1-Hour Emissions (lbs/hour)
EMISSION RATES FROM OPERATION OF EACH COMBUSTION TURBINE		
Ammonia	1.20E+05	1.37E+01
Acetaldehyde	6.94E+02	7.93E-02
Acrolein	1.11E+02	1.27E-02
Benzene	2.08E+02	2.38E-02
1,3-Butadiene	7.46E+00	8.52E-04
Ethylbenzene	5.55E+02	6.34E-02
Formaldehyde	1.23E+03	1.41E-01
Naphthalene	2.26E+01	2.58E-03
Propylene Oxide	5.03E+02	5.75E-02
Toluene	2.26E+03	2.58E-01
Xylene	1.11E+03	1.27E-01
PAHs	7.61E+00	8.69E-04
EMISSION RATES FROM OPERATION OF EACH COOLING TOWER CELL		
Arsenic	1.87E-05	6.74E-09
Beryllium	2.16E-05	2.46E-09
Copper	6.58E-05	1.50E-08
Cyanide compounds	1.07E-07	1.84E-11
Selenium	3.13E-05	6.74E-09
Vanadium	5.94E-05	1.29E-08
p-Dichlorobenzene	1.73E-03	5.90E-07
Chloroform	1.21E+01	1.38E-03
Perchloroethylene	2.27E-05	2.60E-09
Trichloroethylene	1.03E-06	1.18E-10
Toluene	1.61E-03	1.84E-07
Xylenes	1.57E-03	1.79E-07
Phenol	8.27E-05	9.44E-09
DEHP	5.38E-05	6.14E-09
EMISSION RATES FROM OPERATION OF EMERGENCY GENERATOR		
Diesel PM	4.41E+01	8.80E-01
EMISSION RATES FROM OPERATION OF EMERGENCY FIRE PUMP		
Diesel PM	3.00E+00	6.00E-02

Public Health Table 4 (cont'd).
Emission Rates Used in the Cancer Risk and Hazard Analyses Conducted by Staff.

Substance	Annual Average Emissions (lbs/year)	Maximum 1-Hour Emissions (lbs/hour)	Annual Average Emissions (lbs/year)	Maximum 1-Hour Emissions (lbs/hour)
	EMISSION RATES FROM OPERATION OF AUXILIARY BOILER		**EMISSION RATES FROM OPERATION OF HTF HEATER**	
Benzene	2.83E-01	5.66E-04	2.27E-01	2.27E-04
Formaldehyde	6.01E-01	1.20E-03	4.80E-01	4.80E-04
PAHs	1.95E-02	3.91E-05	1.56E-02	1.56E-05
Naphthalene	1.46E-02	2.93E-05	1.17E-02	1.17E-05
Acetaldehyde	1.51E-01	3.03E-04	1.21E-01	1.21E-04
Acrolein	1.32E-01	2.64E-04	1.05E-01	1.05E-04
Propylene	2.59E+01	5.18E-02	2.07E+01	2.07E-02
Toluene	1.29E+00	2.59E-03	1.04E+00	1.04E-03
Xylenes	9.62E-01	1.92E-03	7.70E-01	7.70E-04
Ethyl Benzene	3.37E-01	6.74E-04	2.70E-01	2.70E-04
Hexane	2.25E-01	4.49E-04	1.80E-01	1.80E-04

Public Health Table 5.
Results of Staff's Analysis and the Applicant's Analysis
for Cancer Risk and Chronic and Acute Hazard.

	Staff's Analysis			Applicant's Analysis		
	Cancer Risk (per million)	Chronic HI	Acute HI	Cancer Risk (per million)	Chronic HI	Acute HI
PMI	0.70	0.00056	0.0048	n/a	n/a	n/a
MEIR	0.19	0.00015	0.0019	0.36	0.00080	0.028
MEIW	0.019	0.00016	-	0.040	0.00090	-
Sensitive Receptor	0.18	0.00014	0.0021	0.070	0.00080	-

Note:
PMI= point of maximum impact determined in staff's analysis; located approximately 1.7 miles northeast of the project for cancer risk, 2.3 miles northeast of the project for chronic HI, and 0.23 miles east of the project for acute HI
MEIR = maximally exposed individual, residential is located at a residence approximately 1.3 miles southwest of the project for cancer and acute HI and 2.3 miles southwest for chronic HI
MEIW = maximally exposed individual, worker (located at Sam's Club, approximately 2.4 miles southwest of the project)
Sensitive Receptor is located at Westside Christian School (approximately 2.5 miles southwest of the project) for cancer risk and chronic HI and at Head Start State Preschool approximately 2.6 miles south of the project) for acute HI
n/a = not addressed

Public Health Table 6. Results of Staff's Analysis: Contribution to Total Cancer Risk by Individual Substances from All Sources at the Point of Maximum Impact (PMI).

Substance	TURBINE 1	TURBINE 2	AUXILIARY BOILER	HTF HEATER	FIRE PUMP	EMERGENCY GENERATOR	COOLING TOWER	TOTAL
Acetaldehyde	4.4E-10	4.5E-10	3.6E-12	2.7E-12				9.0E-10
Benzene	1.3E-09	1.3E-09	6.7E-11	5.1E-11				2.8E-09
1,3-Butadiene	2.9E-10	2.9E-10						5.7E-10
Chloroform							7.5E-10	7.5E-10
p-Dichlorobenzene							2.2E-13	2.2E-13
Ethyl Benzene	3.1E-10	3.1E-10	7.0E-12	5.3E-12				6.3E-10
Formaldehyde	1.7E-09	1.7E-09	3.0E-11	2.3E-11				3.4E-09
Naphthalene	1.7E-10	1.7E-10	4.2E-12	3.2E-12				3.5E-10
PAHs-w/o	2.7E-07	2.8E-07	2.6E-08	2.0E-08				5.9E-07
Perchloroethylene							1.6E-15	1.6E-15
Propylene Oxide	4.2E-10	4.2E-10						8.4E-10
Trichloroethylene							2.4E-17	2.4E-17
Arsenic							1.1E-11	1.1E-11
Beryllium							5.9E-13	5.9E-13
DieselExhPM					1.0E-08	8.1E-08		9.1E-08
SUM	2.8E-07	2.8E-07	2.6E-08	2.0E-08	1.0E-08	8.1E-08	7.6E-10	7.0E-07

Public Health Table 7. Results of Staff's Analysis: Contribution to Total Chronic Hazard by Individual Substances from All Sources at the Point of Maximum Impact (PMI).

Substance	TURBINE 1	TURBINE 2	AUXILIARY BOILER	HTF HEATER	FIRE PUMP	EMERGENCY GENERATOR	COOLING TOWER	TOTAL
Acetaldehyde	1.16E-06	1.16E-06	6.12E-09	4.78E-09				2.33E-06
Acrolein	7.40E-05	7.42E-05	2.13E-06	1.67E-06				1.52E-04
Ammonia	1.40E-04	1.40E-04						2.80E-04
Benzene	8.09E-07	8.11E-07	2.67E-08	2.09E-08				1.67E-06
1,3-Butadiene	8.70E-08	8.72E-08						1.74E-07
Chloroform							3.86E-07	3.86E-07
p-Dichlorobenzene							2.06E-11	2.06E-11
Ethyl Benzene	6.47E-08	6.49E-08	9.54E-10	7.45E-10				1.31E-07
Formaldehyde	3.19E-05	3.20E-05	3.78E-07	2.95E-07				6.46E-05
Hexane			1.82E-10	1.42E-10				3.24E-10
Naphthalene	5.84E-07	5.86E-07	9.22E-09	7.20E-09				1.19E-06
Perchloroethylene							6.21E-12	6.21E-12
Phenol							3.96E-12	3.95E-12
Propylene			4.88E-08	3.82E-08				8.70E-08
Propylene Oxide	3.91E-06	3.92E-06						7.83E-06
Toluene	1.75E-06	1.76E-06	2.44E-08	1.91E-08			5.13E-11	3.55E-06
Trichloroethylene							1.65E-14	1.65E-14
Xylenes	3.70E-07	3.71E-07	7.78E-09	6.08E-09			2.15E-11	7.55E-07
Arsenic							1.79E-06	1.79E-06
Beryllium							2.95E-08	2.95E-08
Cyanide cmpds							1.14E-13	1.14E-13
Selenium							1.49E-11	1.49E-11
DieselExhPM					4.26E-06	3.71E-05		4.14E-05
SUM	2.54E-04	2.54E-04	2.61E-06	2.04E-06	4.26E-06	3.71E-05	2.18E-06	5.56E-04

Public Health Table 8. Results of Staff's Analysis: Contribution to Total Acute Hazard by Individual Substances from All Sources at the Point of Maximum Impact (PMI).

Substance	TURBINE 1	TURBINE 2	AUXILIARY BOILER	HTF HEATER	FIRE PUMP	EMERGENCY GENERATOR	COOLING TOWER	TOTAL
Acetaldehyde	2.6E-05	2.6E-05	4.2E-06	1.3E-06				5.7E-05
Acrolein	7.7E-04	7.7E-04	6.8E-04	2.2E-04				2.4E-03
Ammonia	6.5E-04	6.5E-04						1.3E-03
Benzene	2.8E-06	2.8E-06	2.8E-06	8.9E-07				9.2E-06
Chloroform							4.9E-05	4.9E-05
Formaldehyde	3.9E-04	3.9E-04	1.4E-04	4.5E-05				9.6E-04
Perchloroethylene							7.0E-13	7.0E-13
Phenol							8.7E-12	8.7E-12
Propylene oxide	2.8E-06	2.8E-06						5.6E-06
Toluene	1.1E-06	1.1E-06	4.5E-07	1.4E-07			2.7E-11	2.7E-06
Xylenes (mixed)	8.7E-07	8.7E-07	5.7E-07	1.8E-07			4.4E-11	2.5E-06
Arsenic							1.8E-07	1.8E-07
Copper							8.0E-10	8.1E-10
Cyanide compounds							2.9E-13	2.9E-13
Vanadium							2.3E-09	2.3E-09
SUM	1.8E-03	1.8E-03	8.3E-04	2.6E-04	0	0	1.8E-07	4.8E-03

Staff also assessed the potential impacts of using diesel-fueled vehicles was mirror washing. Atmospheric dispersion modeling of diesel particulate matter (DPM) emissions from the vehicles was conducted. Mirror washing involves a water truck spraying de-ionized water on the mirrors in a drive-by fashion, and is generally done at night. The annual DPM emission rate for mirror washing trucks and other maintenance vehicles was provided in Table 35 of Appendix G of the AFC, and is 0.0153 ton/year or 30.6 lbs/yr. The HARP model and local met data were used and emissions were modeled as a volume source and the following assumptions were made in the absence of site-specific information: vertical dimension of 10 feet, horizontal dimension of 50 feet by 50 feet and release height of 10 feet. For the model, the location of the vehicle emissions was assumed to be located in the western area of the site, approximately 880 feet east of the western fenceline and 1,375 feet north of the southern fenceline, in order to give an approximate average location across the mirror field.

In staff's analysis, the maximum predicted offsite concentration of diesel particulate matter was 0.009 ug/m^3 (at the western fenceline). Cancer risk due to diesel emissions was determined using HARP to be 2.9 in a million. At the site of the maximally exposed resident, risk was determined to be 0.045 in a million and at the site of the maximally exposed sensitive receptor, risk was determined to be 0.027 in a million. The procedure, assumptions, and results of this analysis are presented in **Public Health Table 9**. Even when this risk is added to the risk from stationary source emission, the risk to the public is less than significant.

Public Health Table 9.
Staff's Screening Analysis of Diesel Emissions
and Risks from Mirror Washing Trucks and Other Maintenance Vehicles.

Assumptions:	
Area Source	50 feet by 50 feet
Vertical dimension	10 feet
Release height	10 feet
Annual DPM emissions from maintenance vehicles: (from Table 35, Appendix G of the AFC)	30.6 lb/yr
Maximum DPM concentration predicted off-site: (at the western fenceline)	0.009 ug/m^3
Risk at location of maximum concentration: (at the western fenceline)	2.9 in a million
Risk at location of maximally impacted resident	0.045 in a million
Risk at location of maximally impacted sensitive receptor	0.027 in a million

Cooling Tower

In addition to being a source of potential toxic air contaminants, the possibility exists for bacterial growth to occur in the cooling tower, including Legionella. Legionella is a bacterium that is ubiquitous in natural aquatic environments and is also widely distributed in man-made water systems. It is the principal cause of legionellosis, otherwise known as Legionnaires' Disease, which is similar to pneumonia. Transmission to people results mainly from inhalation or aspiration of aerosolized contaminated water. Untreated or inadequately treated cooling systems, such as industrial cooling towers and building heating, ventilating, and air conditioning systems, have been correlated with outbreaks of legionellosis.

Legionella can grow symbiotically with other bacteria and can infect protozoan hosts. This provides Legionella with protection from adverse environmental conditions, including making it more resistant to water treatment with chlorine, biocides, and other disinfectants. Thus, if not properly maintained, cooling water systems and their components can amplify and disseminate aerosols containing Legionella.

As noted in the LORS section above, the State of California regulates recycled water for use in cooling towers in Title 22, Section 60303, California Code of Regulations. This section requires that, in order to protect workers and the public who may come into contact with cooling tower mists, chlorine or another biocide must be used to treat the cooling system water to minimize the growth of Legionella and other micro-organisms. This regulation applies to the PHPP project since it intends to use recycled water provided by the City of Palmdale Water Reclamation Plant (PWRP) for cooling (COP 2008a, Section 2.1).

The U.S. EPA published an extensive review of Legionella in a human health criteria document (EPA 1999). The U.S. EPA noted that Legionella may propagate in biofilms (collections of microorganisms surrounded by slime they secrete, attached to either inert or living surfaces) and that aerosol-generating systems such as cooling towers can aid in the transmission of Legionella from water to air. The U.S. EPA has inadequate quantitative data on the infectivity of Legionella in humans to prepare a dose-response evaluation. Therefore, sufficient information is not available to support a quantitative characterization of the threshold infective dose of Legionella. Thus, the presence of even small numbers of Legionella bacteria presents a risk - however small - of disease in humans.

In February of 2000 the Cooling Technology Institute (CTI) issued its own report and guidelines for the best practices for control of Legionella (CTI 2000). The CTI found that 40-60 percent of industrial cooling towers tested was found to contain Legionella. More recently, staff has received a 2005 report of testing in cooling towers in Australia that found the rate of Legionella presence in cooling tower waters to be extremely low, approximately three to six percent. The cooling towers all had implemented aggressive water treatment and biocide application programs similar to that required by proposed condition of certification **Public Health-1**.

To minimize the risk from Legionella, the CTI noted that consensus recommendations included minimization of water stagnation, minimization of process leads into the cooling system that provide nutrients for bacteria, maintenance of overall system cleanliness, the application of scale and corrosion inhibitors as appropriate, the use of high-efficiency mist eliminators on cooling towers, and the overall general control of microbiological populations.

Good preventive maintenance is very important in the efficient operation of cooling towers and other evaporative equipment (ASHRAE 1998). Preventive maintenance includes having effective drift eliminators, periodically cleaning the system if appropriate, maintaining mechanical components in working order, and maintaining an effective water treatment program with appropriate biocide concentrations. Staff notes that most water treatment programs are designed to minimize scale, corrosion, and biofouling and not to control Legionella.

The efficacy of any biocide in ensuring that bacterial and in particular Legionella growth, is kept to a minimum is contingent upon a number of factors including but not limited to proper dosage amounts, appropriate application procedures and effective monitoring.

In order to ensure that Legionella growth is kept to a minimum, thereby protecting both nearby workers as well as members of the public, staff has proposed Condition of Certification **Public Health-1**. The condition would require the project owner to prepare and implement a biocide and anti-biofilm agent monitoring program to ensure that proper levels of biocide and other agents are maintained within the cooling tower water at all times, that periodic measurements of Legionella levels are conducted, and that periodic cleaning is conducted to remove bio-film buildup. Staff believes that with the use of an aggressive antibacterial program coupled with routine monitoring and biofilm removal, the chances of Legionella growing and dispersing would be reduced to insignificance. The applicant has stated that a Cooling Water Management Plan consistent with CEC staff’s guidelines would be implemented and that high efficiency drift eliminators would be installed and maintained to minimize cooling tower drift and further reduce potential impacts from Legionella (COP 2008a, Section 5.10.4).

CUMULATIVE IMPACTS

Cumulative impacts of the proposed project and other projects within a 6-mile radius were not evaluated in the AFC. The applicant has contacted the AVAQMD which identified two nearby facilities that may contribute to a public health cumulative impact. However, based on an evaluation of potential health risks from these facilities, the AVAQMD ranked them as intermediate priority and did not require these facilities to prepare an HRA. This ranking indicates a low level of health risks and therefore the applicant stated that a significant cumulative impact with these facilities could not occur (COP 2008a, Section 5.10.3.6).

The maximum cancer risk for operations emissions from the PHPP (calculated by staff) at the point of maximum impact (PMI) is 3.6 in 1,000,000, which is well below the level of significance. Similarly, the maximum chronic HI calculated by staff is 0.00056 and the maximum acute HI is 0.0048. As described above, the contribution of the PHPP project to both cancer risk and chronic and acute noncancer disease are comparatively very small. Staff concludes that the proposed PHPP project would not contribute to cumulative impacts in the area of public health.

COMPLIANCE WITH LORS

Staff has considered the minority population as identified in **Socioeconomics Figure 1** in its impact analysis and has found no potential significant adverse impacts for any receptors, including environmental justice populations. In arriving at this conclusion, staff notes that its analysis complies with all directives and guidelines from the Cal/EPA Office of Environmental Health Hazard Assessment and the California Air Resources Board. Staff's assessment is biased toward the protection of public health and takes into account the most sensitive individuals in the population. Using conservative (health-protective) exposure and toxicity assumptions, staff's analysis demonstrates that members of the public potentially exposed to toxic air contaminant emissions of this project—including sensitive receptors such as the elderly, infants, and people with pre-existing medical conditions—will not experience any acute or chronic significant health risk or any significant cancer risk as a result of that exposure. Staff is aware that citizens in this area of the Antelope Valley are exposed currently to levels of air pollution that are associated with chronic health effects, that the population has a higher lung cancer death rate than surrounding areas, and that the Palmdale are had the highest asthma rate in LA County. However, the relationship between low levels of TACs emitted from burning natural gas in gas turbines and asthma, respiratory disease, and lung cancer are not at all clear in terms of causal effects or exacerbation of existing conditions. As the HRA shows, the risks and hazards posed by this project are insignificant, particularly when compared to risks and hazards posed by emissions from existing stationary and mobile sources. Staff therefore believes that the small calculated incremental increase in risk – keeping in mind the conservative nature of this risk assessment - will not add to the public health burden of the population.

Staff believes that it incorporated every conservative assumption called for by state and federal agencies responsible for establishing methods for analyzing public health impacts. The results of that analysis indicate that there would be no direct or cumulative significant public health impact to any population in the area. Therefore, given the absence of any significant health impacts, there are no disparate health impacts and there are no environmental justice issues associated with **PUBLIC HEALTH**.

Staff concludes that construction and operation of the PHPP will be in compliance with all applicable LORS regarding long-term and short-term project impacts in the area of **PUBLIC HEALTH**.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

None Received.

CONCLUSIONS

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

PROPOSED CONDITIONS OF CERTIFICATION

Public Health-1 The project owner shall develop and implement a Cooling Water Management Plan to ensure that the potential for bacterial growth in cooling water is kept to a minimum. The Plan shall be consistent with either staff's "Cooling Water Management Program Guidelines" or with the Cooling Technology Institute's "Best Practices for Control of Legionella" guidelines but in either case, the Plan must include sampling and testing for the presence of Legionella bacteria at least every six months. After two years of power plant operations, the project owner may ask the CPM to re-evaluate and revise the Legionella bacteria testing requirement.

Verification: At least 60 days prior to the commencement of cooling tower operations, the Cooling Water Management Plan shall be provided to the CPM for review and approval.

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SOCIOECONOMICS

Kristin Ford

SUMMARY OF CONCLUSIONS

Staff concludes that construction and operation of the Palmdale Hybrid Power Plant (PHPP) would not cause significant direct, indirect, or cumulative adverse socioeconomic impacts on the study area's housing, schools, law enforcement, and parks. Staff also concludes that the project would not induce substantial growth or concentration of population, substantial increases in demand for housing or public services, or displace a large number of people.

INTRODUCTION

Staff's socioeconomics impact analysis evaluates the project's induced changes on existing population and employment patterns, and community services. Staff discusses the estimated impacts of the construction and operation of the PHPP Application for Certification (AFC) on local communities, community resources, and public services, and provides a discussion of the estimated beneficial economic impacts of the construction and operation of the proposed project.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

SOCIOECONOMICS Table 1 contains socioeconomics laws, ordinances, regulations, and standards (LORS) applicable to the proposed project.

SOCIOECONOMICS Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

California Education Code, Section 17620	The governing board of any school district is authorized to levy a fee, charge, dedication, or other requirement for the purpose of funding the construction or reconstruction of school facilities.
California Government Code, Sections 65996-65997	Except for a fee, charge, dedication, or other requirement authorized under Section 17620 of the Education **Code**, state and local public agencies may not impose fees, charges, or other financial requirements to offset the cost for school facilities.
California Revenue and Taxation Code Section 70-74.7	Property taxes are not assessed on solar facilities. Assembly Bill 1451 extended the current property tax exclusion for new construction of solar energy systems to January 1, 2017.

SETTING

The PHPP plant site is located in the City of Palmdale, Los Angeles County, California, on the southwestern edge of Antelope Valley of the Mojave Desert. The PHPP plant site would be located within approximately 377 acres of currently undeveloped land in the north-eastern part of the city of Palmdale, approximately 60 miles north of downtown Los Angeles. The proposed plant site of 377 acres would be a part of an approximately 600-acre site, owned by the city of Palmdale. The PHPP would be bound by Sierra Highway to the west, E Ave M to the north, and U.S. Air Force Plant 42 on the south and east. All project facilities with the exception of parts of the transmission lines and reclaimed water pipeline are located within the city of Palmdale.

Population centers located within the county of Los Angeles include the city of Lancaster and the unincorporated communities of Quartz Hill to the north; Lake Los Angeles to the east, Acton to the south; and Leona Valley to the west. The nearest sizeable cities to the project site include Santa Clarita (25 miles west), Adelanto (39 miles east), Victorville (40 miles east), Hesperia (41 miles east) and Apple Valley (44 miles east), all of which are located in San Bernardino county. The nearest residential area is located approximately one mile north of the plant site.

Demographic Screening

Staff's demographic screening is designed to determine the existence of a minority or below-poverty-level population or both within a six-mile area of the proposed project site. The demographic screening process is based on information contained in two documents: *Environmental Justice: Guidance Under the National Environmental Policy Act* (Council on Environmental Quality, 1997) and *Final Guidance for Incorporating Environmental Justice Concerns in EPA's Compliance Analyses National* (Council on Environmental Quality, 1998). The screening process relies on Year 2000 U.S. Census data to determine levels of minority and below-poverty-level populations.

Minority Populations

According to *Environmental Justice: Guidance Under the National Environmental Policy Act*, minority individuals are defined as members of the following groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population is identified when the minority population of the potentially affected area is greater than 50 percent or when one or more U.S. Census blocks in the potentially affected area have a minority population greater than 50 percent.

For the PHPP, the total population within the six-mile radius of the proposed site is 100,297 persons or about 52.26 percent of the total population (see **Socioeconomics Figure 1**). Therefore, staff in several technical areas identified in the Executive Summary of this document, have considered environmental justice in their environmental impact analyses.

Below-Poverty-Level Populations

Staff also identified the below-poverty-level population based on Year 2000 U.S. Census block group data within a six-mile radius of the project site. Poverty status excludes institutionalized people, people in military quarters, people in college dormitories, and unrelated individuals under 15 years old. The below-poverty-level population within a six-mile radius of the PHPP consists of approximately 21.1 percent of the total population in that area.

ASSESSMENT OF IMPACTS

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The socioeconomic resource areas evaluated by staff are based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines and shown in **Socioeconomics Table 2**. Staff's assessment of impacts on population, housing, emergency medical services, police protection, schools, medical services, and parks and recreation, are based on subjective judgments, input from local and state agencies, and the industry-accepted two-hour commute range for construction workers. Typically, substantial long-term relocation due to employment of people from regions outside the study area would have the potential to result in significant adverse socioeconomic impacts. Criteria for subject areas such as utilities, fire protection, water supply, and wastewater disposal are analyzed in the **Reliability**, **Worker Safety and Fire Protection**, and **Water Resources** sections of this document.

SOCIOECONOMICS Table 2
CEQA Environmental Checklist Form

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
POPULATION AND HOUSING —Would the project:				
A. Induce substantial population growth in a new area, either directly or indirectly.				X
B. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				X
C. Displace substantial numbers of people, necessitating construction of replacement housing elsewhere?				X
PUBLIC SERVICES —Would the project:				
D. Result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, need for new of physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service rations, response times, or other performance objectives for any of the public services:				

Emergency medical services				
Police protection			X	
Schools			X	
Parks			X	X
Other public facilities				X
RECREATION—Would the project:				
Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				X
Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				X

DIRECT/INDIRECT IMPACTS AND MITIGATION

Induce Substantial Population Growth

For the purpose of this analysis, staff defines "induce substantial population growth" as workers permanently moving into the project area because of project construction and operation, thereby encouraging construction of new homes or extension of roads or other infrastructure. To determine whether the project would induce population growth, staff analyzes the availability of the local workforce and the population within the region. Staff defines "local workforce" as the Los Angeles, San Bernardino and Kern County Statistical Areas (MSAs). **SOCIOECONOMICS Table 3** shows the historical and projected populations of the study area.

SOCIOECONOMICS Table 3
Historical and Projected Populations

Area	2000 Population	2010 Population	2020 Population
Los Angeles County	9,578,960	10,718,007	11,501,884
San Bernardino County	1,709,434	2,059,420	2,397,709
Kern County	665,519	1,086,113	1,352,628
Source: AFC, Table 5.11-2, PHPP, 2009			

SOCIOECONOMICS Tables 4 and 5 show that the total labor by skill for the Los Angeles, San Bernardino, and Kern MSAs would be more than adequate to provide construction labor for the proposed project.

SOCIOECONOMICS Table 4
Total Labor by Skill in MSA Annual Average for 2016

Trade	Los Angeles MSA	Peak # of Workers for Project Construction by Craft
Construction – Combined Cycle Component		
Welders	8,890	40
Carpenters	30,050	35
Bricklayers	1990	35
Masons	1,220	35
Electricians	13,700	25
Ironworkers	770	15
Laborers	34,810	55
Millrights	N/A	20
Equipment Operators	4,780	12
Plasterers	3,860	5
Painters	14,250	3
Pipefitters	630	45
Sheetmetal Workers	2,860	12
Sprinklerfitters	N/A	10
Surveyors/ Designers	7,030	3
Insulation Workers	280	18
Supervisors/ Planners	16,440	38

Construction –Solar Component		
Unskilled Laborers	34,810	216
Pipefitters	630	18
Welders	8,890	18
Electrician	13,700	18
I & C	N/A	18
Management (Industrial Production Managers)	5,180	36
Engineering (Industrial Engineers)	5,760	36
Administration (Administrative Service Managers)	8,890	36
Masons	1,220	18
Operating Engineers	4,780	18
Construction – Pipelines (Gas, Water Supply, Etc.)		
Unskilled Labor	34,810	42
Welders	8,890	3
Pipefitters	630	3
Equipment Operators	4,780	14
Foremen	N/A	8
Supervisors	11,650	2

Construction – Transmission Lines		
General Foreman	1,440[1.]	6
Foreman	1,440[1]	16
Leadman	1,440[1]	20
Journey Lineman	1,440[1.]	51
Apprentice Lineman	1,440[1]	18
Groundman	1,440[1]	20
Equipment operators	4,780	40
Cement Truck Drivers (Cementing and Gluing Machine Operators and Tenders)	1,040	20
Welders	8,890	12
Mechanic (Electrical and Electronic Equipment Mechanics, Installers, and Repairers)	19,670	6
Skilled Laborers	34,810	28
Carpenters	30,050	9
[1.]Electrical Power-Line Installers and Repairers, Annual Average Projection for 2016 Source: Employment Development Department, Labor Market Information (http://www.labormarketinfo.edd.ca.gov), AFC for PHPP, July 2008		

The applicant estimates construction would begin in the third quarter of 2013. As shown in Table 5.11-12 in the AFC, project construction would require an average of 367 employees per day over the entire 27-month construction period with manpower requirements peaking at approximately 767 workers in month 12 of construction.

The project would require 36 full-time employees; most workers are expected to commute to the project site from communities in Los Angeles, San Bernardino and Kern Counties. Given the large labor force within two hours commuting time of the project, staff does not expect potential employees to relocate to the immediate project area.

Staff concludes that the construction and operation workforce would not induce substantial growth or concentration of population, and the PHPP would not encourage people to permanently move into the area. The PHPP would have no direct or indirect impact on population growth in a new area.

Housing Supply

The U.S. Census Bureau Census 2000 data on housing showed that there were approximately 3,339,763 housing units in Los Angeles County and 39,988 housing units in the city of Palmdale. Housing units include; single-family, multi-family, and mobile home residences. There are approximately 14 hotels/motels in Palmdale and 20 motels/hotels in Lancaster with approximately 2,970 rooms available to accommodate workers who may choose to commute to the project site on a work week basis (DR, SOC-1, PHPP, 2009).

Because of the large labor force within commuting distance of the project, staff expects the majority of construction workers would commute to the project daily from their existing residences. No new housing construction would be required.

The project would have 36 full-time employees; the applicant expects all 36 employees would be hired within commuting distance of the project. Given the large labor force in Los Angeles County and surrounding counties within commuting distance of the project, staff does not expect employees would relocate to the immediate project area.

Staff concludes that the construction and operation workforce would not have a significant adverse impact on housing within the immediate project area and the regional areas of Los Angeles, San Bernardino and Kern counties, and would not displace existing housing or necessitate construction of replacement housing elsewhere.

Displace Existing Housing and Substantial Numbers of People

The project and facility site would be located on 377 acres of undeveloped land in the northeastern part of the city of Palmdale, approximately 60 miles north of downtown Los Angeles. In 2005, Palmdale had 39,988 housing units, with a vacancy rate of 3.7 percent. Lancaster had approximately 43,889 housing units with a vacancy rate of 3.7 percent. Renter occupied housing units represent 29.1 percent of Palmdale housing occupancy and 41.1 percent of the Lancaster housing occupancy (AFC, 5.11-5, PHPP, 2008). In 2005, Los Angeles County had approximately 3,339,763 housing units and had a housing vacancy rate of 4.7 percent. Renter occupied units totaled 1,621,543 units, or 50.9 percent of the market (AFC, 5.11-5, PHPP, 2008). Staff's analysis shows that the project would not displace any people or necessitate construction of replacement housing elsewhere.

Result in Substantial Physical Impacts to Government Facilities

As discussed under the subject headings below, the PHPP would not cause significant impacts to service ratios, response times, or other performance objectives relating to emergency medical services, law enforcement, or schools. Fire protection, including the applicant's proposed onsite Fire Protection and Prevention Plan, is analyzed in the **Worker Safety** section of this document.

Emergency Medical Services

As stated in the AFC and verified by staff, the project site is within the Los Angeles County Fire Department's jurisdiction (http://www.fire.lacounty.gov). The Los Angeles County Fire Department is a full-service department which provides fire management, fire operations, fire and environmental safety, and emergency medical services to the residents of Los Angeles County. There are ten fire stations in the City of Palmdale, and seven stations in the City of Lancaster. The nearest fire station (Number 129) is located one mile to the west of the PHPP plant site in the City of Lancaster. Average response time is estimated to be less than two minutes. The station employs nine full-time fire fighters and is trained to handle hazardous materials releases.

As discussed in Section 2.0, **Project Description**, Section 5.18, **Worker Safety**, and Section 5.6, **Hazardous Materials**, the PHPP would be designed to meet all applicable standards to reduce the risk of an accidental hazardous materials release and operate in a manner that complies with safety standards and practices to provide a safe workplace for plant personnel.

The applicant's proposed safety procedures and employee training would minimize potential unsafe work conditions and the need for outside emergency medical response. Staff concludes that the emergency medical services provided the by Los Angeles County Fire Department would be adequate during construction and operation.

Law Enforcement

The Los Angeles Sheriff's Department is under contact with the city of Palmdale to provide police protection and public safety services (http://www.lasd.org). Services include traffic and neighborhood police protection and public safety services. The Palmdale Sheriff Station would respond to the PHPP plant site from the Palmdale Station located approximately four miles south of the site. The Palmdale Sheriff's Station is staffed by 189 sworn deputies and 56 non-sworn employees (AFC, 5.11-10, PHPP, 2008). The station provides law enforcement services to an estimated 700 square miles. The Lancaster Sheriff Station located approximately 3.7 miles north of the PHPP plant site would respond to emergencies when needed. The Lancaster Station is staffed by 189 sworn personnel and 74 civilian personnel (AFC, 5.11-10, PHPP, 2008). The California Highway Patrol (CHP) is the primary law enforcement agency for state highways and roads. Services include law enforcement, traffic control, accident investigation and the management of hazardous material spill incidents. The nearest CHP office is located approximately four miles from the project site in Lancaster, California.

Unlike residential or commercial developments, power plants do not attract large numbers of people and thus require little in the way of law enforcement. Because of this factor and the proposed onsite safety and security measures, staff concludes that the existing law enforcement resources would be adequate to provide services to the PHPP during construction and operation.

Education

There are three school districts that are located near the project site area; Palmdale School District (PSD), Westside Union School District (WUSD), and the Antelope Valley Union High School District (AVUSHSD). The PSD has 21 elementary schools, and four intermediate schools. The WUSD consists of 12 schools/programs for kindergarten through 8^{th} grade students. Total enrollment for the WUSD was approximately 8,900 students for the 2006-2007 school year. The AVUSHSD consists of 15 schools/programs serving student grades 9 through 12. Total enrollment for the AVUHSD was approximately 24,700 students for the 2007-2008 school year (AFC, 5.11-12,-13,-14, PHPP, 2008). Personal communication from representatives of each school district show that some schools within two of the three schools districts are at capacity (Swift, Joyce 2009), (Foster, Jeffery 2009) and (Thomas, Nelly 2009).

During construction, staff expects the labor force would commute daily from the region. Due to the commuting habits of construction workers, staff does not expect any construction workers to relocate their families to the area. Staff does not expect a significant adverse impact to the schools from construction of the proposed project.

A total of 36 workers are needed to operate the PHPP. As previously stated, the applicant expects to hire the operation workforce from within the area and no operation workers are expected to relocate with their families. However, if all 36 operation workers relocate within the Palmdale, Westside Union or Antelope Valley Union High School Districts, an average family size of 3.61 persons per household (U.S. Census Bureau, Household and Families, 2000 for Los Angeles County) would result in the addition of approximately 58 children to the local schools. Although schools within two of the three local school districts are at capacity, as previously noted in **SOCIOECONOMICS Table 1**, other than the requirement authorized under Section 17620 of the Education Code, staff cannot impose developer fees to mitigate the cost of school facilities.

Because the proposed project would be located on property owned by the city of Palmdale, the PHPP would be exempt from paying school impact fees to the PSD, WUSD and AVUSHSD.

Given the small number of students who potentially could relocate to schools within the PSD, WUSD and AVUSHSD, staff does not expect the construction or operation of the project to have a significant adverse impact on schools.

Increase the Use of Existing Recreation Facilities

The Los Angeles Parks and Recreation maintains over 63,000 acres of parks, gardens, lakes, trails, off highway vehicle, natural areas, and the world's largest public golf course system (http://parks.lacounty.gov).

Given the large labor force in Los Angeles, San Bernardino and Kern counties residing within two hours commuting time of the project, staff does not expect employees to relocate to the immediate project area. Staff concludes that there are a number and variety of parks within the regional project area and does not expect the construction or operation workforce to have a significant adverse impact on parks or necessitate construction of new parks in the area.

CUMULATIVE IMPACTS

A project may result in significant adverse cumulative impacts when its effects are cumulatively considerable; that is, when the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects [*Public Resources Code* Section 21083; *California Code of Regulations*, Title 14, Sections 15064(h); 15065 (c); 15130; and 15355]. Mitigation requires taking feasible measures to avoid or substantially reduce the impacts.

In a socioeconomic analysis, cumulative impacts could occur when more than one project in the same area has an overlapping construction schedule, thus creating a demand for workers that cannot be met locally. An increased demand for labor could result in an influx of non-local workers and their dependents, resulting in a strain on housing, schools, parks and recreation, law enforcement and emergency services.

As shown in **SOCIOECONOMICS Table 5,** the total construction labor force by MSA for the region is more than sufficient to accommodate the labor needs for construction of power generation facilities and other large industrial projects. Because of the robust local and regional construction labor force, staff does not expect an influx of non-local workers and their dependents to the project area. Therefore, staff does not expect any significant and adverse impacts on housing, schools, parks and recreation, law enforcement, and emergency services. Staff does not expect construction or operation of the PHPP to contribute to any significant adverse cumulative socioeconomic impacts.

SOCIOECONOMICS Table 5
Occupational Employment Projections by MSA

Construction and Extraction Occupations for Selected MSAs	Average Annual Employment for 2006	Average Annual Employment for 2016
Los Angeles – Long Beach - Glendale County MSA	174,940	187,580
San Bernardino – Riverside –Ontario MSA	137,160	155,250
Kern County MSA	27,690	31,410
Source: EDD 2009 Projections of Employment by Industry and Occupation		

NOTEWORTHY PUBLIC BENEFITS

Noteworthy public benefits include the direct, indirect, and induced impacts of a proposed power plant. For example, the dollars spent on or resulting from the construction and operation of the PHPP would have a ripple effect on the local economy. This ripple effect is measured by an input-output economic model. The model relies on a series of multipliers to provide estimates of the number of times each dollar of input or direct spending cycles through the economy in terms of indirect and induced output, or additional spending, personal income, and employment. The typical input-output model used by economists and the one used for this analysis by the applicant is the IMPLAN model. IMPLAN multipliers indicate the ratio of direct impacts to indirect and induced impacts. Staff reviewed the results of the IMPLAN model and found them to be reasonable considering data provided by the applicant as well as data obtained by staff from governmental agencies, trade associations, and public interest research groups.

PHPP owners would employ workers and purchase supplies and services for the life of the project. Employees would use salaries and wages to purchase goods and services from other businesses. Those businesses make their own purchases and hire employees, who also spend their salaries and wages throughout the local and regional economy. This effect of indirect (jobs, sales, and income generated) and induced (employees' spending for local goods and services) spending continues with subsequent rounds of additional spending, which is gradually diminished through savings, taxes, and expenditures made outside the area.

For purposes of this analysis, direct impacts were said to exist if the project resulted in permanent jobs and wages; indirect impacts, if jobs, wages, and sales resulted from project construction; induced impacts, from the spending of wages and salaries on food, housing, and other consumer goods. The economic benefits of the proposed project, as required by California Energy Commission regulation, are shown from the input-output economic model IMPLAN, is shown below in **Socioeconomics Table 6**.

SOCIOECONOMICS Table 6
PHPP Economic Benefits (2009 dollars)

Fiscal Benefits	
Estimated annual property taxes	Los Angeles County tax rate of 1.115433 percent would create annual property tax revenues estimated at $685,000 to $797,000.
State and local sales taxes: Construction	$4.9 million
State and local sales taxes: Operation	$310,000 would be generated annually or approximately $9.3 million for the nominal 30-year operating life of the project.
School Impact Fee	Exempt
Non-Fiscal Benefits	
Total capital costs	$615 to 715 million
Construction payroll	$106 million
Annual Operations and Maintenance	
Construction materials and supplies	$59 million
Operations and maintenance supplies	$3.7 million
Direct, Indirect, and Induced Benefits	
Estimated Direct	
Construction	367 jobs (average per month for 27 months)
Operation	36 full-time positions
Estimated Indirect	
Construction Jobs	937
Construction Income	$142,000,000
Operation Jobs	64 workers
Operation Income	N/A
Estimated Induced	
Construction Jobs	1,018
Construction Income	$134,000,000
Operation Jobs	59 workers
Operation Income	N/A

Source: AFC, PHPP, 5.11 Socioeconomics.

PROPERTY TAX

California Revenue and Taxation Code Section 73 excludes new construction of active solar energy systems from the definition of “new construction” for property tax reassessment purposes. California Assembly Bill (AB) 1451 extends the current property tax exclusion for new construction of solar energy systems to January 1, 2017. Under this legislation, any non-solar components of a project would be assessed by the county assessor where the project is constructed. In this case, Los Angeles County would be responsible for accessing the PHPPs property value. Components included under the exemption are storage devise, power conditioning equipment, transfer equipment, and parts. Capital costs for the combined-cycle portion of the PHPP are estimated at $615 million to $715 million (2011 dollars). Assuming the property tax rate for the project site is 1.115433 percent, Los Angeles County annual property tax revenues are estimated at approximately $685,000 to $797,000 (AFC, 5.11-32, PHPP, 2008).

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff has received no agency or public socioeconomic comments on this project.

CONCLUSIONS

Estimated gross public benefits from the PHPP include employment and income for the project area and region. Staff concludes that construction and operation of the PHPP would not cause significant direct, indirect or cumulative adverse socioeconomic impacts on the study area’s housing, schools, law enforcement, emergency services and parks.

Staff concludes that the project would not cause significant direct or cumulative adverse impacts to emergency services. Staff also concludes that the PHPP would not induce substantial growth or concentration of population; induce substantial increases in demand for housing or public services; or displace a large number of people.

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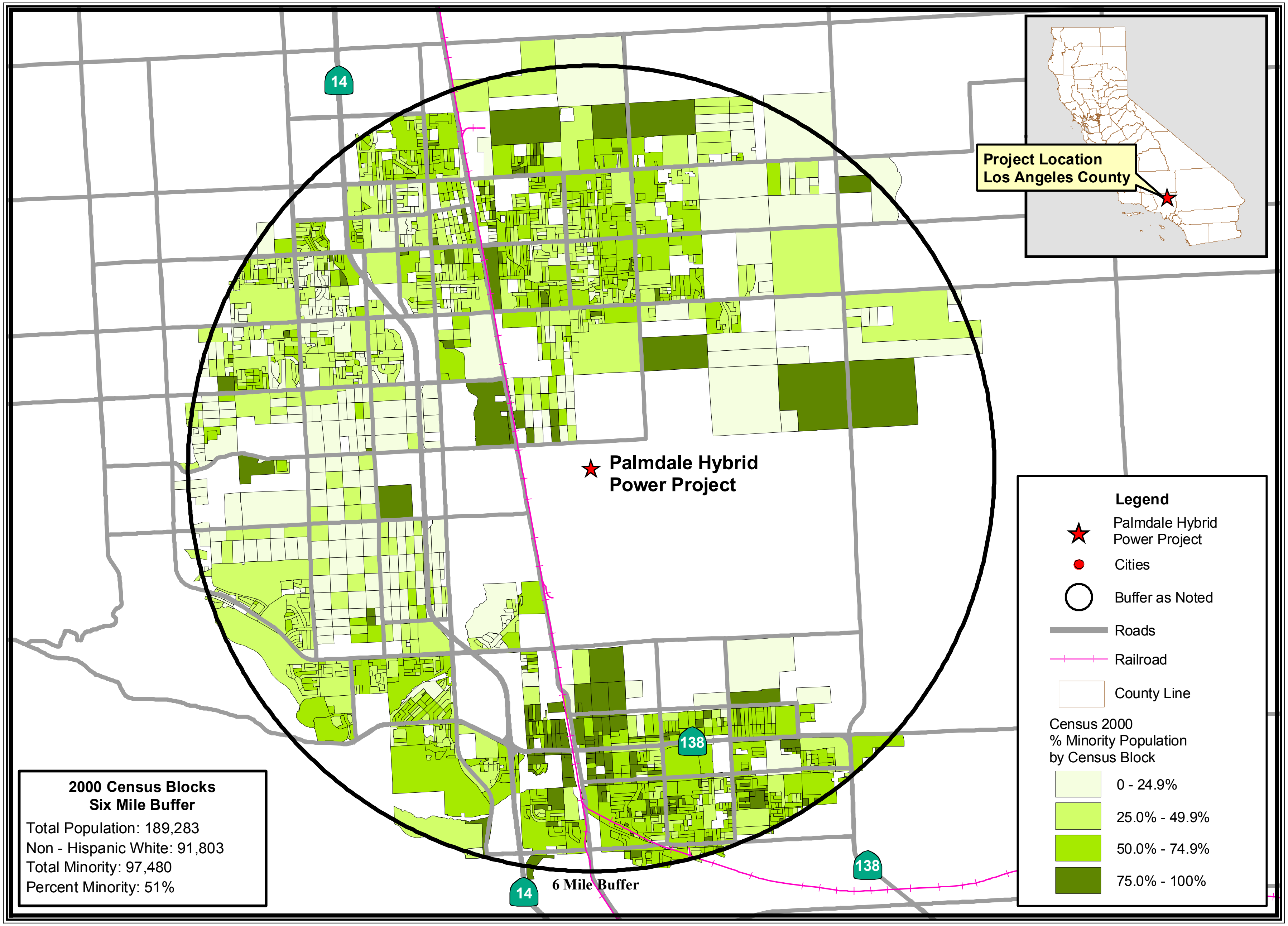
SOCIOECONOMICS - FIGURE 1

Palmdale Hybrid Power Project - Census 2000 Minority Population by Census Block - Six Mile Buffer



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, DECENBER 2009

SOURCE: California Energy Commission Statewide Power Plant Maps 2008 - Census 2000 PL 94-171 Data - Matrix PL2

TRANSMISSION LINE SAFETY AND NUISANCE

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SUMMARY OF CONCLUSIONS

The applicant, the City of Palmdale, proposes to transmit the power from the proposed Palmdale Hybrid Power Project (PHPP) to the Southern California Edison's (SCE's) transmission grid through SCE's existing Vincent Substation approximately 11 miles to the south-southwest. The proposed line would be constructed in two phases and would involve the use of a line of 35.6 miles as necessary to avoid specific area aviation-related facilities and businesses. The proposed PHPP would be owned and operated by the City of Palmdale while the related transmission facilities would be owned and operated by SCE and would thus be constructed, operated, and maintained according to SCE's guidelines for line safety and field management which conform to applicable laws, ordinances, regulations and standards (LORS). With the five proposed conditions of certification, any safety and nuisance impacts from the proposed project line would be less than significant.

INTRODUCTION

The purpose of this staff assessment is to assess the proposed Palmdale Hybrid Power Project's transmission line's design and operational plan to determine whether its related field and non-field impacts would constitute a significant environmental hazard in the areas around the proposed route. All related health and safety laws, ordinances, regulations, and standards (LORS) are currently aimed at minimizing such hazards. Staff's analysis focuses on the following issues taking into account both the physical presence of the line and the physical interactions of its electric and magnetic fields:

- aviation safety;
- interference with radio-frequency communication;
- audible noise;
- fire hazards;
- hazardous shocks;
- nuisance shocks; and
- electric and magnetic field (EMF) exposure.

The following federal, state, and local laws and policies apply to the control of the field and nonfield impacts of electric power lines. Staff's analysis examines the project's compliance with these requirements.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

TRANSMISSION LINE SAFETY AND NUISANCE (TLSN) TABLE 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Aviation Safety	
Federal	
Title 14, Part 77 of the Code of Federal Regulations (CFR),”Objects Affecting the Navigable Air Space”	Describes the criteria used to determine the need for a Federal Aviation Administration (FAA) “Notice of Proposed Construction or Alteration” in cases of potential obstruction hazards.
FAA Advisory Circular No. 70/7460-1G, “Proposed Construction and/or Alteration of Objects that May Affect the Navigation Space”	Addresses the need to file the “Notice of Proposed Construction or Alteration” (Form 7640) with the FAA in cases of potential for an obstruction hazard.
FAA Advisory Circular 70/460-1G, “Obstruction Marking and Lighting”	Describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.
Interference with Radio Frequency Communication	
Federal	
Title 47, CFR, section 15.2524, Federal Communications Commission (FCC)	Prohibits operation of devices that can interfere with radio-frequency communication.
State	
California Public Utilities Commission (CPUC) General Order 52 (GO-52)	Governs the construction and operation of power and communications lines to prevent or mitigate interference.
Audible Noise	
Local	
City of Palmdale General Plan: Noise Element	Establishes goals and policies to ensure that the city’s residents are protected from excessive noise.
City of Lancaster General Plan: Noise Element	Establishes goals and policies to ensure that residents are protected from excessive noise.
Hazardous and Nuisance Shocks	
State	
CPUC GO-95, “Rules for Overhead Electric Line Construction”	Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.
Title 8, California Code of Regulations (CCR) section 2700 et seq. “High Voltage Safety Orders”	Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.
National Electrical Safety Code	Specifies grounding procedures to limit nuisance shocks. Also specifies minimum conductor ground clearances.
Industry Standards	

Applicable LORS	Description
Institute of Electrical and Electronics Engineers (IEEE) 1119, “IEEE Guide for Fence Safety Clearances in Electric-Supply Stations”	Specifies the guidelines for grounding-related practices within the right-of-way and substations.
Electric and Magnetic Fields	
State	
GO-131-D, CPUC ”Rules for Planning and Construction of Electric Generation Line and Substation Facilities in California”	Specifies application and noticing requirements for new line construction including EMF reduction.
CPUC Decision 93-11-013	Specifies CPUC requirements for reducing power frequency electric and magnetic fields.
Industry Standards	
American National Standards Institute (ANSI/IEEE) 644-1944 Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines	Specifies standard procedures for measuring electric and magnetic fields from an operating electric line.
Fire Hazards	
State	
14 CCR sections 1250-1258, “Fire Prevention Standards for Electric Utilities”	Provides specific exemptions from electric pole and tower firebreak and conductor clearance standards and specifies when and where standards apply.

SETTING

As discussed by the applicant, the City of Palmdale, COP, (2008a, pp 1-1, 2-1, 5.2-18, 5.2-19, and 5.7-17 through 5.7-21) the proposed project site is in the northernmost portion of the City of Palmdale approximately 60 miles north of downtown Los Angeles. The 377-acre site is part of an approximately 600-acre City-owned property bounded by Sierra highway to the west, East Avenue M to the north, and Air Force Plant 42 (Plant 42) to the south and east. The presence of the Plant 42 and other aviation related area facilities is one of the reasons for the circuitous route proposed for the 230-killovlt (kV) transmission line as it connects the facility to the SCE Vincent Substation approximately 11 miles to the south southwest.

The proposed project line would be constructed in two phases. The phase I segment would be a an overhead 230-kV line of approximately 23.7 miles in new and existing rights-of-way between the project site and SCE’s Pearblossom Substation to the southeast. Phase II would be a system reliability upgrade that would increase the system’s transmission and expand the existing Vincent Substation to the southeast. This would involve construction of a new 11.9-mile double-circuit 230-kV line within the right-of-way of existing lines connecting the Pearblossom and Vincent Substations. This substation and transmission line upgrade is part of SCE’s Tehachapi Renewable Project and the Antelope Transmission Project. Most of the Phase I Segment (Segment 1) would be within the City of Palmdale with the rest, and the Phase II Segment (Segment 2) located within unincorporated Los Angeles County (COP 2008a pp.2-1 through 2-33).

The proposed project site is in an undeveloped desert land with the surrounding area zoned for commercial and industrial uses. The nearest residential area is located approximately one mile to the north but there are a few scattered residences in the surrounding area the nearest of which is approximately 1,500 feet to the northwest. The route of the proposed 36.5-mile project line would run through or near undisturbed desert land, agricultural land, and industrial and residential areas (COP 2008a, p. 2-33), raising the potential for the long-term residential field exposures that have been of health concern in recent years.

PROJECT DESCRIPTION

The proposed project line would consist of the following individual segments:

- Segment 1 which would be a new 230-kV overhead transmission line extending approximately 23.7 miles from the on-site project switchyard to SCE's Pearblossom Substation;
- Segment 2 extending approximately 11.9 miles westward from the Pearblossom Substation to the Vincent Substation;
- The project's on-site 230-kV switchyard from which the conductors would originate; and
- Project-related upgrades within the Pearblossom and Vincent Substations.

As more fully discussed by the applicant in its application for certification, AFC (COP 2008a, pp. 2-32 and 2-33, and 5.7-17 through 5.7-23), and in response to staff's data requests (AECOM 2009 b), Segment 1 would be located within new and existing rights-of-way as it extends from the on-site substation through the northeast corner of the site, along 10th St E and E Ave L. The line would then continue over industrial and agricultural areas, along existing road rights-of-way, over open spaces, and through areas zoned for non-urban residency, until entry into the Pearblossom Substation via the existing SCE line right-of-way. The conductors would be supported on steel poles spaced approximately 750 feet apart, and would be between 100 feet and 135 feet in height. The Segment 2 conductors would also be supported on new steel poles as the line runs within the existing SCE right-of-way with existing lines. These new support poles would be designed for two-circuit capacity; but only one side of the pole would be used and the other side reserved for future grid expansion.

Segment 2 would also be constructed for double-circuit transmission with conductors on both sides of the support poles. One set of conductors would be the new 230-kV interconnection between Pearblossom and Vincent Substations, the other would be the replacement for the 230-kV line currently providing power to the California Department of Water Resources' (DWR's) pumping station via the Vincent Substation. The proposed construction scheme would allow for continued energy to the DWR station during construction activities. As a proposed SCE line, this PHPP line would be designed built operated, and maintained according to SCE guidelines that comply with existing health and safety LORS (COP 2008a pp. 2-32, and 5.14-1 through 5.14-4). The applicant provided the details of the proposed support structures as related to line safety, maintainability, and field reduction efficiency (COP 2008a, Figures 5.14-6 and 5.14-7).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

The potential magnitude of the line impacts of concern in this staff analysis depends on compliance with the listed design-related LORS and industry practices. These LORS and practices have been established to maintain impacts below levels of potential significance. Thus, if staff determines that the project would comply with applicable LORS, we would conclude that any transmission line-related safety and nuisance impacts would be less than significant. The nature of these individual impacts is discussed below together with the potential for compliance with the LORS that apply.

DIRECT IMPACTS AND MITIGATION

Proposed Project

Aviation Safety

Any potential hazard to area aircraft would relate to the potential for collision in the navigable airspace. The requirements listed on **TLSN Table 1** establish the standards for assessing the potential for obstruction hazards within the navigable space and establish the criteria for determining when to notify the FAA about such hazards. As noted by the applicant (COP 2008a, p. 5.7-3, 5.13-6, and 5.13-7), these regulations require FAA notification in cases of structures over 200 feet from the ground and within the navigable space around the structure in question. Notification is also required if the structure is to be below 200 feet in height but would be located within the restricted airspace in the approaches to public or military airports. For airports with runways longer than 3,200 feet, the restricted space is defined by the FAA as an area extending 20,000 feet from the runway. For airports with runways of 3,200 feet or less, the restricted airspace would be an area that extends 10,000 feet from this runway. For heliports, the restricted space is an area that extends 5,000 feet.

The closest aviation-related facility is the adjacent Plant 42 with its civilian and military air operations from the Plant 42/Palmdale Regional Airport facility. As noted by the applicant, the northern portion of the project line (that runs along E Ave L, the northern portion of the gas supply line, and the sanitary wastewater and reclaimed water supply pipeline) would lie within a restricted zone for flights from the adjacent Plant 42/Palmdale Regional Airport. However, the maximum height of 135 feet for the proposed line support structures (COP 2008a pp. 5.7-23 and Figures 5.14-6 and 5.14-7) would be much less than the 200 feet that triggers the concern over aviation hazard according to FAA requirements.

Interference with Radio-Frequency Communication

Transmission line-related radio-frequency interference is one of the indirect effects of line operation and is produced by the physical interactions of line electric fields. Such interference is due to the radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as *corona discharge*, but is referred to as *spark gap electric discharge* when it occurs within gaps between the conductor and insulators or metal fittings. When generated, such noise manifests itself as perceivable interference with radio or television signal reception or interference with other forms of radio communication. Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration and weather conditions, maximum interference levels are not specified as design criteria for modern transmission lines. The level of any such interference usually depends on the magnitude of the electric fields involved and the distance from the line. The potential for such impacts is therefore minimized by reducing the line electric fields and locating the line away from inhabited areas.

The proposed project lines would be built and maintained in keeping with standard SCE practices that minimize surface irregularities and discontinuities. Moreover, the potential for such corona-related interference is usually of concern for lines of 345 kV and above, and not for 230-kV lines such as the proposed lines. The line's proposed low-corona designs are used for all SCE lines of similar voltage rating to reduce surface-field strengths and the related potential for corona effects. Given the line's low-corona design, staff does not expect any corona-related radio-frequency interference or related complaints but recommends a specific Condition of Certification, (**TLSN-2**) in the unlikely case of such complains.

Audible Noise

The noise-reducing designs related to electric field intensity are not specifically mandated by federal or state regulations in terms of specific noise limits. As with radio noise, such noise is limited instead through design, construction, or maintenance practices established from industry research and experience as effective without significant impacts on line safety, efficiency, maintainability, and reliability. Audible noise usually results from the action of the electric field at the surface of the line conductor and could be perceived as a characteristic crackling, frying, or hissing sound or hum, especially in wet weather. Since the noise level depends on the strength of the line electric field, the potential for perception can be assessed from estimates of the field strengths expected during operation. Such noise is usually generated during rainfall, but mainly from overhead lines of 345 kV or higher. It is, therefore, not generally expected at significant levels from lines of less than 345 kV as proposed for PHPP. Research by the Electric Power Research Institute (EPRI 1982) has validated this by showing the fair-weather audible noise from modern transmission lines to be generally indistinguishable from background noise at the edge of a right-of-way of 100 feet or more. Since the low-corona designs are also aimed at minimizing field strengths, staff does not expect the proposed line operation to add significantly to current background noise levels in the project area. For an assessment of the noise from the proposed line and related facilities, please refer to staff's analysis in the **Noise and Vibration** section.

Fire Hazards

The fire hazards addressed through the related LORS in **TLSN Table 1** are those that could be caused by sparks from conductors of overhead lines, or that could result from direct contact between the line and nearby trees and other combustible objects.

Standard fire prevention and suppression measures for similar SCE lines would be implemented for the proposed project lines (COP 2008a, p. 5.14-2). The applicant's intention to ensure compliance with the clearance-related aspects of GO-95 would be an important part of this mitigation approach. Condition of Certification **TLSN-4** is recommended to ensure compliance with important aspects of the fire prevention measures.

Hazardous Shocks

Hazardous shocks are those that could result from direct or indirect contact between an individual and the energized line, whether overhead or underground. Such shocks are capable of serious physiological harm or death and remain a driving force in the design and operation of transmission and other high-voltage lines.

No design-specific federal regulations have been established to prevent hazardous shocks from overhead power lines. Safety is assured within the industry from compliance with the requirements specifying the minimum national safe operating clearances applicable in areas where the line might be accessible to the public.

The applicant's stated intention to implement the GO-95-related measures against direct contact with the energized line (COP 2008a, pp. 5.14-2 and 5.14-8) would serve to minimize the risk of hazardous shocks. Staff's recommended Condition of Certification **TLSN-1** would be adequate to ensure implementation of the necessary mitigation measures.

Nuisance Shocks

Nuisance shocks are caused by current flow at levels generally incapable of causing significant physiological harm. They result mostly from direct contact with metal objects electrically charged by fields from the energized line. Such electric charges are induced in different ways by the line's electric and magnetic fields.

There are no design-specific federal or state regulations to limit nuisance shocks in the transmission line environment. For modern overhead high-voltage lines, such shocks are effectively minimized through grounding procedures specified in the National Electrical Safety Code (NESC) and the joint guidelines of the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE). For the proposed project line, the project owner will be responsible in all cases for ensuring compliance with these grounding-related practices within the right-of-way.

The potential for nuisance shocks around the proposed line would be minimized through standard industry grounding practices (COP 2008a, p. 5.14-7). Staff recommends Condition of Certification **TLSN-5** to ensure such grounding for PHPP.

Electric and Magnetic Field Exposure

The possibility of deleterious health effects from EMF exposure has increased public concern in recent years about living near high-voltage lines. Both electric and magnetic fields occur together whenever electricity flows, and exposure to them together is generally referred to as *EMF exposure*. The available evidence as evaluated by the CPUC, other regulatory agencies, and staff has not established that such fields pose a significant health hazard to exposed humans. There are no health-based federal regulations or industry codes specifying environmental limits on the strengths of fields from power lines. Most regulatory agencies believe, as staff does, that health-based limits are inappropriate at this time. They also believe that the present knowledge of the issue does not justify any retrofit of existing lines.

Staff considers it important, as does the CPUC, to note that while such a hazard has not been established from the available evidence, the same evidence does not serve as proof of a definite lack of a hazard. Staff therefore considers it appropriate, in light of present uncertainty, to recommend feasible reduction of such fields without affecting safety, efficiency, reliability, and maintainability.

While there is considerable uncertainty about EMF health effects, the following facts have been established from the available information and have been used to establish existing policies:

- Any exposure-related health risk to the exposed individual will likely be small.
- The most biologically significant types of exposures have not been established.
- Most health concerns are about the magnetic field.
- There are measures that can be employed for field reduction, but they can affect line safety, reliability, efficiency, and maintainability, depending on the type and extent of such measures.

State

In California, the CPUC (which regulates the installation and operation of many high-voltage lines owned and operated by investor-owned utilities) has determined that only no-cost or low-cost measures are presently justified in any effort to reduce power line fields beyond levels existing before the present health concern arose. The CPUC has further determined that such reduction should be made only in connection with new or modified lines. It requires each utility within its jurisdiction to establish EMF-reducing measures and incorporate such measures into the designs for all new or upgraded power lines and related facilities within their respective service areas. The CPUC further established specific limits on the resources to be used in each case for field reduction. Such limitations were intended by the CPUC to apply to the cost of any redesign to reduce field strength or relocation to reduce exposure. Publicly owned utilities, which are not within the jurisdiction of the CPUC, voluntarily comply with these CPUC requirements. This CPUC policy resulted from assessments made to implement CPUC Decision 93-11-013.

In keeping with this CPUC policy, staff requires a showing that each proposed overhead line would be designed according to the EMF-reducing design guidelines applicable to the utility service area involved. These field-reducing measures can impact line operation if applied without appropriate regard for environmental and other local factors bearing on safety, reliability, efficiency, and maintainability. Therefore, it is up to each applicant to ensure that such measures are applied in ways that prevent significant impacts on line operation and safety. The extent of such applications would be reflected by ground-level field strengths as measured during operation. When estimated or measured for lines of similar voltage and current-carrying capacity, such field strength values can be used by staff and other regulatory agencies to assess the effectiveness of the applied reduction measures. These field strengths can be estimated for any given design using established procedures. Estimates are specified for a height of one meter above the ground, in units of kilovolts per meter (kV/m), for the electric field, and milligauss (mG) for the companion magnetic field. Their magnitude depends on line voltage (in the case of electric fields), the geometry of the support structures, degree of cancellation from nearby conductors, distance between conductors, and, in the case of magnetic fields, amount of current in the line.

Since the CPUC currently requires that most new lines in California be designed according to the EMF-reducing guidelines of the electric utility in the service area involved, their fields are required under this CPUC policy to be similar to fields from similar lines in that service area. Designing the proposed project line according to existing SCE field strength-reducing guidelines would constitute compliance with the CPUC requirements for line field management.

The CPUC has recently revisited the EMF management issue to assess the need for policy changes to reflect the available information on possible health impacts. The findings did not point to a need for significant changes to existing field management policies. Since there are no residences in the immediate vicinity of the proposed project line, there would not be the long-term residential EMF exposures mostly responsible for the health concern of recent years. The only project-related EMF exposures of potential significance would be the short-term exposures of plant workers, regulatory inspectors, maintenance personnel, visitors, or individuals in the vicinity of the line. These types of exposures are short term and well understood as not significantly related to the health concern.

Industry's Approach to Reducing Field Exposures

The present focus is on the magnetic field because unlike electric fields, it can penetrate the soil, buildings, and other materials to produce the types of human exposures at the root of the health concern of recent years. The industry seeks to reduce exposure, not by setting specific exposure limits, but through design guidelines that minimize exposure in each given case. As one focuses on the strong magnetic fields from the more visible high-voltage power lines, staff considers it important, for perspective, to note that an individual in a home could be exposed to much stronger fields while using some common household appliances than from high-voltage lines (National Institute of Environmental Health Services and the U.S. Department of Energy, 1998). The difference between these types of field exposures is that the higher-level, appliance-related exposures are short term, while the exposures from power lines are lower level, but long term. Scientists have not established which of these types of exposures would be more biologically meaningful in the individual. Staff notes such exposure differences only to show that high-level magnetic field exposures regularly occur in areas other than around high-voltage power lines.

As with similar SCE lines, specific field strength-reducing measures would be incorporated into the proposed line's design to ensure the field strength minimization currently required by the CPUC in light of the concern over EMF exposure and health.

The field reduction measures to be applied include the following:

1. increasing the distance between the conductors and the ground to an optimal level;
2. reducing the spacing between the conductors to an optimal level;
3. minimizing the current in the line; and
4. arranging current flow to maximize the cancellation effects from interacting of conductor fields.

Given the proposed project line's low-field design, (as Segment 1 and Segment 2), any long-term residential field exposures would be at levels associated with SCE lines of similar voltage and current-carrying capacity. It is this similarity with existing lines that constitutes compliance with present CPUC's policy on line field management.

Maximum field intensities for Segment 1 (alone within its own right-of-way) reflect the effectiveness of the applied field reduction measures and potential level of contribution to area exposures. The applicant (COP 2008a, pp. 5.14-5 through 5.14-7, and Figures 5.14-1 through 5.14-7) calculated these maximum field intensities as 30 mG for the magnetic field and 0.65 kV/m for the electric field. These field intensities are similar to those for fields from SCE lines of similar voltage and current-carrying capacity. For Segment 2 (which would share an existing right-of-way with several SCE lines), the maximum intensity of 1.66 kV/m before the line is introduced compares with the 1.86 kV/m estimated for the period the line is operating. The maximum magnetic field intensity was calculated as 144 mG before the line and the same 144 mG when the new line is operating. The lack of change in magnetic field strength in spite of the added PHPP power reflects the interactive effects of fields from all contributing lines. Since these field intensities would depend on the effectiveness of the applied field-reducing measures, they should mostly remain the same within any specific route connecting PHPP and the Pearblossom Substation in a way that avoids the existing aviation-related facilities. While these maximum field intensities are similar to those of similar SCE lines (as required under current CPUC regulations), they are much less than the 200 mG currently specified by the few states with regulatory limits. The requirements in Condition of Certification **TLSN-2** for field strength measurements are intended to assess the applicant's assumed reduction efficiency.

Closure and Decommissioning Impacts and Mitigation

If the proposed PHPP were to be closed, decommissioned and all related structures are removed as described in the **Project Description** section, the minimal area aviation risk and electric shocks and fire hazards from the physical presence of this project line would be eliminated. Decommissioning and removal would also eliminate the line's field impacts assessed in this analysis in terms of nuisance shocks, radio-frequency impacts, audible noise, and electric and magnetic field exposure. Since the line would be designed and operated according existing SCE guidelines, these impacts would be as expected for SCE lines of the same voltage and current-carrying capacity and therefore, at levels reflecting compliance with existing health and safety LORS.

No Project/No Action Alternative.

As noted by the applicant (COP 2008a, pp. 4-1 through 4-15) failure to build the proposed PHPP and its related tie-in transmission line would eliminate the potential field and nonfield impacts of specific concern in this analysis. Since the l design and operation would be according to existing SCE guidelines, these avoided impacts would be at levels expected for similar area SCE lines.

CUMULATIVE IMPACTS AND MITIGATION

When field intensities are measured or calculated for a specific location, they reflect the interactive, and therefore, cumulative effects of fields from all contributing conductors. This interaction could be additive or subtractive depending on prevailing conditions. The field strength estimates for Segment 1 (within the right-of-way it would occupy by itself) reflects the potential level of its contribution to total field exposures along the Phase one line segment. The phase two segment line would similarly add to the cumulative exposure within the occupied corridor. Since the proposed line segments would be designed, built, and operated according to applicable field-reducing SCE guidelines (as currently required by the CPUC for effective field management), any contribution to these cumulative area exposures should be at levels expected for SCE lines of similar voltage and current-carrying capacity. It is this similarity in intensity that constitutes compliance with current CPUC requirements on EMF management. The actual field strengths and contribution levels for the proposed line design would be assessed from the results of the field strength measurements specified in Condition of Certification **TLSN-2**.

COMPLIANCE WITH LORS

As previously noted, current CPUC policy on safe EMF management requires that any high-voltage line within a given area be designed to incorporate the field strength-reducing guidelines of the main area utility lines to be interconnected. The utility in this case is SCE. Since the proposed project 230-kV line and related switchyards would be designed according to the respective requirements of the LORS listed in **Table 1**, and operated and maintained according to current SCE guidelines on line safety and field strength management, staff considers the proposed design and operational plan to be in compliance with the health and safety requirements of concern in this analysis.

NOTEWORTHY PUBLIC BENEFITS

Since the proposed PHPP line segments would pose specific, although insignificant risks of the field and nonfield effects of concern in this analysis, their building and operation would not yield any public benefits regarding the effort to minimize any human risks from these impacts.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff received no public or agency comments on the preliminary staff assessment of the transmission line nuisance and safety aspects of the proposed PHPP.

CONCLUSIONS

Since staff does not expect the proposed 230-kV transmission line to pose an aviation hazard according to current FAA criteria, we do not consider it necessary to recommend location changes on the basis of a potential hazard to area aviation.

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

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

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed PHPP and similar transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed line's design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information. Any long-term, mostly residential magnetic exposure of health concern in recent years would be at levels possible with SCE lines of similar voltage and current-carrying capacity and thus in keeping with current CPUC requirements. On-site worker or public exposure would be short term and at levels expected for SCE lines of similar design and current-carrying capacity. Such exposure is well understood and has not been established as posing a significant human health hazard.

Since the proposed project line would be operated to minimize the health, safety, and nuisance impacts of concern to staff, staff considers the proposed design, maintenance, and construction plan as complying with the applicable laws. With implementation of the conditions of certification proposed below, any such impacts would be less than significant for any of the area routes that might be chosen to avoid affecting area airport operations.

PROPOSED CONDITIONS OF CERTIFICATION

TLSN-1 The project owner shall construct the proposed transmission line according to the requirements of California Public Utility Commission's GO-95, GO-52, GO-131-D, Title 8, and Group 2. High Voltage Electrical Safety Orders, sections 2700 through 2974 of the California Code of Regulations, and Southern California Edison's EMF reduction guidelines.

Verification: At least 30 days before starting the transmission line or related structures and facilities, the project owner shall submit to the Compliance Project Manager (CPM) a letter signed by a California registered electrical engineer affirming that the lines will be constructed according to the requirements stated in the condition.

TLSN-2 The project owner shall ensure that every reasonable effort will be made to identify and correct, on a case-specific basis, any complaints of interference with radio or television signals from operation of the chosen line option or associated switchyard.

Verification: At least thirty days before starting operation of either line option, the project owner shall submit to the CPM a letter signed by a California registered electrical engineer affirming the project owner's intention to comply with this requirement.

TLSN-3 The project owner shall use a qualified individual to measure the strengths of the electric and magnetic fields from the line at the points of maximum intensity along the route for which the applicant provided specific estimates. The measurements shall be made before and after energization according to the American National Standard Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) standard procedures. These measurements shall be completed no later than 6 months after the start of operations.

Verification: The project owner shall file copies of the pre-and post-energization measurements with the CPM within 60 days after completion of the measurements.

TLSN-4 The project owner shall ensure that the rights-of-way of the proposed transmission line are kept free of combustible material, as required under the provisions of section 4292 of the Public Resources Code and section 1250 of Title 14 of the California Code of Regulations.

Verification: During the first 5 years of plant operation, the project owner shall provide a summary of inspection results and any fire prevention activities carried out along the right-of-way and provide such summaries in the Annual Compliance Report.

TLSN-5 The project owner shall ensure that all permanent metallic objects within the right-of-way of the project-related lines are grounded according to industry standards regardless of ownership.

Verification: At least 30 days before the lines are energized, the project owner shall transmit to the CPM a letter confirming compliance with this condition.

REFERENCES

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EPRI -Electric Power Research Institute. 1982. Transmission Line Reference Book: 345 kV and Above.

National Institute of Environmental Health Services. 1998. An Assessment of the Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields. A Working Group Report, August 1998.

WASTE MANAGEMENT

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SUMMARY OF CONCLUSIONS

Management of non- Heat Transfer Fluid (HTF) wastes generated during construction and operation of the Palmdale Hybrid Power Project (PHPP) would not result in any significant adverse impacts and would comply with applicable waste management laws, ordinances, regulations, and standards if the measures proposed in the Application for Certification and staff's proposed conditions of certification are implemented. In the case of HTF releases, staff cannot finalize a condition of certification until further information is received on the design and location of the bioremediation unit for the HTF- contaminated soils and associated permit requirements from the Lahontan Regional Water Quality Control Board (Lahontan RWQCB).

INTRODUCTION

This Preliminary Staff Assessment (PSA) presents an analysis of issues associated with wastes generated by the proposed construction and operation of the PHPP. The technical scope of this analysis encompasses solid wastes existing on site and wastes that would likely be generated during facility construction and operation. Management and discharge of wastewater is addressed in the **Soil and Water Resources** section of this document. Additional information related to waste management may also be covered in the **Worker Safety** and **Hazardous Materials Management** sections of this document.

In accordance with the California Environmental Quality Act (CEQA) Guidelines and waste management significance criteria (CCR 2008), the California Energy Commission (Energy Commission) staff's objectives in conducting this waste management analysis are to ensure that:

- The management of project wastes would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS).
- During project construction and operation, wastes are managed in such a way that the wastes themselves, or any waste constituents, would not result in contamination or releases that pose a significant risk to humans or the environment.
- The disposal of project wastes would not result in significant adverse impacts to existing waste disposal facilities.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local environmental laws, ordinances, regulations, and standards (LORS) have been established to ensure the safe and proper management of both solid and hazardous wastes in order to protect human health and the environment. Project compliance with the various LORS is a major component of staff's determination regarding the significance and acceptability of the PHPP project with respect to management of waste.

WASTE MANAGEMENT Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
Title 42, United States Code (U.S.C.), §6901, et seq. Solid Waste Disposal Act of 1965 (as amended and revised by the Resource Conservation and Recovery Act of 1976, et al.)	Establishes requirements for the management of solid wastes (including hazardous wastes), landfills, underground storage tanks, and certain medical wastes. The statute also addresses program administration, implementation and delegation to states, enforcement provisions, and responsibilities, as well as research, training, and grant funding provisions. RCRA Subtitle C establishes provisions for the generation, storage, treatment, and disposal of hazardous waste, including requirements addressing: • Generator record keeping practices that identify quantities of hazardous wastes generated and their disposition; • Waste labeling practices and use of appropriate containers; • Use of a manifest when transporting wastes; • Submission of periodic reports to the United States Environmental Protection Agency (U.S. EPA) or other authorized agency; and • Corrective action to remediate releases of hazardous waste and contamination associated with RCRA-regulated facilities. RCRA Subtitle D establishes provisions for the design and operation of solid waste landfills. RCRA is administered at the federal level by U.S. EPA and its 10 regional offices. The Pacific Southwest regional office (Region 9) implements U.S. EPA programs in California, Nevada, Arizona, and Hawaii.
Title 42, U.S.C., §9601, et seq. Comprehensive Environmental Response, Compensation and Liability Act (also known as *Superfund*)	Establishes authority and funding mechanisms for cleanup of uncontrolled or abandoned hazardous waste sites, as well as cleanup of accidents, spills, or emergency releases of pollutants and contaminants into the environment. Among other things, the statute addresses: • Reporting requirements for releases of hazardous substances; • Requirements for remedial action at closed or abandoned hazardous waste sites, and brownfields; • Liability of persons responsible for releases of hazardous substances or waste; and • Requirements for property owners/potential buyers to conduct "all appropriate inquiries" into previous ownership and uses of the property to 1) determine if hazardous substances have been or may have been released at the site, and 2) establish that the owner/buyer did not cause or contribute to the release. A Phase I Environmental Site Assessment is commonly used to satisfy CERCLA "all appropriate inquiries" requirements.
Title 40, Code of Federal Regulations (CFR), Subchapter I – Solid Wastes	Implements the provisions of the Solid Waste Disposal Act and RCRA (described above). Among other things, the regulations establish the criteria for classification of solid waste disposal facilities (landfills), hazardous waste characteristic criteria and regulatory thresholds, hazardous waste generator requirements, and requirements for management of used oil and universal wastes.

	• Part 257 addresses the criteria for classification of solid waste disposal facilities and practices. • Part 258 addresses the criteria for municipal solid waste landfills. • Parts 260 through 279 address management of hazardous wastes, used oil, and universal wastes (i.e., batteries, mercury-containing equipment, and lamps). U.S. EPA implements the regulations at the federal level. However, California is a RCRA-authorized state, so most of the solid and hazardous waste regulations are implemented by state agencies and authorized local agencies in lieu of U.S. EPA.
Title 49, CFR, Parts 172 and 173. Hazardous Materials Regulations	Addresses the United States Department of Transportation established standards for transport of hazardous materials and hazardous wastes. The standards include requirements for labeling, packaging, and shipping of hazardous materials and hazardous wastes, as well as training requirements for personnel completing shipping papers and manifests. Section 172.205 specifically addresses use and preparation of hazardous waste manifests in accordance with Title 40, CFR, Section 262.20.
Federal Clean Water Act, 33 USC § 1251 *et seq.*	Controls discharge of wastewater to the surface waters of the U.S.
State	
California Health and Safety Code (HSC), Chapter 6.5, §25100, et seq. Hazardous Waste Control Act of 1972, as amended	Creates the framework under which hazardous wastes must be managed in California. The law provides for the development of a state hazardous waste program that administers and implements the provisions of the federal RCRA program. It also provides for the designation of California-only hazardous wastes and development of standards (regulations) that are equal to or, in some cases, more stringent than federal requirements. The California Environmental Protection Agency (CalEPA), Department of Toxic Substances Control (DTSC) administers and implements the provisions of the law at the state level. Certified Unified Program Agencies (CUPAs) implement some elements of the law at the local level.
Title 22, California Code of Regulations (CCR), Division 4.5. Environmental Health Standards for the Management of Hazardous Waste	Establishes requirements for the management and disposal of hazardous waste in accordance with the provisions of the California Hazardous Waste Control Act and federal RCRA. As with the federal requirements, waste generators must determine if their wastes are hazardous according to specified characteristics or lists of wastes. Hazardous waste generators must obtain identification numbers; prepare manifests before transporting the waste off site; and use only permitted treatment, storage, and disposal facilities. Generator standards also include requirements for record keeping, reporting, packaging, and labeling. Additionally, while not a federal requirement, California requires that hazardous waste be transported by registered hazardous waste transporters. The standards addressed by Title 22, CCR include: • Identification and Listing of Hazardous Waste (Chapter 11, §66261.1, et seq.). • Standards Applicable to Generator of Hazardous Waste (Chapter 12, §66262.10, et seq.). • Standards Applicable to Transporters of Hazardous Waste (Chapter 13, §66263.10, et seq.).

	• Standards for Universal Waste Management (Chapter 23, §66273.1, et seq.). • Standards for the Management of Used Oil (Chapter 29, §66279.1, et seq.). • Requirements for Units and Facilities Deemed to Have a Permit by Rule (Chapter 45, §67450.1, et seq.). The Title 22 regulations are established and enforced at the state level by DTSC. Some generator and waste treatment standards are also enforced at the local level by CUPAs.
HSC, Chapter 6.11 §§25404 – 25404.9 Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program)	Consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of the six environmental and emergency response programs listed below. • Aboveground Petroleum Storage Act requirements for Spill Prevention, Control, and Countermeasure (SPCC) Plans. • Hazardous Materials Release and Response Plans and Inventories (Business Plans). • California Accidental Release Prevention (CalARP) Program. • Hazardous Material Management Plan / Hazardous Material Inventory Statements. • Hazardous Waste Generator / Tiered Permitting Program. • Underground Storage Tank Program. The state agencies responsible for these programs set the standards for their programs while local governments implement the standards. The local agencies implementing the Unified Program are known as CUPAs. The Los Angeles County Fire Department is the CUPA for the PHPP project. Note: The Waste Management analysis only considers application of the Hazardous Waste Generator/Tiered Permitting element of the Unified Program.
Title 27, CCR, Division 1, Sub-division 4, Chapter 1, §15100, et seq. Unified Hazardous Waste and Hazardous Materials Management Regulatory Program	Primarily addresses certification and implementation of the program by the local CUPAs, but also contains specific reporting requirements for businesses. • Article 9 – Unified Program Standardized Forms and Formats (§§ 15400–15410). • Article 10 – Business Reporting to CUPAs (§§15600–15620).
Public Resources Code, Division 30, §40000, et seq. California Integrated Waste Management Act of 1989	Establishes mandates and standards for management of solid waste in California. The law addresses solid waste landfill diversion requirements; establishes the preferred waste management hierarchy (source reduction first, then recycling and reuse, and treatment and disposal last); sets standards for design and construction of municipal landfills; and addresses programs for county waste management plans and local implementation of solid waste requirements.
Title 14, CCR, Division 7, §17200, et seq.	Implements the provisions of the California Integrated Waste Management Act and sets forth minimum standards for solid waste handling and disposal. The regulations include standards for solid waste

California Integrated Waste Management Board	management, as well as enforcement and program administration provisions. • Chapter 3 – Minimum Standards for Solid Waste Handling and Disposal. • Chapter 3.5 – Standards for Handling and Disposal of Asbestos Containing Waste. • Chapter 7 – Special Waste Standards. • Chapter 8 – Used Oil Recycling Program. • Chapter 8.2 – Electronic Waste Recovery and Recycling.
HSC, Division 20, Chapter 6.5, Article 11.9, §25244.12, et seq. Hazardous Waste Source Reduction and Management Review Act of 1989	Expands the state's hazardous waste source reduction activities. Among other things, it establishes hazardous waste source reduction review, planning, and reporting requirements for businesses that routinely generate more than 12,000 kilograms (approximately 26,400 pounds) of hazardous waste in a designated reporting year. The review and planning elements are required to be done on a four-year cycle, with a summary progress report due to DTSC every fourth year.
Title 22, CCR, §67100.1 et seq. Hazardous Waste Source Reduction and Management Review	Further clarifies and implements the provisions of the Hazardous Waste Source Reduction and Management Review Act of 1989 (noted above). The regulations establish the specific review elements and reporting requirements to be completed by generators subject to the act.
Local	
Los Angeles County Fire Department, Health and Hazardous Materials Division County of Los Angeles Codes, Title 32 Fire Code	Establishes requirements for the use, generation, storage, and disposal of hazardous materials and wastes within the Los Angeles County.
Solid Waste Handling and Recycling Services Chapter 5.52 City of Palmdale Municipal Code	Establishes requirements for commercial and industrial collection of solid waste.
Los Angeles County Code Chapter 20.87	Requires projects in the County unincorporated areas to recycle or reuse 50 percent of the debris generated, in accordance with the mandates of Integrated Waste Management Act of 1989. The County of Los Angeles Department of Public Works enforces the ordinance in unincorporated areas of the County.

SETTING

The PHPP would be located in the northernmost part of the City of Palmdale, in Los Angeles County. The high desert city is 60 miles north of Los Angeles and just south of Lancaster, at the southwestern edge of the Antelope Valley. The 383-acre project site is part of a 600-acre City-owned property, bounded by Sierra Highway to the west, East Avenue M to the north, and the U.S. Air Force Plant 42 to the south and east. The undeveloped site supports Joshua tree woodland, Mojave creosote bush scrub, and rabbit bush scrub.

With a nominal output of 570 MW, the PHPP would consist of a hybrid of natural gas-fired combined-cycle generating equipment integrated with solar thermal generating equipment. The solar thermal input would provide approximately 10 percent of the peak power generated by the Project during the daily periods of highest energy demand.

A 35.6-mile transmission interconnection would connect from SCE's Vincent Substation south of Palmdale. From the substation, the interconnection would travel east to Lone Oak Rd, north on 126th St., west on E. Ave. S, north on 120th St., west on E. Ave. Q, north on 100th St. E, east on E. Ave. P, north on 100th St. E., west on E. Ave. M, north again on 100th St. E., west on E. Ave. L, south on 30th St. E, and west on E. Ave M to the project site. The Southern California Gas Company would construct an 8.7-mile pipeline to deliver natural gas to the PHPP; from the gas main, the pipeline would travel west on E. Ave. S, north on 10th St., west on Blackbird Way, north on Sierra Hwy, and east along E. Ave. M. The Los Angeles County Waterworks District No. 40 would supply potable water; the 1-mile potable water pipeline would originate on E Ave. N near the water tanks between 5th and 6th St. E, proceed along E Ave. M, turn south at the new entrance on 10th St. E, and follow the new access road entering the power block from the west. The City of Palmdale Water Reclamation Plant (PWRP) would supply reclaimed water, with a 1-mile alignment that heads west on E Ave. P, north on 10th St. E, west on Blackbird Way, North on Sierra Highway, and east on E Ave. M to the project site. Meanwhile, sanitary wastewater would be disposed by a 1-mile long sewer connection to the Los Angeles County Sanitation District. The applicant modified the pipeline location (originally proposed to connect to an existing sewer line at E. Ave. L and 10th St. E, approximately 1.0 mile north of the plant site); the revised route would proceed north from the east side of the power block, east along E Ave. M, and connect with the sanitary wastewater main at 25th St. E. (COP2008a, Sections 2, 5.3, and 5.7; AECOM2009E, p. PD 1-5; AECOM2009i, p. WASTE-1).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

This **Waste Management** analysis addresses; a) existing project site conditions and the potential for contamination associated with prior activities on or near the project site and b) the impacts from the generation and management of wastes during project construction and operation.

a) For any site in California proposed for the construction of a power plant, the applicant must provide documentation about the nature of any potential or existing releases of hazardous substances or contamination at the site. If potential or existing releases or contamination at the site are identified, the significance of the release or contamination would be determined by site-specific factors, including, but not limited to: the amount and concentration of contaminants or contamination; the proposed use of the area where the contaminants/contamination is found; and any potential pathways for workers, the public, or sensitive species or environmental areas to be exposed to the contaminants. Any unmitigated contamination or releases of hazardous substances that pose a risk to human health or environmental receptors would be considered significant by Energy Commission staff.

As a first step in documenting existing site conditions, the Energy Commission's power plant site certification regulations require that a Phase I Environmental Site Assessment (ESA) be prepared[1] and submitted as part of an application for certification. The Phase I ESA is conducted to identify any conditions indicative of releases and threatened releases of hazardous substances at the site and to identify any areas known to be contaminated (or a source of contamination) on or near the site.

In general, the Phase I ESA uses a qualified Environmental Professional (EP) to conduct inquiries into past uses and ownership of the property, research hazardous substance releases and hazardous waste disposal at the site and within a certain distance of the site, and visually inspect the property, making observations about the potential for contamination and possible areas of concern. After conducting all necessary file reviews, interviews, and site observations, the EP then provides findings about the environmental conditions at the site. In addition, since the Phase I ESA does not include sampling or testing, the EP may also give an opinion about the potential need for any additional investigation. Additional investigation may be needed, for example, if there were significant gaps in the information available about the site, an ongoing release is suspected, or to confirm an existing environmental condition.

In conducting its assessment of a proposed project, Energy Commission staff will review the project's Phase I ESA and work with the appropriate oversight agencies, as necessary, to determine if additional site characterization work is needed. If additional investigation is needed to identify the extent of possible contamination, a Phase II ESA may be required. The Phase II ESA usually includes sampling and testing of potentially contaminated media to verify the level of contamination and the need for remediation at the site. If a hazardous substance release or contamination is identified at the site, staff will again work with the appropriate oversight agencies to identify what mitigation, if any, may be necessary to protect human health and the environment from any releases or contamination identified.

b) Regarding the management of project-related wastes generated during construction and operation of the proposed project, staff reviews the applicant's proposed solid and hazardous waste management methods and determines if the methods proposed are consistent with the LORS identified for waste disposal and recycling. The federal, state, and local LORS represent a comprehensive regulatory system designed to protect human

[1] Title 20, California Code of Regulations, section 1704(c) and Appendix B, section (g)(12)(A). Note that the Phase I ESA must be prepared according to American Society for Testing and Materials protocol or an equivalent method agreed upon by the applicant and the Energy Commission staff.

health and the environment from impacts associated with management of both nonhazardous and hazardous wastes. Absent any unusual circumstances, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur as a result of project waste management.

Staff then reviews the capacity available at off-site treatment and disposal sites and determines whether or not the proposed power plant's waste would have a significant impact on the available capacity.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Existing Site Conditions and Possible Contamination

A Phase I ESA, dated May 2008, was prepared by ENSR in accordance with the American Society for Testing and Materials Standard Practice E 1527-05 for ESAs. The Phase I ESA addressed conditions on the 383-acre vacant site located to the southwest of the intersection of E. Avenue M Road and Sierra Highway, in the City of Palmdale – but did not review transmission, gas, and water linear routes. It is included as Appendix K of the project's AFC.

The site consists of entire or partial portions of 16 parcels. Based on maps, aerial photographs, and other historical records, the site has been vacant, undeveloped desert land since at least the early 1900s. The City purchased the property from Lockheed Martin in March 2007, at which time there was no evidence of recognized environmental conditions (RECs) in connection with the site (Tetra Tech 2007). Prior to Lockheed Martin assuming ownership in 1984, a succession of private owners date back to the 1940s.

During ENSR's March 4, 2008 site visit, municipal trash and miscellaneous debris were sporadically observed. Such debris included tar piles, asphalt piles, scattered tiles/bricks, rusty metal cans, broken glass bottles, clothing, roofing materials, tires, piles of sand/gravel/dirt, concrete debris, and wood. A slightly disturbed surface area, which appeared to have been used for unauthorized dumping, was observed in the central portion of the site. The site visit, however, did not find any evidence of hazardous materials. No observations were made of groundwater monitoring wells, clarifiers, or dry wells; discolored soil, water, or unusual vegetative conditions; or of staining or visual evidence of a hazardous materials release. Buildings and structures were not present, curbing potential concerns about asbestos-containing material, lead-based paint, and mold or water intrusion. In addition, no power line transformers, aboveground storage tanks, underground storage tanks, or petroleum hydrocarbon storage/use/disposal were observed. ENSR considered the scattered trash and debris a de minimis condition and did not recommend further assessment of the site. Staff concurs that no further assessment is necessary at this time given the nature of the wastes. Staff discusses appropriate disposal of these wastes below under Construction Impacts and Mitigation.

Air Force Plant 42, a federally-owned military aerospace facility to the east and south of the proposed PHPP site, was developed in the 1950s. ENSR reviewed the Air Force's January 2008 Installation Restoration Program (IRP) Monitoring Report, which describes a plume of contaminated groundwater adjacent to the east side of the PHPP site. The report shows the plume is migrating to the south, away from the PHPP site. The closest groundwater monitoring wells (on Air Force property) have historically detected trichloroethylene (TCE), chloromethane, toluene, acetone, and perchloroethylene. Since the groundwater plume does not extend to the proposed site, ENSR does not expect the plume from the adjacent site to present an REC to the proposed site.

To verify this information, staff reviewed the Air Force's proposed interim remediation plan (CH2M Hill 2008); the plan indicates that the majority of the remaining TCE in the vadose (unsaturated) zone and groundwater is located beneath Building 150, located approximately 1000 feet east of the PHPP boundary. As noted above, groundwater flow is to the south. The plume boundary is approximately 700 feet east of the PHPP boundary. A soil vapor extraction treatment system is located on the west side of Building 150 and a groundwater treatment system is located southeast of the building. No other off-site sources of concern were identified. Staff does not expect PHPP construction and operation activities to affect Air Force Plant 42 remedial actions associated with Building 150 nor would these remedial actions affect PHPP construction or operation.

ENSR conducted a subsequent Phase I ESA, dated February 2009, on the proposed 8.7-mile natural gas, 7.4-mile reclaimed water, 1.0-mile potable water, and 1.0-mile sanitary wastewater pipeline (original and revised) routes. The pipeline routes are primarily in the City of Palmdale, with a short segment in unincorporated Los Angeles County; they are either along city-controlled parcels or land owned by gas and electric utilities. No RECs were identified from historical research (review of topographic maps), database and records review, and a field survey (conducted on January 6, 2009). Portions of the routes are located within the vicinity of active regulatory cases, although no offsite sources of concern were identified. Furthermore, as pipeline construction would not have an impact on soils below a depth of 10 to 15 feet, ENSR did not recommend additional assessment of the routes (AECOM2009b, Attachment DR-86). The applicant subsequently relocated the sanitary wastewater pipeline to proceed east along East Ave. M (located approximately 2,000 feet north of Building 150), and conducted a review of the EDR database the week of April 20, 2009. Staff concurs with the EDR review conclusion that contamination from the adjacent Air Force Plant 42 is not expected to have impacted the proposed sanitary wastewater route (AECOM2009i, p. WASTE-1).

The Applicant conducted a Phase I ESA for portions of the 35.6-mile transmission interconnection, and has agreed to Condition of Certification **Waste-1** to evaluate potentially contaminated sites for the entire length of the transmission route where construction would occur. **Waste-1** would require a Phase I ESA, and subsequent Phase II ESA and Health Risk Assessment, as appropriate, of those areas that have not been evaluated in the Phase I ESA. In addition, portions of the alignment will traverse properties where there has been agricultural activity. Past agricultural land use can result in remnant concentrations of potentially hazardous pesticides and other agricultural chemicals. **Waste-2** would require the project owner to test for residual pesticides/herbicides on currently or historically farmed land in agricultural areas where transmission line construction would occur. These conditions will ensure that any potentially hazardous substances are identified and appropriate mitigation measures are implemented to ensure public health and safety during project construction.
If contamination is identified during construction of any part of the project (the power block, pipeline routes, transmission line, etc.), staff recommends the applicant be required to comply with Conditions of Certification **Waste-3, 4, and 5. Waste-3** would require that an experienced and qualified Professional Engineer or Professional Geologist be available for consultation in the event contaminated soil is encountered. If contaminated soil is identified,

Waste-4 would require that the Professional Engineer or Professional Geologist inspect the site, determine what is required to characterize the nature and extent of contamination, and provide a report to the Energy Commission Compliance Project Manager (CPM) and DTSC with findings and recommended actions. **Waste-5** would require that any additional work be conducted under the oversight of DTSC, with review and approval from the CPM.

Construction Impacts and Mitigation

Site preparation and construction of the proposed hybrid solar project and its associated facilities would last approximately 27 months (COP2008a p. 2-41) and generate both non-hazardous and hazardous wastes in solid and liquid forms. Before construction can begin, the project owner will be required to develop and implement a Construction Waste Management Plan as described in the proposed Condition of Certification **Waste-6**. This plan must describe all waste streams and methods of managing each waste.

Nonhazardous Wastes

Construction activities would generate, on a weekly basis, 40 cubic yards of construction waste, 3 cubic yards of office waste, and 4 spent compressed gas cylinders. Recyclable materials (including the gas cylinders) would be separated and removed as needed to recycling facilities. Non-recyclable items (such as insulation, other plastics, food waste, paint containers, and packing materials) would be disposed at a Class III landfill (COP2008a p. 5.16.12).

Non-hazardous liquid wastes generated during construction would include 200 gallons per day of sanitary waste, which would be disposed by a sewer connection to the Los Angeles County Sanitation District. Storm water runoff would be managed in accordance with appropriate LORS. Please see the **Soil and Water Resources** section of this document for more information on the management of project wastewater and storm water.

Hazardous Wastes

During construction, anticipated hazardous wastes include waste paint, spent construction solvents, waste cleaners, waste oil, oily rags, waste batteries, and HRSG cleaning waste. Estimated amounts are 1 cubic yard of empty hazardous material containers (per week), 175 gallons of solvents/oil/paint/oily rags (every 90 days), 60,000 gallons of chealant-type solution (one-time event), and 20 spent alkaline batteries (in two years). Empty hazardous material containers would be returned to the vendor or regularly disposed at a permitted Class I hazardous waste facility; solvents, used oils, paint, oily rags, and adhesives would be recycled and spent batteries would be disposed at a recycling facility (COP2008a, pages 5.14-11 to 5.14-12).

Hazardous waste would be collected and stored in a satellite accumulation area or an appropriately-contained hazardous waste accumulation area for less than 90 days. Accumulated wastes would then be properly manifested, transported, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies. Staff reviewed the disposal methods and concluded that all wastes would be disposed of in accordance with all applicable LORS. Should any construction waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by the proposed Condition of Certification **Waste-7** to notify the CPM. Along with the notification, the project owner must describe how the violation will be corrected and include a timeline for completion of the correction. In the event that construction excavation, grading, or trenching activities for the proposed project encounter potentially contaminated soils, specific waste handling, disposal, or other precautions may be necessary pursuant to hazardous waste management LORS.

Both the construction contractor and the project owner/operator could be considered the generators of hazardous wastes at the site during the construction period. Because hazardous waste generator status is determined by site, the project owner would be required to obtain a unique hazardous waste generator identification number for the site prior to starting construction, pursuant to proposed Condition of Certification **Waste-8**. Wastes would be accumulated on site for less than 90 days and then properly manifested, transported to, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies.

Staff has reviewed the proposed construction waste management methods described in AFC section 5.16.3.1 and in the responses to data requests, and concludes that project construction wastes would be managed in accordance with all applicable LORS. Absent any unusual circumstances and with the implementation of Conditions of Certification **Waste-7** described above, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur as a result of project waste management activities.

Construction and Demolition (C&D) Waste Diversion

The Integrated Waste Management Act of 1989 [Assembly Bill (AB) 939, Sher, Chapter 1095, Statutes of 1989] established landfill waste diversion goals for both the state and local jurisdictions. Accordingly, the County of Los Angeles added Chapter 20.87 to the Los Angeles County Code, requiring construction projects (valued at over $100,000 or requiring demolition or grading permits) to recycle or reuse at least 50 percent of the debris generated. Steps to meet ordinance requirements include submitting the County's Recycling and Reuse Plan and Final Compliance Report. Any violations are subject to administrative penalty, enforcement, and collection proceedings. The ordinance applies to projects in the County's unincorporated areas, where portions of the project's transmission lines would reside. The remainder of the project, including the power block and solar arrays, is located within the Palmdale city limits. The City does not operate a formal Construction and Demolition (C&D) Waste Diversion Program, but a franchising agreement with Waste Management Inc. provides such services to the City and to private contractors operating on behalf of the City. Staff believes the Applicant should be required to comply with the County and City of Palmdale requirements to meet a 50 percent waste diversion rate. Adoption of Condition of Certification **Waste-9** will ensure the Applicant reports to the CPM and to the County of Los Angeles on how much waste is being diverted and that the PHPP project owner is meeting the waste diversion goals of the C&D program. Staff believes that compliance with proposed Condition of Certification **Waste-9** would also help ensure that project construction wastes are managed properly and further reduce potential impacts to local landfills from project wastes.

Operation Impacts and Mitigation

The proposed PHPP project would generate both non-hazardous and hazardous wastes in solid and liquid forms under normal operating conditions. Table 5.16-6 of the project AFC gives a summary of the anticipated operation waste streams, estimated waste volumes and generation frequency, and proposed management methods. Before operations can begin, the project owner would be required to develop and implement an Operations Waste Management Plan as required in the proposed Condition of Certification **Waste-10**.

Heat Transfer Fluid Releases

The PHPP would use Therminol VP-1™ (a synthetic oil consisting of diphenyl ether and biphenyl) for the heat transfer fluid (HTF). The PHPP solar system would contain 260,000 gallons of Therminol, which would not be stored onsite outside of the closed-loop system (COP2008a p. 5.6-23).

Occasional spills of HTF from either equipment failure or human error can result in the generation of contaminated soil. HTF spills typically spread laterally on the bare ground and soak down to a relatively shallow depth. The contaminated soil is regulated as a hazardous material by the State of California due to the constituent biphenyl. Biphenyl is listed in Title 22, CCR, Chapter 11 Appendix X (list #299) as an extremely hazardous waste. The listing of a chemical in Appendix X creates the regulatory presumption that a waste containing that chemical (i.e. HTF contaminated soil) is hazardous unless determined otherwise, pursuant to specified procedures. The determination is required to be based on criteria and lists in Title 22, California Code of Regulations, Section 66261.1 et seq., which identify hazardous wastes subject to regulation. DTSC made a 1995 determination that a 10,000 mg/kg concentration of HTF would be assumed hazardous for SEGS III-VI at Kramer Junction. This determination, however, cannot be extrapolated to the proposed project, and DTSC has indicated that determination of whether a discharge of HTF constitutes a hazardous waste would have to be made on a case by case basis (CEC2009t). Once a history of discharges has been established, the applicant may petition DTSC for their concurrence on a standardized waste classification for HTF contaminated soils generated at the facility (title 22, CCR, section 66260.200(d)). Depending on DTSC findings an operator could modify their operations to standardize treatment and eliminate the need for case by case determinations.

Title 22, CCR, section 66260.200(f) places the responsibility of determining whether a waste must be classified as hazardous on the generator of that waste. The project owner would therefore be required to assess the waste classification for HTF-impacted soils at the PHPP facility in consultation with the CEC, DTSC, and Lahontan RWQCB.

The applicant estimates generating 10 cubic yards per year of hazardous HTF-contaminated soils and 750 cubic yards per year of non-hazardous soils (COP2008a, p. 5.16-13).
The AFC provides only general information on how spills of HTF at the PHPP would be managed. AFC Table 5.16-6R states that soil contaminated with HTF in concentrations greater than 10,000 mg/kg would be collected and sent off site for disposal at a Class I landfill. Revised Table 5.16-6R provided in response to Data Request #82 indicates that soil contaminated with HTF at levels below 10,000 mg/kg would be moved to a bioremediation unit and subsequently used as fill material on site once concentrations meet permit conditions. No location is provided for the bioremediation unit or specifics on how the material would be processes. In addition, the Lahontan RWQCB would need to issue Waste Discharge Requirements (WDRs) that would specify all the requirements associated with handling and treatment of HTF-contaminated soil. The applicant has not submitted an application/report of waste discharge to the RWQCB that would then allow the water board to issue WDRs.

Until waste discharge requirements are issued by the Lahontan RWQCB, staff cannot determine whether the applicant's proposed treatment and disposal methods for HTF-contaminated soils are generally consistent with and would provide for compliance with these requirements. Condition of Certification **WASTE-11** requires the project owner to comply with RWQCB and Energy Commission requirements regarding the treatment of HTF-contaminated soils. These requirements cannot be developed until staff receives further information on the design and location of the bioremediation unit from the applicant and the permit requirements from the RWQCB.

Nonhazardous Solid Wastes

Non-hazardous solid wastes generated during project operations would consist of: air filters (2,100 every five years), spent demineralizer resins (10 cubic feet every 3 years), sand and filter media (100 cubic feet every 3 years), cooling tower basin sludge (2 tons per year), spent softener resins (100 cubic feet every 3 years), water treatment solids (1,200 pounds per hour), and office wastes.

The wastes generated from cooling tower operations (sludge) and from the processing of cooling tower blowdown in an onsite Zero-Liquid Discharge (ZLD) system (filter press solids, dewatered sludge cake) would be containerized and stored in designated areas prior to disposal at an approved waste management facility. To ensure appropriate disposal of these wastes, Condition of Certification **Waste-12** requires testing of the material and documentation of the handling, testing, and disposal methods in the Operation Waste Management Plan required in Condition of Certification **Waste -10**.

Other than bioremediation of any HTF-contaminated soils, there would be no onsite treatment. Wastes would be recycled to the greatest extent possible, and the remainder would be removed on a regular basis for disposal in a Class III landfill (COP2008a p. 5.16-3 to 5.16-5).

Non-hazardous Liquid Wastes

Non-hazardous liquid wastes would include 5,400 gallons per day of sanitary wastewater (COP2008a, p. 5.16-4) and storm water runoff. Wastewater would be disposed by the sewer connection to the Los Angeles County Sanitation District. Sanitary wastewater and storm water runoff generated during facility operation is discussed in the **Soil and Water Resources** section of this document.

Hazardous Wastes

The project owner/operator would be considered the generator of hazardous wastes at the site during facility operations. Therefore, the project owner's unique hazardous waste generator identification number, obtained prior to construction in accordance with proposed Condition of Certification **Waste-8**, would be retained and used for hazardous waste generated during facility operation.

Hazardous wastes that may be generated during routine project operation include hydraulic fluid/oils/grease/oily filters from turbines and hydraulic actuators (less than 5 gallons per day), oily effluent from water separation systems (3,000 gallons per year), oily rags/oil absorbent/oil filters from various sources (55 gallons per month), spent SCR catalyst (20,000 cubic feet every 3 to 5 years), batteries with lead acid (20 every 2 years), household batteries (less than 10 per month), and fluorescent light bulbs (less than 50 per year) (COP2008a p. 5.16-3). Spills and unauthorized releases of hazardous materials or hazardous wastes may generate contaminated soils or cleanup materials that may also require management and disposal as hazardous waste. Proper hazardous material handling and good housekeeping practices would help keep spill wastes to a minimum. However, to ensure proper cleanup and management of any contaminated soils or waste materials generated from hazardous materials spills, staff proposes Condition of Certification **Waste-13,** requiring the project owner/operator to document, clean up, and properly manage and dispose of wastes from any hazardous materials spills or releases in accordance with all applicable federal, state, and local requirements. (More information on project hazardous materials management provisions, including emergency response and spill reporting and spill control and countermeasures plan requirements is provided in the **Hazardous Materials Management** and **Worker Safety and Fire Protection** sections of this document.)

The amounts of hazardous wastes generated during the operation of the PHPP project would be limited, with source reduction and recycling of wastes implemented whenever possible. The hazardous wastes would be temporarily stored on site, transported off site by licensed hazardous waste haulers, and recycled or disposed of at authorized disposal facilities in accordance with established standards applicable to generators of hazardous waste (Title 22, CCR, §66262.10 et seq.). Should any operations waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by proposed Condition of Certification **Waste-7** to notify the CPM when advised of any such action and provide information on how the violation(s) causing the enforcement action would be corrected.

Impact on Existing Waste Disposal Facilities

Nonhazardous Solid Wastes

During construction and operation of the proposed project, approximately 43 cubic yards per week of nonhazardous solid waste (including scrap wood, concrete, steel, glass, plastic, paper, aluminum, and food) would be generated and recycled or disposed of in a Class III landfill. Approximately 4 spent compressed gas cylinders per week would be recycled.

Table 5.16-4R of AECOM2009b lists 10 non-hazardous (Class III) waste disposal facilities in Los Angeles County that could potentially take the non-hazardous construction and operation wastes generated by the PHPP project. The combined remaining capacity for the landfill facilities is approximately 118.8 million cubic yards. The total amount of nonhazardous waste generated from project construction and operation would contribute significantly less than 10 percent of the available landfill capacity. Staff finds that disposal of the solid wastes generated by the PHPP project could occur without significantly impacting the capacity or remaining life of any of these facilities.

Hazardous Wastes

Hazardous wastes generated during construction and operation would be recycled to the extent possible and practical. AFC Table 5.16-4 lists landfills and recycling facilities that could be used to manage project wastes. Any wastes that cannot be recycled would be transported off-site to a permitted landfill.

Two hazardous waste (Class I) disposal facilities are currently accepting waste and could be used to manage PHPP wastes: the Clean Harbors Buttonwillow Landfill in Kern County and the Chemical Waste Management Kettleman Hills Landfill in Kings County. The Kettleman Hills facility also accepts Class II wastes. In total, there is a combined excess of 15.5 million cubic yards of remaining hazardous waste disposal capacity at these landfills. The Kettleman Hills facility is in the process of permitting an additional 15 million cubic yards of disposal capacity (EEC2006a, Section 8.14.3.5.2), and the Buttonwillow facility has 40 years to reach its capacity at its current disposal rate (CEC2008aa).

Given the availability of recycling facilities for high volume hazardous wastes such as used oil and solvents, along with the remaining capacity available at Class I disposal facilities, staff concludes that the volume of hazardous waste from the PHPP project requiring off-site disposal would be minor and would therefore not significantly impact the capacity or remaining life of the Class I waste facilities.

CUMULATIVE IMPACTS AND MITIGATION

In general, cumulative impacts consist of impacts that are created as a result of the proposed project in combination with impacts from other closely related past, present, or reasonably foreseeable future projects. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over time (Cal. Code Regs., tit. 14, §15355.). Foreseeable projects within a 3-mile radius of the PHPP are the Fairway Business Park (a 120-acre park for industrial tenants), Palmdale Transit Village Specific Plan (a transit-oriented village with up to 1,027 new housing units and 221,000 square feet of retail and office space), Amargosa Creek Specific Plan (a 152-acre site for a Commercial District and a Medical District), and 30th St W and Avenue K Projects (commercial and townhome developments).

The wastes generated by these projects and the proposed PHPP would incrementally increase the volumes of waste requiring offsite management and disposal at local landfills. However, staff has concluded that the PHPP project's proposed waste management methods and mitigation measures (implementation of source reduction, waste minimization and recycling), along with staff's proposed conditions of certification (including compliance with Los Angeles County's construction and demolition waste recycling and diversion requirements), would ensure that wastes generated by the proposed project would not result in a significant cumulative impact to local waste management and disposal facilities.

COMPLIANCE WITH LORS

At this time, Energy Commission staff cannot conclude that the proposed PHPP project would comply with all applicable LORS regulating the management of hazardous and nonhazardous wastes during both facility construction and operation. In the case of Heat Transfer Fluid releases, staff requires receipt of further information on the design and location of the HTF bioremediation unit and Waste Discharge Requirements issued by the Lahontan RWQCB

For all wastes, the applicant would be required to recycle and/or dispose of hazardous and nonhazardous wastes at facilities licensed or otherwise approved to accept the wastes. Because hazardous wastes would be produced during both project construction and operation, the PHPP project would be required to obtain a hazardous waste generator identification number from U.S. EPA. The PHPP project would also be required to properly store, package, and label all hazardous waste; use only approved transporters; prepare hazardous waste manifests; keep detailed records; and appropriately train employees, in accordance with state and federal hazardous waste management requirements.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

No comments have been received.

CONCLUSIONS

Consistent with the three main objectives for staff's waste management analysis (as noted in the Introduction section of this analysis), staff provides the following conclusions:

1) After review of the applicant's proposed waste management procedures, staff concludes that, with the exception of HTF wastes, project wastes would be managed in compliance with all applicable waste management LORS. Staff notes that both construction and operation wastes would be characterized and managed as either hazardous or non-hazardous waste. All non-hazardous wastes would be recycled to the extent feasible, and nonrecyclable wastes would be collected by a licensed hauler and disposed of at a permitted solid waste disposal facility. Hazardous wastes would be accumulated onsite in accordance with accumulation time limits (90,180, 270, or 365 days depending on waste type and volumes generated), and then properly manifested, transported to, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies.

   In the case of HTF releases, staff requires receipt of further information on the design and location of the HTF bioremediation unit and the Waste Discharge Requirements issued by the RWQCB.

   However, to help ensure and facilitate ongoing project compliance with LORS, staff proposes Conditions of Certification **WASTE-1** through **13**. These conditions would require the project owner to do all of the following:

   - Ensure the project site is investigated and any contamination identified is remediated as necessary, with appropriate professional and regulatory agency oversight (**WASTE-1**, **2**, **3, 4, 5, and 11**).
   - Prepare Construction Waste Management and Operation Waste Management Plans detailing the types and volumes of wastes to be generated and how wastes will be managed, recycled, and/or disposed of after generation (**WASTE-6** and **10**).
   - Ensure that all spills or releases of hazardous substances are reported and cleaned-up in accordance with all applicable federal, state, and local requirements (**WASTE-7 and 11, 12** and **13**).
   - Obtain a hazardous waste generator identification number (**WASTE-8**).
   - Comply with local waste recycling and diversion requirements (**WASTE-9**).

- Report any waste management-related LORS enforcement actions and how violations will be corrected (**WASTE-13**).

2) To reduce and remediate as necessary any impacts from hazardous substance or hazardous waste releases at the site to a level of insignificance, staff proposes Conditions of Certification **WASTE-4**, **5**, **11,12** and **13**. Staff concludes that, with the exception of HTF releases, construction and operation of the proposed PHPP project would not result in contamination or releases of hazardous substances that would pose a substantial risk to human health or the environment. Staff cannot make this same conclusion for HTF releases until the applicant submits further information on the design and location of the bioremediation unit and provides a WDR permit from the RWQCB.

3) Regarding impacts of project wastes on existing waste disposal facilities, the existing available capacity for the 10 operating Class III landfills that may be used to manage nonhazardous project wastes is approximately 18.3 million cubic yards. The total amount of nonhazardous wastes generated from construction and operation of PHPP would be minimal compared to the remaining landfill capacity. Therefore, disposal of project generated non-hazardous wastes would have a less than significant impact on Class III landfill capacity.

4) The two Class I disposal facilities that could be used for hazardous wastes generated by the construction and operation of PHPP have a combined remaining capacity in excess of 16 million cubic yards. The total amount of hazardous wastes generated by the PHPP project would be minor. Therefore, impacts from disposal of PHPP generated hazardous wastes would also have a less than significant impact on the remaining capacity at Class I landfills.

Staff concludes that except for HTF-contaminated soils, management of the waste generated during construction and operation of the PHPP project would not result in any significant adverse impacts, and would comply with applicable LORS, if the waste management practices and mitigation measures proposed in the PHPP project AFC and staff's proposed conditions of certification are implemented. In the case of HTF releases, staff requires further information on the design and location of the bioremediation unit for the HTF-contaminated soils and associated permit requirements from the WQCB before a similar conclusion can be made.

PROPOSED CONDITIONS OF CERTIFICATION

WASTE-1 The project owner shall implement the following steps at locations where excavation or significant ground disturbance will occur for the construction of the project transmission line. All steps shall be completed at least 60 days prior to the project transmission line construction to prevent mobilization of contaminants and exposure of workers and the public:

- Step 1. Investigate the tower locations and associated laydown and staging areas for construction of the transmission line to determine whether these locations have a record of hazardous material contamination which would affect construction activities. This investigation shall be performed as a Phase I

Environmental Site Assessment (ESA). If contamination is identified that could potentially affect the health and safety of workers or the public during construction of the Proposed Project, proceed to Step 2.

- Step 2. Perform a Phase II ESA to characterize the locations and determine the nature and extent of the contamination present at the location before construction activities proceed within the Project Right-of-Way near the suspect site. If it is determined there are conditions that may pose a risk to the health and safety of workers or the public, or could mobilize contamination, then proceed to Step 3.
- Step 3. Prepare a Health Risk Assessment to determine whether risks may be present and a Remedial Action Plan to identify what remedial measures would be required to facilitate linear construction if there were conditions that pose a risk. Mitigate the health and safety risk according to applicable regulations or requirements. This would include preparation and implementation of site-specific Health and Safety Plans, Work Plans, and/or Remediation Plans.

Verification: The project owner shall submit the Phase I ESA, and Phase II ESA, Health Risk Assessment results and other plans, as applicable, to the CPM at least 60 days prior to commencement of transmission line construction.

WASTE-2 In areas where the land has been or is currently being farmed, and where excavation or significant ground disturbance will occur for the construction of the project transmission line, soil samples shall be collected and tested for herbicides, pesticides, and fumigants to determine the presence and extent of any material levels of contamination.

The sampling and testing plan shall be prepared in consultation with the appropriate Los Angeles County agency, conducted by an appropriate California licensed professional, and sent to a California Certified laboratory for testing. Sampling and analysis shall be consistent with the DTSC's 'Interim Guidance for Sampling Agricultural Fields for School Sites (Third Revision)' or equivalent. A report documenting the areas proposed for sampling, and the process used for sampling and testing shall be submitted to the Energy Commission for review and approval at least 90 days before transmission line construction occurs in the affected areas. Results of the laboratory testing and recommended resolutions for handling and excavation of material found to exceed regulatory requirements shall be submitted to the Energy Commission 60 days prior to transmission line construction occurs in the affected areas. Should sampling indicate additional remediation or mitigation is required, Conditions of Certification **WASTE-3 and -4** would apply.

Excavated materials containing elevated levels of pesticide or herbicide require special handling and disposal according to procedures established by the regulatory agencies. Effective dust suppression procedures shall be used in construction areas to reduce airborne emissions of these contaminants and reduce the risk of exposure to workers and the public. Regulatory agencies for the State of California and Los Angeles County shall be contacted by Applicant or its contractor to plan handling, treatment, and/or disposal options.

Verification: The project owner shall identify the current/previous land use for the project transmission tower locations and associated laydown and staging areas for construction of the transmission line. The project owner shall submit a report documenting the areas proposed for sampling, and the process used for sampling and testing to the CPM for approval at least 90 days before transmission line construction occurs in the affected areas. Results of the laboratory testing and recommended mitigation or remediation plan for handling and excavation of material found to exceed regulatory requirements shall be submitted to the CPM for review and approval 60 days prior to transmission line construction.

WASTE-3 The project owner shall contract with an experienced and qualified Professional Engineer or Professional Geologist, who shall be available for consultation and oversight of earth moving activities throughout all phases of site construction. The Professional Engineer/Geologist shall be given full authority by the project owner to oversee any earth moving activities that have the potential to disturb contaminated soil. Selection of the Professional Engineer/Geologist shall be subject to CPM approval.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit the resume of their preferred Professional Engineer or Geologist to the CPM for review and approval. The project owner shall then provide a copy of the contract with the approved Professional Engineer/Geologist prior to the start of site construction activities.

WASTE-4 If potentially contaminated soil is identified during any phase of site construction, including excavation or grading at either the proposed site or linear facilities, as evidenced by discoloration, odor, detection by handheld instruments, or other signs, the Professional Engineer or Professional Geologist shall inspect the site, determine the need for sampling to confirm the nature and extent of contamination, and provide a written report to the project owner, representatives of DTSC, and the CPM stating the recommended course of action.

Depending on the nature and extent of contamination, the Professional Engineer or Professional Geologist shall have the authority to temporarily suspend construction activity at that location for the protection of workers or the public. The Professional Engineer or Professional Geologist shall contact the project owner, the CPM, and representatives of the DTSC for guidance and oversight in accordance with Condition of Certification **WASTE-3**.

Verification: The project owner shall submit any reports filed by the Professional Engineer or Professional Geologist to the CPM within 5 days of their receipt. The project owner shall notify the CPM within 24 hours of any orders issued to halt construction.

WASTE-5 In the event that contamination is identified during assessment of the project site, during any phase of PHPP construction, any additional work to assess and/or remediate any contamination shall be conducted under the oversight of DTSC, with CPM review and approval.

Verification: The project owner shall consult with DTSC, and enter into a consent agreement as necessary to ensure oversight of any additional site assessment and remediation work needed to reevaluate the site or address contamination found during any phase of PHPP site construction. The project owner shall ensure that the CPM is involved and appraised of all discussions with DTSC, and CPM concurrence shall be required for project decisions addressing site remediation.

WASTE-6 The project owner shall prepare a Construction Waste Management Plan for all wastes generated during construction of the facility and shall submit the plan to the CPM for review and approval prior to the start of construction. The plan shall contain, at a minimum, the following:

- A description of all construction waste streams, including projections of frequency, amounts generated, and hazard classifications; and
- Management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans.

Verification: The project owner shall submit the Construction Waste Management Plan to the CPM for approval no less than 30 days prior to the initiation of construction activities at the site.

WASTE-7 Upon notification of any impending waste management-related enforcement action by any local, state, or federal authority, the project owner shall notify the CPM of any such action taken or proposed against the project itself, or against any waste hauler or disposal facility or treatment operator with which the owner contracts, and describe how the violation will be corrected.

Verification: The project owner shall notify the CPM in writing within 10 days of becoming aware of an impending enforcement action and provide a description and timeline for correction of the violation. The CPM shall notify the project owner of any changes that will be required in the way project-related wastes are managed to ensure compliance with LORS.

WASTE-8 The project owner shall obtain a hazardous waste generator identification number from the United States Environmental Protection Agency (U.S. EPA) prior to generating any hazardous waste during construction and operations.

Verification: The project owner shall keep a copy of the identification number on file at the project site and provide documentation of the hazardous waste generation notification and receipt of the number to the CPM in the next scheduled Monthly Compliance Report after receipt of the number. Submittal of the notification and issued number documentation to the CPM is only needed once unless there is a change in ownership, operation, waste generation, or waste characteristics that requires a new notification to USEPA. Documentation of any new or revised hazardous waste generation notifications or changes in identification number shall be provided to the CPM in the next scheduled compliance report. .

WASTE-9 The project owner shall provide a Recycling and Reuse Plan to the County of Los Angeles, consistent with the Chapter 20.87 of the Los Angeles County Code. The project owner shall ensure compliance with all of the County's diversion program requirements in unincorporated areas, and shall also meet a 50 percent diversion rate within City of Palmdale limits. The owner shall provide proof of compliance documentation to the County and the CPM, including a Final Compliance Report, receipts, and other relevant information consistent with normal reporting requirements. Project mobilization and construction shall not proceed until the County has reviewed and the CPM has issued approval documents.

Verification: At least 60 days prior to the start of any construction activities, the project owner shall submit the proposed Recycling and Reuse Plan and list of recycling services to the County of Los Angeles and CPM for review and approval. Upon completion of construction, the project owner shall submit proof that the 50 percent diversion rate within the City of Palmdale limits has been achieved and that the requirements of the Recycling and Reuse Plan have been complied with to the County and CPM.

WASTE-10 The project owner shall prepare an Operation Waste Management Plan for all wastes generated during operation of the PHPP facility and shall submit the plan to the CPM for review and approval. The plan shall contain, at a minimum, the following:

- A detailed description of all operation and maintenance waste streams, including projections of amounts to be generated, frequency of generation, and waste hazard classifications;
- Management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans;
- Information and summary records of conversations with the Palmdale area CUPA – Los Angeles County Fire Department– and DTSC regarding any waste management requirements necessary for project activities. Copies of all required waste management permits, notices, and/or authorizations shall be included in the plan and updated as necessary;
- A detailed description of how facility wastes will be managed, and any contingency plans to be employed, in the event of an unplanned closure or planned temporary facility closure; and
- A detailed description of how facility wastes will be managed and disposed of upon closure of the facility.

Verification: The project owner shall submit the Operation Waste Management Plan to the CPM for approval no less than 30 days prior to the start of project operation. The project owner shall submit any required revisions to the CPM within 20 days of notification from the CPM that revisions are necessary. The project owner shall also document in each Annual Compliance Report the actual volume of wastes generated and the waste management methods used during the year; provide a comparison of the actual waste generation and management methods used to those proposed in the original Operation Waste Management Plan; and update the Operation Waste Management Plan as necessary to address current

WASTE-11 The project owner shall comply with requirements of the Waste Discharge Requirements (WDRs) under development by the Lahontan RWQCB, and any additional requirements imposed by the Energy Commission, for onsite storage and treatment of HTF-contaminated soils.

Verification: The project owner shall retain a copy of the WDRs on site. The project owner shall submit copies to the CPM of all correspondence between the project owner and the RWQCB regarding the WDRs for treatment of HTF-contaminated soils within ten (10) days of its receipt or submittal.

WASTE-12 The project owner shall ensure that the cooling tower basin sludge is tested pursuant to Title 22, California Code of Regulations, and section 66262.10 and report the findings to the CPM. The handling, testing, and disposal methods for sludge shall be identified in the Operation Waste Management Plan required in Condition of Certification **Waste -10**.

Verification: The project owner shall report the results of filter cake testing to the CPM within seven days of sampling. If two consecutive tests show that the sludge is non-hazardous, the project owner may apply to the CPM to discontinue testing. The test results and method and location of sludge disposal shall also be reported in the Annual Compliance Report required in Condition of Certification **Waste -10**.

WASTE-13 The project owner shall ensure that all spills or releases of hazardous substances, hazardous materials, or hazardous waste are documented and cleaned up and that wastes generated from the release/spill are properly managed and disposed of, in accordance with all applicable federal, state, and local requirements.

Verification: The project owner shall document all unauthorized releases and spills of hazardous substances, materials, or wastes that are in excess of reportable quantities (RQs) that occur on the project property or transmission corridors during construction and on the project property during operation. The documentation shall include, at a minimum, the following information:

- location of release;
- date and time of release;
- reason for release;
- volume released;
- amount of contaminated soil/material generated;
- how release was managed and material cleaned up;
- if the release was reported;
- to whom the release was reported;
- release corrective action and cleanup requirements placed by regulating agencies;
- level of cleanup achieved and actions taken to prevent a similar release or spill; and
- disposition of any hazardous wastes and/or contaminated soils and materials that may have been generated by the release.

Copies of the unauthorized spill documentation shall be provided to the CPM within 30 days of the date the release was discovered.

REFERENCES

AECOM 2009b – AECOM / S. Head (tn: 50094). Applicant Supplemental Responses to CEC Data Request Set 1. Dated on 02/13/09. Submitted to CEC / Docket Unit on 02/13/09.

AECOM 2009e – AECOM/ S. Head (tn: 50363). Responses to CEC Data Request Set 1. Dated on 03/28/09. Submitted to CEC/ Docket Unit on 03/28/09.

AECOM 2009i – AECOM/ S. Head (tn: 51417). Applicant Responses to CEC Data Request Set 2 & Supplemental Responses # 4. Dated on 05/01/09. Submitted to CEC/ Docket Unit on 05/04/09.

CCR 2008 – California Environmental Quality Act (CEQA) Guidelines. Title 14, California Code of Regulations, section 15000 and the following (Cal. Code Regs., tit. 14, §15000 et seq,).

CEC 2009t – California Energy Commission/E. Solorio (tn: 51934). CEC Staff Dialogue with DTSC Regarding HTF, dated 6/9/09. Submitted to CEC/Docket Unit on 6/11/09.

CH2MHill 2008 - Proposed Plan for Interim Remedial Action at Installation Restoration Program Site 29, Air Force Plant 42, Palmdale, CA.

COP 2008a – City of Palmdale/ S. Williams (tn: 47383). Application for Certification for the Palmdale Hybrid Power Project. Dated on 07/30/08. Submitted to CEC/ Docket Unit on 08/04/08.

Tetra Tech 2007 - Phase I Environmental Site Assessment – Avenue M and Sierra Highway, Palmdale. Prepared for the Lockheed Martin Corporation. Dated March 14, 2007.

WORKER SAFETY AND FIRE PROTECTION

Alvin J. Greenberg, Ph.D. and Rick Tyler

SUMMARY OF CONCLUSIONS

Staff concludes that if the applicant for the proposed Palmdale Hybrid Power Project (PHPP) provides project construction safety and health and project operations and maintenance safety and health programs, and fulfills the requirements of conditions of certification **WORKER SAFETY -1** through **-7**, the project would incorporate sufficient measures to both ensure adequate levels of industrial safety and comply with applicable laws, ordinances, regulations, and standards (LORS). These proposed conditions of certification ensure that these programs, proposed by the applicant, will be reviewed by the appropriate agencies before they are implemented. The conditions also require verification that the proposed plans adequately ensure worker safety and fire protection and comply with applicable LORS.

Staff also concludes that the proposed project would not have significant impacts on local fire protection services. The proposed facility would be located in an area that is currently served by the local fire department. The fire risks at the proposed facility do not pose significant added demands on local fire protection services. Staff also concludes that the Los Angeles County Fire Department Hazmat Team located at Station #129 is adequately equipped and staffed to respond to hazardous materials incidents at the proposed facility with an adequate response time (LACFD 2008).

INTRODUCTION

Worker safety and fire protection are regulated through federal, state, and local LORS. Industrial workers at the facility both operate equipment and handle hazardous materials daily, and could face hazards resulting in accidents and serious injury. Protection measures are employed to eliminate or reduce these hazards or minimize their risk through special training, protective equipment, and procedural controls.

The purpose of this preliminary staff assessment (PSA) is to assess the worker safety and fire protection measures proposed by the PHPP applicant and determine whether the applicant has proposed adequate measures to:

- Comply with applicable safety LORS;
- Protect workers during the construction and operation of the facility;
- Protect against fire; and
- Provide adequate emergency response procedures.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

Worker Safety and Fire Protection Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
29 U.S. Code sections 651 et seq (Occupational Safety and Health Act of 1970)	This Act mandates safety requirements in the workplace, with the purpose of "[assuring] so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources" (29 USC § 651).
29 CFR sections 1910.1 to 1910.1500 (Occupational Safety and Health Administration Safety and Health Regulations)	These sections define the procedures for promulgating regulations and conducting inspections to implement and enforce safety and health procedures to protect workers, particularly in the industrial sector.
29 CFR sections 1952.170 to 1952.175	These sections provide federal approval of California's plan for enforcement of its own safety and health requirements, in lieu of most of the federal requirements found in 29 CFR §1910.1 to 1910.1500.
State	
8 CCR all applicable sections (Cal/OSHA regulations)	Requires that all employers follow these regulations as they pertain to the work involved. This includes regulations pertaining to safety matters during the construction, commissioning, and operation of power plants, as well as safety around electrical components, fire safety, and hazardous materials usage, storage, and handling.
24 CCR section 3, et seq.	Incorporates the current addition of the Uniform Building Code.
California Health and Safety Code, section 25531 to 25543.4	The California Accidental Release Program (Cal-ARP) requires the preparation of a Risk Management Plan (RMP) and Off-site Consequence Analysis (OCA) and submittal to the local Certified Unified Program Authority (CUPA) for approval.
Health and Safety Code sections 25500 to 25541	Requires a Hazardous Materials Business plan detailing emergency response plans for hazardous materials emergencies at a facility.
Local (or locally enforced)	
City of Palmdale Municipal Code, Title 8 Health and Safety, Chapter 8.04	Adoption of Health, Safety, and Technical Construction Codes from the Los Angeles County Code. Addresses organization, roles, responsibilities, etc. of Los Angeles County Fire Department and provisions of Palmdale City fire code.
City of Palmdale Building Code	Includes specific building codes, such as the electrical code.
Los Angeles County Fire, Certified Unified Permitting Agency	Responsible for administering the hazardous materials release response plans and inventory program and the California Accidental Release Prevention Program (Cal-ARP).

Los Angeles County Fire Department, Title 32, Chapter 40 Consolidated Fire Protection District Code	The adoption and incorporation of the fire code for the District of Los Angeles County.
2007 California Fire Code and 2006 International Fire Code	The fire code contains general provisions for fire safety, including requirements for proper storage and handling of hazardous materials and listing of the information needed by emergency response personnel. Enforced by the Los Angeles County Fire Department.

SETTING

Fire support services to the site would be under the jurisdiction of the Los Angeles County Fire Department (LACFD). Station #129, located at 42110 6th Street in Lancaster, would be the first responder to PHPP with a response time of 2-4 minutes. Station #129 has one fire engine staffed with four firefighters and a fully-equipped hazmat unit staffed with nine personnel. The next closest station to the PHPP would be Station #135, located roughly 2-2.5 miles away in Lancaster, with a response time of 4-5 minutes. This station has one engine staffed with three firefighters and a paramedic vehicle staffed with two personnel (LACFD 2008). The LACFD has ten fire stations in the City of Palmdale and seven stations in the City of Lancaster. In the event of a fire or incident at the proposed facility, a full response would be dispatched from several nearby stations (LACFD 2008).

All LACFD personnel are trained at minimum to Emergency Medical Technician Level 1 (EMT-1) and as first responders for hazardous materials incidents. The Hazmat unit at Station #129 is capable of responding to any type of hazardous materials spill (LACFD 2008).

Worker Safety and Fire Protection Table 2
Response Capabilities of the LACFD*

PFD Station	Response Time	Distance to PHPP	EMS Capability
Station 129	2-4 min	~1.5 miles	Yes
Station 135	4-5 min	~2-2.5 miles	Yes

***Source: Telephone communication with LACFD Captain Richard Robinson, November 20, 2008.

In addition to construction and operations worker safety issues, the potential exists for exposure to contaminated soil during site preparation. The Phase I Environmental Site Assessment conducted for this site in 2008 identified no “Recognized Environmental Conditions” per the American Society for Testing and Materials Standards (ASTM) definition. That is, there was no evidence or record of any use, spillage or disposal of hazardous substances on the site, nor any other environmental concern that would require remedial action (PHPP 2008a, Section 5.16.2.3). In the event that any unexpected contamination is encountered during construction of the PHPP, proposed

Conditions of Certification **Waste-1** and **Waste-2** require a registered professional engineer or geologist to be available during soil excavation and grading to ensure proper handling and disposal of contaminated soil. See the staff assessment section on **Waste Management** for a more detailed analysis of this topic.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Two issues are assessed in **WORKER SAFETY AND FIRE PROTECTION**:

1. The potential for impacts on the safety of workers during demolition, construction, and operation activities; and
2. Fire prevention/protection, emergency medical response, and hazardous materials spill response during demolition, construction, and operations.

Worker safety is essentially a LORS compliance matter and if all LORS are followed, workers will be adequately protected. Thus, the standard for staff's review and determination of significant impacts on worker health is whether the applicant has demonstrated adequate knowledge of and commitment to implementation of all pertinent and relevant Cal-OSHA standards.

Staff reviews and evaluates the on-site fire-fighting systems proposed by the applicant, as well as the time needed for off-site local fire departments to respond to a fire, medical, or hazardous material emergency at the PHPP site. If on-site systems do not follow established codes and industry standards, staff recommends additional measures. Staff reviews and evaluates local fire department capabilities and response times, and interviews local fire officials to determine if they are adequately trained, staffed, and equipped to respond to the needs of a power plant. Staff then determines if the presence of the power plant would cause a significant impact on a local fire department. If it does, staff will recommend that the applicant mitigate this impact by providing additional resources to the fire department.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Worker Safety

Industrial environments are potentially dangerous during both construction and operation. Workers at the proposed project will be exposed to loud noises, moving equipment, trenches, and confined space entry and egress. Workers may sustain falls, trips, burns, lacerations, and other injuries. They may be exposed to falling equipment or structures, chemical spills, hazardous waste, fires, explosions, and electrical sparks or electrocution. It is important that PHPP has well-defined policies and procedures, training, and hazard recognition and control to minimize these hazards and protect workers. If the facility complies with all LORS, workers will be adequately protected from health and safety hazards.

Water for worker sanitary needs, emergency showers and eyewashes, and fire suppression is required and the source of this water is an important factor. Portable sanitary facilities and bottled water will be used during construction. During Project operations, potable water for drinking, sanitary uses, safety showers, etc. will be obtained from the Los Angeles County Waterworks District No. 40. The District has a potable water pipeline along E Ave M that currently terminates a short distance west of the plant site's northern border. A one mile pipeline along E Ave M will be constructed to connect the PHPP to the existing pipeline. A dedicated 250,000 gallons of reclaimed tertiary-treated water will be used for fire suppression.

A Safety and Health Program will be prepared by the applicant to minimize worker hazards during construction and operation of the project. "Safety and Health Program," for staff, refers to measures that will be taken to ensure compliance with the applicable LORS during the construction and operation of the project.

Construction Safety and Health Program

PHPP includes the construction and operation of a hybrid, combined-cycle, natural gas-fired power plant and solar thermal generating equipment. For the Power Block, workers will be exposed to hazards typical of construction and operation of a gas-fired combined-cycle facility; while the solar component will present similar construction risks and minimal operational risks to workers.

Construction safety orders are published at Title 8 of the California Code of Regulations, section 1502 et seq. These requirements are promulgated by Cal/OSHA and apply to the construction phase of the project. The construction safety and health program will include the following:

- Construction injury and illness prevention program (8 CCR § 1509);
- Construction fire prevention plan (8 CCR § 1920);
- Personal protective equipment program (8 CCR §§ 1514 - 1522); and
- Emergency action program and plan.

Additional programs under General Industry Safety Orders (8 CCR §§ 3200 to 6184), Electrical Safety Orders (8 CCR §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (8 CCR §§ 450 to 544) will include:

- Motor vehicle and heavy equipment safety program;
- Forklift operation program;
- Excavation/trenching program;
- Fall protection program
- Equipment inspection program;
- Scaffolding/ladder safety program;
- Articulating boom platforms program;
- Crane and material handling program;

- Employee exposure monitoring program;
- Electrical safety program;
- Hand and portable power tool safety program;
- Housekeeping and material handling and storage program;
- Hearing conservation program;
- Respiratory protection program;
- Hazard communication program;
- Heat and cold stress monitoring and control program;
- Pressure vessel and pipeline safety program;

The AFC includes adequate outlines for each of the above programs (PHPP 2008a, section 5.18.3.1). Prior to the project's start of construction, detailed programs and plans will be provided pursuant to Condition of Certification **WORKER SAFETY-1**.

Operations and Maintenance Safety and Health Program

Prior to the start-up of PHPP, an operations and maintenance safety and health program will be prepared. This program will include the following programs and plans:

- Injury and illness prevention program (8 CCR § 3203);
- Fire prevention program (8 CCR § 3221);
- Personal protective equipment program (8 CCR §§ 3401 to 3411); and
- Emergency action plan (8 CCR § 3220).

In addition, the requirements under General Industry Safety Orders (8 CCR §§ 3200 to 6184), Electrical Safety Orders (8 CCR §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (8 CCR §§ 450 to 544) will apply to this project. Written safety programs for PHPP, which the applicant will develop, will ensure compliance with those requirements.

The AFC includes adequate outlines for an injury and illness prevention program, an emergency action plan, a fire prevention program, and a personal protective equipment program (PHPP 2008a, section 5.18.3.1). Prior to operation of PHPP, all detailed programs and plans will be provided pursuant to Condition of Certification **WORKER SAFETY-2**.

Safety and Health Program Elements

As mentioned above, the applicant provided the proposed outlines for both a Construction Safety and Health Program and an Operations Safety and Health Program. The measures in these plans are derived from applicable sections of state and federal law. The major items required in both Safety and Health Programs are as follows:

Injury and Illness Prevention Program (IIPP)

The IIPP will include the following components (PHPP 2008a, section 5.18.3.1):

- Identify persons with the authority and responsibility for implementing the program;
- Establish the safety and health policy of the plan;
- Define work rules and safe work practices for construction activities;
- Establish a system for ensuring that employees comply with safe and healthy work practices;
- Establish a system to facilitate employer-employee communication;
- Develop procedures for identifying and evaluating workplace hazards and establish necessary program(s);
- Establish methods for correcting unhealthy/unsafe conditions in a timely manner;
- Determine and establish training and instruction requirements and programs;
- Specify safety procedures; and
- Provide training and instruction.

Fire Prevention Plan

The California Code of Regulations requires an operations fire prevention plan (8 CCR § 3221). The AFC outlines a proposed fire prevention plan that is acceptable to staff (PHPP 2008a, section 5.18.3.1). The plan will include the following:

- Determine general program requirements;
- Develop good housekeeping practices and proper materials storage;
- Establish employee alarms and/or communication system(s);
- Provide portable fire extinguishers at appropriate site locations;
- Locate fixed fire fighting equipment in suitable areas;
- Specify fire control requirements and procedures;
- Establish proper flammable and combustible liquid storage facilities;
- Identify the location and use of flammable and combustible liquids;
- Provide proper dispensing and determine disposal requirements for flammable liquids;
- Determine proper disposal requirements for flammable liquids;
- Identify proper servicing and refueling locations; and
- Establish and determine training and instruction requirements and programs; and

Staff proposes that the applicant submit a final fire prevention plan to the California Energy Commission compliance project manager (CPM) for review and approval and to the LACFD for review and comment to satisfy proposed conditions of certification **WORKER SAFETY-1** and **WORKER SAFETY-2**.

Personal Protective Equipment Program

California regulations require personal protective equipment (PPE) and first aid supplies whenever hazards in the environment, or from chemicals or mechanical irritants, could cause injury or impair bodily function through absorption, inhalation, or physical contact (8 CCR sections 3380 to 3400). The PHPP operational environment will require PPE.

All safety equipment must meet National Institute of Safety and Health (NIOSH) or American National Standards Institute (ANSI) standards and will carry markings, numbers, or certificates of approval. Respirators must meet NIOSH and Cal/OSHA standards. Each employee must be provided with the following information about protective clothing and equipment:

- Proper use, maintenance, and storage;
- When protective clothing and equipment are used;
- Benefits and limitations; and
- When and how protective clothing and equipment are replaced.

The PPE program ensures that employers comply with applicable requirements for PPE and provides employees with the information and training necessary to protect them from potential hazards in the workplace, and will be required as per proposed Conditions of Certification **WORKER SAFETY-1 and -2**.

Emergency Action Plan

California regulations require an emergency action plan (8 CCR § 3220). The AFC contains a satisfactory outline for an emergency action plan (PHPP 2008a, section 5.18.3.1).

The outline lists the following features:

- Establishes emergency procedures for the protection of personnel, equipment, the environment, and materials;
- Identifies fire and emergency reporting procedures;
- Determines response actions for accidents involving personnel and/or property;
- Develops response and reporting requirements for bomb threats;
- Specifies site assembly and emergency evacuation route procedures;
- Defines natural disaster responses (for example, earthquakes, high winds, and flooding);
- Establishes reporting and notification procedures for emergencies (including on-site, off-site, local authorities, and/or state jurisdictions);
- Determines alarm and communication systems needed for specific operations;
- Includes a spill response, prevention, and countermeasure (SPCC) plan;
- Identifies emergency personnel (response team) responsibilities and notification roster;

- Specifies emergency response equipment and strategic locations; and
- Establishes and determines training and instruction requirements and programs.

An emergency action plan will be required as per proposed Conditions of Certification **WORKER SAFETY-1 and -2**

Written Safety Program

In addition to the specific plans listed above, additional LORS called "safe work practices" apply to the project. Both the construction and operations safety programs will address safe work practices in a variety of programs. The components of these programs include, but are not limited to, the programs found under the heading "Construction Safety and Health Program" in this staff assessment.

Safety Training Programs

Employees will be trained in the safe work practices described in the above-referenced safety programs.

Additional Safety Issues

This "hybrid" power plant will present a unique work environment that includes a solar field located in the high desert. The solar field features thousands of mirrors that heat a heat transfer fluid (HTF) to approximately 750°F. The pipe containing the HTF will reach temperatures at the mirror focal point as high as 1100 °F. Experience at existing solar generating stations shows that these mirrors break, the pipes age, and HTF can leak and catch fire from ball joints or frayed flex hoses. The area under the solar arrays must be kept free from weeds and thus herbicides will be applied as necessary. Exposure to workers via inhalation and ingestion of dusts containing herbicides poses a health risk. Finally, workers will inspect the solar array for HTF leaks and broken mirrors at least once each day by driving up and down dirt paths between the rows of mirrors and even under the mirrors. Cleaning the mirrors will also be conducted on a routine schedule. All these activities will take place year-round and especially during the summer months of peak solar power generation, when outside ambient temperatures routinely reach 115 °F and above.

The applicant has indicated that workers will be adequately trained and protected, but has not included precautions against heat stress and exposure to herbicides. Therefore, to ensure that workers are indeed protected, staff has proposed additional requirements found in Conditions of Certification **WORKER SAFETY-6**. This requirement consists of the following provisions:

- A worker heat stress protection plan that implements and expands on existing Cal OSHA regulations (8 CCR 3395) requiring heat illness prevention; and
- The development and implementation of Best Management Practices (BMP) for the storage and application of herbicides used to control weeds beneath and around the solar array.

Staff believes that effective implementation of a Heat Stress Protection Plan will mitigate the potential for significant risks to workers from heat during both construction and operations. A BMP requiring proper herbicide storage and application, as recommended in Condition of Certification **WORKER SAFETY-6,** will mitigate potential risks to workers from exposure to herbicides and reduce the chance that herbicides will contaminate either surface water or groundwater. Staff suggests that a BMP follow either the guidelines established by the U.S. EPA (EPA 1993), or more recent guidelines established by the State of California or U.S. EPA.

Additional Mitigation Measures

Protecting construction workers from injury and disease is one of the greatest challenges today in occupational safety and health. The following facts are reported by NIOSH:

- More than seven million persons work in the construction industry, representing 6% of the labor force. Approximately 1.5 million of these workers are self-employed;
- Of approximately 600,000 construction companies, 90% employ fewer than 20 workers. Few have formal safety and health programs;
- From 1980-1993, an average of 1,079 construction workers were killed on the job each year, with more fatal injuries than any other industry;
- Falls caused 3,859 construction worker fatalities, or 25.6% of the total, between 1980 and 1993;
- 15% of workers' compensation costs are spent on construction-related injuries;
- Ensuring safety and health in construction is a complex task involving short-term work sites, changing hazards, and multiple operations and crews working in close proximity to one another;
- In 1990, Congress directed NIOSH to conduct research and training to reduce diseases and injury among construction workers in the United States. Under this mandate, NIOSH funds both intramural and extramural research projects.

The hazards associated with the construction industry are well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex industrial projects like gas-fired power plants. In order to reduce and/or eliminate these hazards, it has become standard industry practice to hire a construction safety supervisor to ensure a safe and healthful environment for all workers. This has been evident in the audits of power plants recently conducted by the staff. The Federal Occupational Safety and Health Administration (OSHA) has also entered into strategic alliances with several professional and trade organizations to promote and recognize safety professionals trained as construction safety supervisors, construction health and safety officers, and other professional designations. The goal of these partnerships is to encourage construction subcontractors to improve their safety and health performance; to assist them in striving to eliminate the four major construction hazards (falls, electrical, caught in/between, and struck-by hazards) that account for the majority of fatalities and injuries in this industry and have been the focus of targeted OSHA inspections; to prevent serious accidents in the construction industry through implementation of enhanced safety and health programs and increased employee training; and to recognize subcontractors that have exemplary safety and health programs.

There are no OSHA or Cal-OSHA requirements that an employer hire or provide for a construction safety officer. OSHA and Cal-OSHA regulations do, however, require that safety be provided by an employer and the term “Competent Person” appears in many OSHA and Cal-OSHA standards, documents, and directives. A “Competent Person” is defined by OSHA as an individual who, by way of training and/or experience, is knowledgeable of standards, is capable of identifying workplace hazards relating to the specific operations, is designated by the employer, and has authority to take appropriate action. Therefore, in order to meet the intent of the OSHA standard to provide for a safe workplace during power plant construction, staff proposes Condition of Certification **WORKER SAFETY-3,** which would require the applicant/project owner to designate and provide for a project site construction safety supervisor.

As discussed above, the hazards associated with the construction industry are well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex industrial projects like gas-fired power plants.

Accidents, fires, and a worker death have occurred at Energy Commission-certified power plants in the recent past because of both the failure to recognize and control safety hazards and the inability to adequately monitor compliance with occupational safety and health regulations. Safety problems have been documented by Energy Commission staff in safety audits, conducted in 2005, at several power plants under construction. The findings of the audit include, but are not limited to, safety oversights like:

- Lack of posted confined-space warning placards/signs;
- Confusing and/or inadequate electrical and machinery lockout/tagout permitting and procedures;
- Confusing and/or inappropriate procedures for handing over lockout/tagout and confined space permits from the construction team to the commissioning team, and then to operations;
- Dangerous placement of hydraulic elevated platforms under one another;
- Inappropriate placement of fire extinguishers near hotwork;
- Dangerous placement of numerous power cords in standing water on the site, increasing the risk of electrocution;
- Construction of an unsafe aqueous ammonia unloading pad;
- Inappropriate and unsecure placement of above-ground natural gas pipelines inside the facility, but too close to the perimeter fence; and
- Lack of adequate employee or contractor written training programs that address the proper procedures to follow in the event of the discovery of suspicious packages or objects either onsite or offsite.

In order to reduce and/or eliminate these hazards, it is necessary for the Energy Commission to require a professional Safety Monitor on-site to track compliance with Cal-OSHA regulations and periodically audit safety compliance during construction, commissioning, and the hand-over to the operations staff. These requirements are outlined in Condition of Certification **WORKER SAFETY-4**. A Safety Monitor, hired by the project owner but reporting to the Chief Building Official (CBO) and the Compliance Project Manager (CPM), will serve as an extra set of eyes to ensure that safety procedures and practices are fully implemented during construction at all power plants certified by the Energy Commission. During audits conducted by staff, most site safety professionals welcomed the audit team and actively engaged them in questions about the team's findings and recommendations. These safety professionals recognized that safety requires continuous vigilance and that the presence of an independent audit team provides a fresh perspective" of the site.

Finally, in order to ensure that reconductoring of the transmission lines between the Pearl Blossom and Vincent substations is accomplished with the highest degree of worker safety, staff proposes Condition of Certification **WORKER SAFETY-9** that would require the project owner to provide to the CPM for review a copy of the worker safety plan for that reconductoring.

Fire Hazards

During construction and operation of the proposed PHPP there is the potential for both small fires and major structural fires. Electrical sparks, combustion of fuel oil, natural gas, hydraulic fluid, mineral oil, insulating fluid, and heat transfer fluid (HTF) at the project power or switchyard or flammable liquids, explosions, and overheated equipment, may cause small fires. Major structural fires in areas without automatic fire detection and suppression systems are unlikely at power plants. Fires and explosions of natural gas or other flammable gasses or liquids are rare, however, fires involving spills/leaks of HTF have occurred at other solar generating facilities. Compliance with all LORS will be adequate to ensure protection from all fire hazards.

Staff reviewed the information provided in the AFC and spoke to representatives of the LACFD to determine if available fire protection services and equipment would adequately protect workers, and to further determine the project's impact on fire protection services in the area. The project will rely on both onsite fire protection systems and local fire protection services. The onsite fire protection system provides the first line of defense for small fires. In the event of a major fire, fire support services, including trained firefighters and equipment for a sustained response, would be provided by the LACFD (PHPP 2008a, 5.18.3.1 and LACFD 2008).

Construction

During construction, portable fire extinguishers and other fire fighting equipment will be located and maintained throughout the site, and the permanent fire suppression system would be installed as soon as practical. Safety procedures and training will also be implemented as described in the Construction Fire Protection and Prevention Program (PHPP 2008a, section 5.18.3.1). Stations #129, #135, and other LACFD stations would be available to provide fire protection backup for larger fires that cannot be extinguished using the project's portable suppression equipment (LACFD 2008).

Operation

The information in the AFC indicates that the project intends to meet the fire protection and suppression requirements of the California Fire Code, all applicable recommended NFPA standards (including Standard 850, which addresses fire protection at electric generating plants), and all Cal-OSHA requirements with one exception (see below). Fire suppression elements in the proposed plant will include both fixed and portable fire extinguishing systems.

A dedicated 250,000-gallon portion of a 1,000,000-gallon raw water storage tank that would be located on the project site would supply water to the fire suppression system. A sophisticated diesel and electric pump system will ensure a continuous adequate water supply to the fire protection water-piping network, which includes fire hydrants throughout the site and sprinkler systems at each transformer and in the operations building (PHPP 2008a, Section 5.18.3.2). However, it is unclear if the dedicated water source has been assured through contractual obligations. Since the provision of fire-fighting water is critical to the safe operation of the power plant, staff proposes a Condition of Certification WORKER SAFETY-8 that would require the project owner to ensure that water is available for the life of the project.

A carbon dioxide (CO_2) fire protection system will be provided for the combustion turbine generators and accessory equipment. The system will have fire detection sensors that will trigger alarms, turn off ventilation, close ventilation openings, and automatically activate the system. A fire involving the Heat transfer Fluid (HTF) in the solar field will extinguish itself after burning the limited volume of fuel leaked since the lines will be isolated (see discussion of required isolation valves in the Hazardous Materials Management section of this staff assessment) and the remainder of the field is nonflammable (PHPP 2008a, section 5.18.3.2).

In addition to the fixed fire protection system, smoke detectors, flame detectors, temperature detectors, appropriate class of service portable extinguishers, and fire hydrants must be located throughout the facility at code-approved intervals. These systems are standard requirements of the fire code, NFPA, and staff has determined that they will ensure adequate fire protection.

The applicant would be required by conditions of certification **WORKER SAFETY-1** and**-2** to provide a final fire protection and prevention program to both staff and the LACFD prior to the construction and operation of the project in order to confirm the adequacy of proposed fire protection measures.

The one exception mentioned above pertains to fire department access to the site. Both the California Fire Code (24 CCR Part 9, chapter 5, section 503.1.2) and the Uniform Fire Code (sections 901 and 902) require that access to the site be reviewed and approved by the fire department. All power plants licensed by the Energy Commission have more than one access point to the power plant site. This is sound fire safety procedure and allows for fire department vehicles and personal to access the site should the main gate be blocked. The proposed PHPP has only one access point, that being through the main gate off East Avenue M. The applicant has stated that they are in discussion with Air Force Plant 42 to determine a location for a second access point to the PHPP and that their tentative proposal is to construct a road off East Avenue M that would run parallel to the existing Site 1 Road (the entry way to Air Force Plant 42) and enter the PHPP site from the eastern boundary (AECOM 2009a). Staff finds that a second access point is necessary to ensure fire department access, and it can be restricted to emergency use only and, if possible, should be equipped with an Opticom System for remote keyless entry. Therefore, in order to comply with the requirements of LORS, staff proposes a Condition of Certification **WORKER SAFETY-7** that would require the project owner to identify and provide a second access point to the site for emergency vehicles and equip this secondary gate with either an Opticom System or a keypad for fire department personnel to open the gate.

Emergency Medical Services Response

A statewide survey was conducted by staff to determine the frequency of emergency medical services (EMS) and off-site fire-fighters for natural gas-fired power plants in California. The purpose of this analysis was to determine what impact, if any, power plants might have on local emergency services. Staff concludes that incidents at power plants requiring fire or EMS responses are infrequent and represent an insignificant impact on local fire departments, except, in rare instances, where a rural fire department has a primarily volunteer fire-fighting staff. However, staff has determined that the potential for both work-related and non-work related heart attacks exists at power plants. In fact, staff's research on the frequency of EMS response to gas-fired power plants shows that many of the responses for cardiac emergencies involved non-work related incidences, including visitors. The need for prompt response within a few minutes is well documented in the medical literature. Staff believes that the quickest medical intervention can only be achieved with the use of an on-site defibrillator often called an Automatic External Defibrillator or AED; the response from an off-site provider would take longer regardless of the provider location. This fact is also well documented and serves as the basis for many private and public locations including airports, factories, and government buildings, all of which maintain on-site cardiac defibrillation devices. Therefore, staff concludes that with the availability of modern cost-effective AED devices, it is proper in a power plant environment to maintain these devices on-site in order to treat cardiac arrythmias resulting from industrial accidents or other non-work related causes. Therefore, an additional condition of certification, **WORKER SAFETY-5**, is proposed so that a portable AED will be located on site, and workers trained in its use.

CUMULATIVE IMPACTS AND MITIGATION

Staff reviewed the potential for the construction and operation of the PHPP combined with existing industrial facilities and expected new facilities (as described in AFC section 5.1.1), to result in impacts on the fire and emergency service capabilities of the LACFD. The LACFD stated that every new facility has the potential to impact the fire department, but that the LACFD certainly has the resources and capability to respond to any incident at the proposed facility (LACFD 2008).

Given the lack of unique fire hazards associated with a modern hybrid power plant, staff finds that this project will not have any significant incremental burden on the department's ability to respond to a fire or medical emergency.

AGENCY AND PUBLIC COMMENTS

No comments from any agency or the public were received relative to **Worker Safety/Fire Protection** issues.

CONCLUSIONS

Staff concludes that if the applicant for the proposed PHPP project provides project construction safety and health and project operations and maintenance safety and health programs, as required by conditions of certification **WORKER SAFETY -1**, and **-2**; and fulfills the requirements of conditions of certification **WORKER SAFETY-3** through**-9**, PHPP would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. Staff also concludes that the proposed project would not have significant impacts on local fire protection services.

PROPOSED CONDITIONS OF CERTIFICATION

WORKER SAFETY-1 The project owner shall submit to the Compliance Project Manager (CPM) a copy of the Project Construction Safety and Health Program containing the following:

- A Construction Personal Protective Equipment Program;
- A Construction Exposure Monitoring Program;
- A Construction Injury and Illness Prevention Program;
- A Construction Emergency Action Plan; and
- A Construction Fire Prevention Plan.

The Personal Protective Equipment Program, the Exposure Monitoring Program, and the Injury and Illness Prevention Program shall be submitted to the CPM for review and approval concerning compliance of the program with all applicable Safety Orders. The Construction Emergency Action Plan and the Fire Prevention Plan shall be submitted to the Los Angeles County Fire Department for review and comment prior to submittal to the CPM for approval.

<u>Verification:</u> At least thirty (30) days prior to the start of construction, the project owner shall submit to the CPM for review and approval a copy of the Project Construction Safety and Health Program. The project owner shall provide a copy of a letter to the CPM from the Los Angeles County Fire Department stating the Fire Department's comments on the Construction Fire Prevention Plan and Emergency Action Plan.

WORKER SAFETY-2 The project owner shall submit to the CPM a copy of the Project Operations and Maintenance Safety and Health Program containing the following:

- An Operation Injury and Illness Prevention Plan;
- An Emergency Action Plan;

- Hazardous Materials Management Program;
- Fire Prevention Program (8 CCR § 3221); and;
- Personal Protective Equipment Program (8 CCR §§ 3401-3411).

The Operation Injury and Illness Prevention Plan, Emergency Action Plan, and Personal Protective Equipment Program shall be submitted to the CPM for review and approval concerning compliance of the program with all applicable Safety Orders. The Operation Fire Prevention Plan and the Emergency Action Plan shall also be submitted to the Los Angeles County Fire Department for review and comment.

Verification: At least thirty (30) days prior to the start of first-fire or commissioning, the project owner shall submit to the CPM for approval a copy of the Project Operations and Maintenance Safety and Health Program. The project owner shall provide a copy of a letter to the CPM from the Los Angeles County Fire Department stating the Fire Department's comments on the Operations Fire Prevention Plan and Emergency Action Plan.

WORKER SAFETY-3 The project owner shall provide a site Construction Safety Supervisor (CSS) who, by way of training and/or experience, is knowledgeable of power plant construction activities and relevant laws, ordinances, regulations, and standards, is capable of identifying workplace hazards relating to the construction activities, and has authority to take appropriate action to assure compliance and mitigate hazards. The CSS shall:

- Have over-all authority for coordination and implementation of all occupational safety and health practices, policies, and programs;
- Assure that the safety program for the project complies with Cal/OSHA & federal regulations related to power plant projects;
- Assure that all construction and commissioning workers and supervisors receive adequate safety training;
- Complete accident and safety-related incident investigations, emergency response reports for injuries, and inform the CPM of safety-related incidents; and
- Assure that all the plans identified in Worker Safety 1 and 2 are implemented.

Verification: At least thirty (30) days prior to the start of site mobilization, the project owner shall submit to the CPM the name and contact information for the Construction Safety Supervisor (CSS). The contact information of any replacement (CSS) shall be submitted to the CPM within one business day.

The CSS shall submit in the Monthly Compliance Report a monthly safety inspection report to include:

- Record of all employees trained for that month (all records shall be kept on site for the duration of the project);

- Summary report of safety management actions and safety-related incidents that occurred during the month;
- Report of any continuing or unresolved situations and incidents that may pose danger to life or health; and
- Report of accidents and injuries that occurred during the month.

WORKER SAFETY-4 The project owner shall make payments to the Chief Building Official (CBO) for the services of a Safety Monitor based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. Those services shall be in addition to other work performed by the CBO. The Safety Monitor shall be selected by and report directly to the CBO, and will be responsible for verifying that the Construction Safety Supervisor, as required in Worker Safety 3, implements all appropriate Cal/OSHA and Commission safety requirements. The Safety Monitor shall conduct on-site (including linear facilities) safety inspections at intervals necessary to fulfill those responsibilities.

<u>Verification:</u> At least thirty (30) days prior to the start of construction, the project owner shall provide proof of its agreement to fund the Safety Monitor services to the CPM for review and approval.

WORKER SAFETY-5 The project owner shall ensure that a portable automatic external defibrillator (AED) is located on site during construction and operations and shall implement a program to ensure that workers are properly trained in its use and that the equipment is properly maintained and functioning at all times. During construction and commissioning, the following persons shall be trained in its use and shall be on-site whenever the workers that they supervise are on-site: the Construction Project Manager or delegate, the Construction Safety Supervisor or delegate, and all shift foremen. During operations, all power plant employees shall be trained in its use. The training program shall be submitted to the CPM for review and approval.

<u>Verification:</u> At least thirty (30) days prior to the start of site mobilization the project owner shall submit to the CPM proof that a portable AED exists on site and a copy of the training and maintenance program for review and approval.

WORKER SAFETY-6 The project owner shall prepare and implement a worker Heat Stress Protection Plan and a Best Management Practices (BMPs) for the storage and application of herbicides used to control weeds beneath and around the solar array. These plans shall be submitted to the CPM for review and approval.

<u>Verification:</u> At least thirty (30) days prior to the start of site mobilization, the project owner shall submit to the CPM for review and approval a copy of the worker Heat Stress Protection Plan and Best Management Practices (BMPs) for the storage and application of herbicides.

WORKER SAFETY-7 The project owner shall identify and provide a second access point for emergency personnel to enter the site. This access point and the method of gate operation shall be submitted to the Los Angeles County Fire Department for review and comment and to the CPM for review and approval.

Verification: At least 60) days prior to the start of site mobilization, the project owner shall submit to the Los Angeles County Fire Department and the CPM preliminary plans showing the location of a second access point to the site and a description of how the gate will be opened by the fire department. At least thirty (30) days prior to the start of site mobilization, the project owner shall submit final plans to the CPM review and approval. The final plan submittal shall also include a letter containing comments from the Los Angeles County Fire Department or a statement that no comments were received.

WORKER SAFETY-8 The project owner shall ensure that an adequate supply of water is available for firefighting for the life of the project.

Verification: At least 60 days prior to the start of commissioning ("first-fire"), the project owner shall submit to the CPM proof that the water supply selected is available and contractually ensured for the life of the project.

WORKER SAFETY-9 The project owner shall provide to the CPM for review a copy of the worker safety plan for reconductoring the transmission lines between the Pearl Blossom and Vincent substations.

Verification: At least 60 days prior to the start of reconductoring, the project owner shall submit to the CPM the worker safety plan for review.

REFERENCES

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ENGINEERING ASSESSMENT

FACILITY DESIGN

Erin Bright

SUMMARY OF CONCLUSIONS

The California Energy Commission staff concludes that the design, construction, and eventual closure of the Palmdale Hybrid Power Project and its linear facilities would likely comply with applicable engineering laws, ordinances, regulations, and standards. The proposed conditions of certification, below, would ensure compliance with these laws, ordinances, regulations, and standards.

INTRODUCTION

Facility design encompasses the civil, structural, mechanical, and electrical engineering design of the Palmdale Hybrid Power Project. The purpose of this analysis is to:

- verify that the laws, ordinances, regulations, and standards (LORS) that apply to the engineering design and construction of the project have been identified;
- verify that both the project and its ancillary facilities are sufficiently described, including proposed design criteria and analysis methods, in order to provide reasonable assurance that the project will be designed and constructed in accordance with all applicable engineering LORS, in a manner that also ensures the public health and safety;
- determine whether special design features should be considered during final design to address conditions unique to the site which could influence public health and safety; and
- describe the design review and construction inspection process and establish the conditions of certification used to monitor and ensure compliance with the engineering LORS, in addition to any special design requirements.

Subjects discussed in this analysis include:

- identification of the engineering LORS that apply to facility design;
- evaluation of the applicant’s proposed design criteria, including identification of criteria essential to public health and safety;
- proposed modifications and additions to the application for certification (AFC) necessary for compliance with applicable engineering LORS; and
- conditions of certification proposed by staff to ensure that the project will be designed and constructed to ensure public health and safety and comply with all applicable engineering LORS.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Lists of LORS applicable to each engineering discipline (civil, structural, mechanical, and electrical) are described in the AFC (COP2008a, Appendix C). Key LORS are listed in **FACILITY DESIGN Table 1** below.

FACILITY DESIGN Table 1
Key Engineering Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	Title 29 Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health standards
State	2007 California Building Standards Code (CBSC) (also known as Title 24, California Code of Regulations)
Local	City of Palmdale regulations and ordinances Los Angeles County regulations and ordinances
General	American National Standards Institute (ANSI) American Society of Mechanical Engineers (ASME) American Welding Society (AWS) American Society for Testing and Materials (ASTM)

SETTING

The Palmdale Hybrid Power Project (Palmdale), a 570-MW hybrid power plant combining natural gas-fired combined cycle power generation with parabolic trough solar thermal power generation, would be built on a 377-acre site in the City of Palmdale in Los Angeles County. The site lies in Seismic Risk Zone 4. For more information on the site and related project description, please see the **Project Description** section of this document. Additional engineering design details are contained in the AFC (COP2008a, Appendices C).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The purpose of this analysis is to ensure that the project would be built to applicable engineering codes and ensure public health and life safety. This analysis further verifies that applicable engineering LORS have been identified and that the project and its ancillary facilities have been described in adequate detail. It also evaluates the applicant’s proposed design criteria, describes the design review and construction inspection process, and establishes conditions of certification that would monitor and ensure compliance with engineering LORS and any other special design requirements. These conditions allow both the California Energy Commission (Energy Commission) compliance project manager (CPM) and the applicant to adopt a compliance monitoring scheme that will verify compliance with these LORS.

SITE PREPARATION AND DEVELOPMENT

Staff has evaluated the proposed design criteria for grading, flood protection, erosion control, site drainage, and site access, in addition to the criteria for designing and constructing linear support facilities such as natural gas and electric transmission interconnections. The applicant proposes the use of accepted industry standards (see Palmdale AFC Appendix C, for representative lists of applicable industry standards), design practices, and construction methods in preparing and developing the site. Staff concludes that this project, including its linear facilities, would most likely comply with all applicable site preparation LORS and proposes conditions of certification (see below and the **Geology and Paleontology** section of this document) to ensure that compliance.

MAJOR STRUCTURES, SYSTEMS, AND EQUIPMENT

Major structures, systems, and equipment are structures and their associated components or equipment that are necessary for power production; costly or time consuming to repair or replace; used for the storage, containment, or handling of hazardous or toxic materials; or capable of becoming potential health and safety hazards if not constructed according to applicable engineering LORS. Major structures and equipment are identified in the proposed Condition of Certification **GEN-2,** below. Typically, **Facility Design Table 2** in Condition of Certification **GEN-2** lists the major structures and equipment identified in the AFC and other project related information available before project licensing; this list is based on the preliminary design of the project. The master drawing and master specifications lists described in Condition of Certification **GEN-2**, however, include the project-related documents based on the project's detailed design and may include additional documents for structures and equipment not identified in **Facility Design Table 2**. (Detailed project design typically occurs after project licensing and is not available at this time.)

Palmdale shall be designed and constructed to the 2007 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and other applicable codes and standards in effect when the design and construction of the project actually begin. If the initial designs are submitted to the chief building official (CBO) for review and approval after the update to the 2007 CBSC takes effect, the 2007 CBSC provisions shall be replaced with the updated provisions.

Certain structures in a power plant may be required, under the CBC, to undergo dynamic lateral force (structural) analysis; others may be designed using the simpler static analysis procedure. In order to ensure that structures are analyzed according to their appropriate lateral force procedure, staff has included Condition of Certification **STRUC-1**, below, which, in part, requires the project CBO's review and approval of the owner's proposed lateral force procedures before construction begins.

PROJECT QUALITY PROCEDURES

The applicant does not specifically discuss in the AFC the quality control program that would be followed for the project, however, a program insuring that the project's systems and components will be designed, fabricated, stored, transported, installed, and tested in accordance with all appropriate power plant technical codes and standards would have to be followed to meet the LORS summarized above and in the AFC (COP2008a, AFC Appendix C). Compliance with design requirements would have to be verified through specific inspections, audits, and testing. Implementation of such a quality assurance/quality control (QA/QC) program would ensure that Palmdale is actually designed, procured, fabricated, and installed as described in this analysis.

COMPLIANCE MONITORING

Under Section 104.1 in Appendix Chapter 1 of the CBC, the CBO is authorized and directed to enforce all provisions of the CBC. The Energy Commission itself serves as the building official and has the responsibility to enforce the code for all of the energy facilities it certifies. In addition, the Energy Commission has the power to interpret the CBC and adopt and enforce both rules and supplemental regulations that clarify application of the CBC's provisions.

The Energy Commission's design review and construction inspection process conforms to CBC requirements and ensures that all facility design conditions of certification are met. As provided by section 103.3 in Appendix Chapter 1 of the CBC, the Energy Commission appoints experts to perform design review and construction inspections and act as delegate CBOs on behalf of the Energy Commission. These delegates typically include the local building official and/or independent consultants hired to provide technical expertise that is not provided by the local official alone. The applicant, through permit fees provided by the CBC, section 108 in Appendix Chapter 1, pays the cost of these reviews and inspections. While building permits in addition to Energy Commission certification are not required for this project, the applicant, consistent with CBC section 108, pays in lieu of CBC permit fees to cover the costs of these reviews and inspections.

Engineering and compliance staff will invite the City of Palmdale, Los Angeles County, or a third-party engineering consultant to act as CBO for this project. When an entity has been assigned CBO duties, Energy Commission staff will complete a memorandum of understanding (MOU) with that entity to outline both its roles and responsibilities and those of its subcontractors and delegates.

Staff has developed proposed conditions of certification to ensure public health and safety and compliance with engineering design LORS. Some of these conditions address the roles, responsibilities, and qualifications of the engineers who will design and build the proposed project (Conditions of Certification **GEN-1** through **GEN-8**). These engineers must be registered in California and sign and stamp every submittal of design plans, calculations, and specifications submitted to the CBO. These conditions require that every element of the project's construction (subject to CBO review and approval) be approved by the CBO before it is performed. They also require that qualified special inspectors perform or oversee special inspections required by all applicable LORS.

While the Energy Commission and delegate CBO have the authority to allow some flexibility in scheduling construction activities, these conditions are written so that no element of construction (of permanent facilities subject to CBO review and approval) that could be difficult to reverse or correct can proceed without prior CBO approval. Elements of construction that are not difficult to reverse may proceed without approval of the plans. The applicant bears the responsibility to fully modify construction elements in order to comply with all design changes resulting from the CBO's subsequent plan review and approval process.

FACILITY CLOSURE

The removal of a facility from service (decommissioning) when it reaches the end of its useful life ranges from "mothballing" to the removal of all equipment and appurtenant facilities and subsequent restoration of the site. Future conditions that could affect decommissioning are largely unknown at this time.

In order to ensure that decommissioning will be completed in a manner that is environmentally sound, safe, and protects the public health and safety, the applicant shall submit a decommissioning plan to the Energy Commission for review and approval before the project's decommissioning begins. The plan shall include a discussion of:

- proposed decommissioning activities for the project and all appurtenant facilities that were constructed as part of the project;
- all applicable LORS and local/regional plans and proof of adherence to those applicable LORS and local/regional plans;
- the activities necessary to restore the site if the plan requires removal of all equipment and appurtenant facilities; and
- decommissioning alternatives other than complete site restoration.

Satisfying the above requirements should serve as adequate protection, even in the unlikely event that the project is abandoned. Staff has proposed general conditions (see **General Conditions**) to ensure that these measures are included in the Facility Closure Plan.

CONCLUSIONS AND RECOMMENDATIONS

1. The laws, ordinances, regulations, and standards (LORS) identified in the AFC and supporting documents directly apply to the project.

2. Staff has evaluated the proposed engineering LORS, design criteria, and design methods in the record, and concludes that the design, construction, and eventual closure of the project will likely comply with applicable engineering LORS.

3. The proposed conditions of certification will ensure that Palmdale is designed and constructed in accordance with applicable engineering LORS. This will be accomplished through design review, plan checking, and field inspections that will be

performed by the CBO or other Energy Commission delegate. Staff will audit the CBO to ensure satisfactory performance.

4. Though future conditions that could affect decommissioning are largely unknown at this time, it can reasonably be concluded that if the project owner submits a decommissioning plan as required in the **General Conditions** section of this document prior to decommissioning, decommissioning procedures will comply with all applicable engineering LORS.

Energy Commission staff recommends that:

1. The proposed conditions of certification be adopted to ensure that the project is designed and constructed in a manner that protects the public health and safety and complies with all applicable engineering LORS;

2. The project be designed and built to the 2007 CBSC (or successor standards, if in effect when initial project engineering designs are submitted for review); and

3. The CBO reviews the final designs, checks plans, and performs field inspections during construction. Energy Commission staff shall audit and monitor the CBO to ensure satisfactory performance.

CONDITIONS OF CERTIFICATION

GEN-1 The project owner shall design, construct, and inspect the project in accordance with the 2007 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and all other applicable engineering laws, ordinances, regulations and standards (LORS) in effect at the time initial design plans are submitted to the chief building official (CBO) for review and approval (the CBSC in effect is the edition that has been adopted by the California Building Standards Commission and published at least 180 days previously). The project owner shall ensure that all the provisions of the above applicable codes are enforced during the construction, addition, alteration, moving, demolition, repair, or maintenance of the completed facility (2007 CBC, Appendix Chapter 1, § 101.2, Scope). All transmission facilities (lines, switchyards, switching stations, and substations) are covered in the conditions of certification in the **Transmission System Engineering** section of this document.

In the event that the initial engineering designs are submitted to the CBO when the successor to the 2007 CBSC is in effect, the 2007 CBSC provisions shall be replaced with the applicable successor provisions. Where, in any specific case, different sections of the code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

The project owner shall ensure that all contracts with contractors, subcontractors, and suppliers clearly specify that all work performed and materials supplied comply with the codes listed above.

Verification: Within 30 days following receipt of the certificate of occupancy, the project owner shall submit to the compliance project manager (CPM) a statement of verification, signed by the responsible design engineer, attesting that all designs, construction, installation, and inspection requirements of the applicable LORS and the Energy Commission's decision have been met in the area of facility design. The project owner shall provide the CPM a copy of the certificate of occupancy within 30 days of receipt from the CBO (2007 CBC, Appendix Chapter 1, § 110, Certificate of Occupancy).

Once the certificate of occupancy has been issued, the project owner shall inform the CPM at least 30 days prior to any construction, addition, alteration, moving, demolition, repair, or maintenance to be performed on any portion(s) of the completed facility that requires CBO approval for compliance with the above codes. The CPM will then determine if the CBO needs to approve the work.

GEN-2 Before submitting the initial engineering designs for CBO review, the project owner shall furnish the CPM and the CBO with a schedule of facility design submittals, master drawing, and master specifications lists. The schedule shall contain a list of proposed submittal packages of designs, calculations, and specifications for major structures and equipment. To facilitate audits by Energy Commission staff, the project owner shall provide specific packages to the CPM upon request.

Verification: At least 60 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO and to the CPM the schedule, the master drawing, and master specifications lists of documents to be submitted to the CBO for review and approval. These documents shall be the pertinent design documents for the major structures and equipment listed in **FACILITY DESIGN Table 2,** below. Major structures and equipment shall be added to or deleted from the table only with CPM approval. The project owner shall provide schedule updates in the monthly compliance report.

FACILITY DESIGN Table 2
Major Structures and Equipment List

Equipment/System	Quantity (Plant)
Reclaim and Fire Water Storage Tank Foundation and Connections	1
Brine Storage Tank Foundation and Connections	1
Process Surge Tank Foundation and Connections	1
Demineralized Water Tank Foundation and Connections	1
RO Water Tank Foundation and Connections	1
Combustion Turbine Wash Drain Tank Foundation and Connections	1

Equipment/System	Quantity (Plant)
ACW Heat Exchangers Foundation and Connections	2
Cooling Tower Foundations and Connections	1
Cooling Tower Blowdown Filter Press and Shelter Foundation and Connections	1
Pretreatment Filter Press and Shelter Foundation and Connections	1
Crystallizer Vapor Body Foundation and Connections	1
Sludge Thickener Foundation and Connections	1
Solids Contact Clarifier Foundation and Connections	1
Fire Pump Module Foundation and Connections	1
Admin/Control Building Warehouse Foundation and Connections	1
Water Treatment Building Foundation and Connections	1
Auxiliary Cooling Water Pump Foundation and Connections	2
Circulating Water Pump Foundation and Connections	2
Gland Steam Regulating Skid Foundation and Connections	1
STG MCC XFMR & Module Foundation and Connections	1
Cycle Chemical Feed Module Foundation and Connections	1
Auxiliary Electric Module Foundation and Connections	1
Ammonia Storage Foundation and Connections	1
HRSG Structure, Foundation and Connections	2
HRSG Blowdown Sump Foundation and Connections	1
HRSG Blowdown Tank Foundation and Connections	2
CEMS Foundation and Connections	2
Combustion Turbine Generator Foundation and Connections	2
Gas Fired Oil Heater Foundation and Connections	2
Fuel Gas Filter/separator Foundation and Connections	2
Fuel Gas Heater Foundation and Connections	2
Auxiliary Transformer Foundation and Connections	2
Oil/water Separator Foundation and Connections	1
Emergency Shutdown Generator Foundation and Connections	1
Switchgear Module Foundation and Connections	2
Switchyard Module Foundation and Connections	1
Diesel Tank Foundation and Connections	1
Condenser Exhausters Foundation and Connections	1
Steam Turbine Lube Oil Skid Foundation and Connections	1
Steam Turbine Drains Tank Foundation and Connections	1
ACW Pumps Foundation and Connections	2
Condensate Pumps Foundation and Connections	3
EHC Unit Foundation and Connections	1
Steam Turbine Generator Foundation and Connections	1
Thyristor Foundation and Connections	1
Valve House Foundation and Connections	1
Cooling Tower MCC and XFMRS Foundation and Connections	1

Equipment/System	Quantity (Plant)
Solar Field and Components Foundation and Connections	1 Lot
Solar Array Heat Exchangers Foundation and Connections	1 Lot
HTF Oil Heater Foundation and Connections	1 Lot
HTF Surge Tanks Foundation and Connections	1 Lot

GEN-3 The project owner shall make payments to the CBO for design review, plan checks, and construction inspections, based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. These fees may be consistent with the fees listed in the 2007 CBC (2007 CBC, Appendix Chapter 1, § 108, Fees; Chapter 1, Section 108.4, Permits, Fees, Applications and Inspections), adjusted for inflation and other appropriate adjustments; may be based on the value of the facilities reviewed; may be based on hourly rates; or may be otherwise agreed upon by the project owner and the CBO.

Verification: The project owner shall make the required payments to the CBO in accordance with the agreement between the project owner and the CBO. The project owner shall send a copy of the CBO's receipt of payment to the CPM in the next monthly compliance report indicating that applicable fees have been paid.

GEN-4 Prior to the start of rough grading, the project owner shall assign a California-registered architect, structural engineer, or civil engineer, as the resident engineer in charge of the project (2007 California Administrative Code, § 4-209, Designation of Responsibilities). All transmission facilities (lines, switchyards, switching stations, and substations) are addressed in the conditions of certification in the **Transmission System Engineering** section of this document.

The resident engineer may delegate responsibility for portions of the project to other registered engineers. Registered mechanical and electrical engineers may be delegated responsibility for mechanical and electrical portions of the project, respectively. A project may be divided into parts, provided that each part is clearly defined as a distinct unit. Separate assignments of general responsibility may be made for each designated part.

The resident engineer shall:

1. Monitor progress of construction work requiring CBO design review and inspection to ensure compliance with LORS;

2. Ensure that construction of all facilities subject to CBO design review and inspection conforms in every material respect to applicable LORS, these conditions of certification, approved plans, and specifications;

3. Prepare documents to initiate changes in approved drawings and specifications when either directed by the project owner or as required by the conditions of the project;

4. Be responsible for providing project inspectors and testing agencies with complete and up-to-date sets of stamped drawings, plans, specifications, and any other required documents;

5. Be responsible for the timely submittal of construction progress reports to the CBO from the project inspectors, the contractor, and other engineers who have been delegated responsibility for portions of the project; and

6. Be responsible for notifying the CBO of corrective action or the disposition of items noted on laboratory reports or other tests when they do not conform to approved plans and specifications.

The resident engineer shall have the authority to halt construction and to require changes or remedial work if the work does not meet requirements.

If the resident engineer or the delegated engineers are reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

Verification: At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, the resume and registration number of the resident engineer and any other delegated engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the resident engineer and other delegated engineer(s) within five days of the approval.

If the resident engineer or the delegated engineer(s) is subsequently reassigned or replaced, the project owner has five days to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

GEN-5 Prior to the start of rough grading, the project owner shall assign at least one of each of the following California registered engineers to the project: a civil engineer; a soils, geotechnical, or civil engineer experienced and knowledgeable in the practice of soils engineering; and an engineering geologist. Prior to the start of construction, the project owner shall assign at least one of each of the following California registered engineers to the project: a design engineer who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; a mechanical engineer; and an electrical engineer. (California Business and Professions Code section 6704 et seq., and sections 6730, 6731 and 6736 require state registration to practice as a civil engineer or structural engineer in California.) All transmission facilities (lines, switchyards, switching stations, and substations) are handled in the conditions of certification in the **Transmission System Engineering** section of this document.

The tasks performed by the civil, mechanical, electrical, or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (for example, proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California registered electrical engineer.

The project owner shall submit, to the CBO for review and approval, the names, qualifications, and registration numbers of all responsible engineers assigned to the project (2007 CBC, Appendix Chapter 1, § 104, Duties and Powers of Building Official).

If any one of the designated responsible engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications, and registration number of the newly assigned responsible engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

A. The civil engineer shall:

   1. Review the foundation investigations, geotechnical, or soils reports prepared by the soils engineer, the geotechnical engineer, or by a civil engineer experienced and knowledgeable in the practice of soils engineering;

   2. Design (or be responsible for the design of), stamp, and sign all plans, calculations, and specifications for proposed site work, civil works, and related facilities requiring design review and inspection by the CBO. At a minimum, these include: grading; site preparation; excavation; compaction; and construction of secondary containment, foundations, erosion and sedimentation control structures, drainage facilities, underground utilities, culverts, site access roads and sanitary sewer systems; and

   3. Provide consultation to the resident engineer during the construction phase of the project and recommend changes in the design of the civil works facilities and changes to the construction procedures.

B. The soils engineer, geotechnical engineer, or civil engineer experienced and knowledgeable in the practice of soils engineering, shall:

   1. Review all the engineering geology reports;

   2. Prepare the foundation investigations, geotechnical or soils reports containing field exploration reports, laboratory tests, and engineering analysis detailing the nature and extent of the soils that could be susceptible to liquefaction, rapid settlement, or collapse when saturated under load (2007 CBC, Appendix J, § J104.3, Soils Report; Chapter 18, § 1802.2, Foundation and Soils Investigations);

3. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with requirements set forth in the 2007 CBC, Appendix J, section J105, Inspections, and the 2007 California Administrative Code, section 4-211, Observation and Inspection of Construction (depending on the site conditions, this may be the responsibility of either the soils engineer, the engineering geologist, or both); and

4. Recommend field changes to the civil engineer and resident engineer.

This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform to the predicted conditions used as the basis for design of earthwork or foundations (2007 CBC, Appendix Chapter 1, § 114, Stop Orders).

C. The engineering geologist shall:

1. Review all the engineering geology reports and prepare a final soils grading report; and

2. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with the requirements set forth in the 2007 California Administrative Code, section 4-211, Observation and Inspection of Construction (depending on the site conditions, this may be the responsibility of either the soils engineer, the engineering geologist, or both).

D. The design engineer shall:

1. Be directly responsible for the design of the proposed structures and equipment supports;

2. Provide consultation to the resident engineer during design and construction of the project;

3. Monitor construction progress to ensure compliance with engineering LORS;

4. Evaluate and recommend necessary changes in design; and

5. Prepare and sign all major building plans, specifications, and calculations.

E. The mechanical engineer shall be responsible for, and sign and stamp a statement with, each mechanical submittal to the CBO, stating that the proposed final design plans, specifications, and calculations conform to all of the mechanical engineering design requirements set forth in the Energy Commission's decision.

F. The electrical engineer shall:

1. Be responsible for the electrical design of the project; and

2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

<u>Verification:</u> At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible civil engineer, soils (geotechnical) engineer, and engineering geologist assigned to the project.

At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of construction, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible design engineer, mechanical engineer, and electrical engineer assigned to the project.

The project owner shall notify the CPM of the CBO's approvals of the responsible engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

GEN-6 Prior to the start of an activity requiring special inspection, the project owner shall assign to the project qualified and certified special inspector(s) who shall be responsible for the special inspections required by the 2007 CBC, Chapter 17, Section 1704, Special Inspections; Chapter 17A, Section 1704A, Special Inspections; and Appendix Chapter 1, Section 109, Inspections. All transmission facilities (lines, switchyards, switching stations, and substations) are handled in conditions of certification in the **Transmission System Engineering** section of this document.

A certified weld inspector, certified by the American Welding Society (AWS), and/or American Society of Mechanical Engineers (ASME) as applicable, shall inspect welding performed on site requiring special inspection (including structural, piping, tanks, and pressure vessels).

The special inspector shall:

1. Be a qualified person who shall demonstrate competence, to the satisfaction of the CBO, for inspection of the particular type of construction requiring special or continuous inspection;

2. Observe the work assigned for conformance with the approved design drawings and specifications;

3. Furnish inspection reports to the CBO and resident engineer. All discrepancies shall be brought to the immediate attention of the resident engineer for correction, then, if uncorrected, to the CBO and the CPM for corrective action (2007 CBC, Chapter 17, § 1704.1.2, Report Requirements); and

4. Submit a final signed report to the resident engineer, CBO, and CPM, stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications, and other provisions of the applicable edition of the CBC.

<u>Verification:</u> At least 15 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of an activity requiring special inspection, the project owner shall submit to the CBO for review and approval, with a copy to the CPM, the name(s) and qualifications of the certified weld inspector(s) or other certified special inspector(s) assigned to the project to perform one or more of the duties set forth above. The project owner shall also submit to the CPM a copy of the CBO's approval of the qualifications of all special inspectors in the next monthly compliance report.

If the special inspector is subsequently reassigned or replaced, the project owner has five days in which to submit the name and qualifications of the newly assigned special inspector to the CBO for approval. The project owner shall notify the CPM of the CBO's approval of the newly assigned inspector within five days of the approval.

GEN-7 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend required corrective actions (2007 CBC, Appendix Chapter 1, § 109.6, Approval Required; Chapter 17, § 1704.1.2, Report Requirements). The discrepancy documentation shall be submitted to the CBO for review and approval. The discrepancy documentation shall reference this condition of certification and, if appropriate, applicable sections of the CBC and/or other LORS.

<u>Verification:</u> The project owner shall transmit a copy of the CBO's approval of any corrective action taken to resolve a discrepancy to the CPM in the next monthly compliance report. If any corrective action is disapproved, the project owner shall advise the CPM, within five days, of the reason for disapproval and the revised corrective action to obtain CBO's approval.

GEN-8 The project owner shall obtain the CBO's final approval of all completed work that has undergone CBO design review and approval. The project owner shall request the CBO to inspect the completed structure and review the submitted documents. The project owner shall notify the CPM after obtaining the CBO's final approval. The project owner shall retain one set of approved engineering plans, specifications, and calculations (including all approved changes) at the project site or at an alternative site approved by the CPM during the operating life of the project (2007 CBC, Appendix Chapter 1, § 106.3.1, Approval of Construction Documents). Electronic copies of the approved plans, specifications, calculations, and marked-up as-builts shall be provided to the CBO for retention by the CPM.

<u>Verification:</u> Within 15 days of the completion of any work, the project owner shall submit to the CBO, with a copy to the CPM, in the next monthly compliance report, (a) a written notice that the completed work is ready for final inspection, and (b) a signed statement that the work conforms to the final approved plans. After storing the final approved engineering plans, specifications, and calculations described above, the project owner shall submit to the CPM a letter stating both that the above documents have been stored and the storage location of those documents.

Within 90 days of the completion of construction, the project owner shall provide to the CBO three sets of electronic copies of the above documents at the project owner's expense. These are to be provided in the form of "read only" files (Adobe .pdf 6.0), with restricted (password-protected) printing privileges, on archive quality compact discs.

CIVIL-1 The project owner shall submit to the CBO for review and approval the following:

1. Design of the proposed drainage structures and the grading plan;
2. An erosion and sedimentation control plan;
3. Related calculations and specifications, signed and stamped by the responsible civil engineer; and
4. Soils, geotechnical, or foundation investigation reports required by the 2007 CBC, Appendix J, section J104.3, Soils Report, and Chapter 18, section 1802.2, Foundation and Soils Investigation.

Verification: At least 15 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of site grading the project owner shall submit the documents described above to the CBO for design review and approval. In the next monthly compliance report following the CBO's approval, the project owner shall submit a written statement certifying that the documents have been approved by the CBO.

CIVIL-2 The resident engineer shall, if appropriate, stop all earthwork and construction in the affected areas when the responsible soils engineer, geotechnical engineer, or the civil engineer experienced and knowledgeable in the practice of soils engineering identifies unforeseen adverse soil or geologic conditions. The project owner shall submit modified plans, specifications, and calculations to the CBO based on these new conditions. The project owner shall obtain approval from the CBO before resuming earthwork and construction in the affected area (2007 CBC, Appendix Chapter 1, § 114, Stop Work Orders).

Verification: The project owner shall notify the CPM within 24 hours when earthwork and construction is stopped as a result of unforeseen adverse geologic/soil conditions. Within 24 hours of the CBO's approval to resume earthwork and construction in the affected areas, the project owner shall provide to the CPM a copy of the CBO's approval.

CIVIL-3 The project owner shall perform inspections in accordance with the 2007 CBC, Appendix Chapter 1, section 109, Inspections, and Chapter 17, section 1704, Special Inspections. All plant site-grading operations, for which a grading permit is required, shall be subject to inspection by the CBO.

If, in the course of inspection, it is discovered that the work is not being performed in accordance with the approved plans, the discrepancies shall be reported immediately to the resident engineer, the CBO, and the CPM (2007 CBC, Chapter 17, § 1704.1.2, Report Requirements). The project owner shall prepare a written report, with copies to the CBO and the CPM, detailing all discrepancies, non-compliance items, and the proposed corrective action.

Verification: Within five days of the discovery of any discrepancies, the resident engineer shall transmit to the CBO and the CPM a non-conformance report (NCR), and the proposed corrective action for review and approval. Within five days of resolution of the NCR, the project owner shall submit the details of the corrective action to the CBO and the CPM. A list of NCRs, for the reporting month, shall also be included in the following monthly compliance report.

CIVIL-4 After completion of finished grading and erosion and sedimentation control and drainage work, the project owner shall obtain the CBO's approval of the final grading plans (including final changes) for the erosion and sedimentation control work. The civil engineer shall state that the work within his/her area of responsibility was done in accordance with the final approved plans (2007 CBC, Chapter 17, § 1703.2, Written Approval).

Verification: Within 30 days (or within a project owner- and CBO-approved alternative time frame) of the completion of the erosion and sediment control mitigation and drainage work, the project owner shall submit to the CBO, for review and approval, the final grading plans (including final changes) and the responsible civil engineer's signed statement that the installation of the facilities and all erosion control measures were completed in accordance with the final approved combined grading plans and that the facilities are adequate for their intended purposes, along with a copy of the transmittal letter to the CPM. The project owner shall submit a copy of the CBO's approval to the CPM in the next monthly compliance report.

STRUC-1 Prior to the start of any increment of construction of any major structure or component listed in **FACILITY DESIGN Table 2** of Condition of Certification **GEN 2**, above, the project owner shall submit to the CBO for design review and approval the proposed lateral force procedures for project structures and the applicable designs, plans, and drawings for project structures. Proposed lateral force procedures, designs, plans, and drawings shall be those for the following items (from **Table 2**, above):

1. Major project structures;
2. Major foundations, equipment supports, and anchorage; and
3. Large field-fabricated tanks.

Construction of any structure or component shall not begin until the CBO has approved the lateral force procedures to be employed in designing that structure or component.

The project owner shall:

1. Obtain approval from the CBO of lateral force procedures proposed for project structures;

2. Obtain approval from the CBO for the final design plans, specifications, calculations, soils reports, and applicable quality control procedures. If there are conflicting requirements, the more stringent shall govern (for example, highest loads, or lowest allowable stresses shall govern). All plans, calculations, and specifications for foundations that support structures shall be filed concurrently with the structure plans, calculations, and specifications (2007 CBC, Appendix Chapter 1, § 109.6, Approval Required);

3. Submit to the CBO the required number of copies of the structural plans, specifications, calculations, and other required documents of the designated major structures prior to the start of on-site fabrication and installation of each structure, equipment support, or foundation (2007 California Administrative Code, § 4-210, Plans, Specifications, Computations and Other Data);

4. Ensure that the final plans, calculations, and specifications clearly reflect the inclusion of approved criteria, assumptions, and methods used to develop the design. The final designs, plans, calculations, and specifications shall be signed and stamped by the responsible design engineer (2007 CBC, Appendix Chapter 1, § 106.3.4, Design Professional in Responsible Charge); and

5. Submit to the CBO the responsible design engineer's signed statement that the final design plans conform to applicable LORS (2007 CBC, Appendix Chapter 1, § 106.3.4, Design Professional in Responsible Charge).

Verification: At least 60 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of any increment of construction of any structure or component listed in **FACILITY DESIGN Table 2** of Condition of Certification **GEN-2**, above, the project owner shall submit to the CBO the above final design plans, specifications and calculations, with a copy of the transmittal letter to the CPM.

The project owner shall submit to the CPM, in the next monthly compliance report, a copy of a statement from the CBO that the proposed structural plans, specifications, and calculations have been approved and comply with the requirements set forth in applicable engineering LORS.

STRUC-2 The project owner shall submit to the CBO the required number of sets of the following documents related to work that has undergone CBO design review and approval:

1. Concrete cylinder strength test reports (including date of testing, date sample taken, design concrete strength, tested cylinder strength, age of test, type and size of sample, location and quantity of concrete placement from which sample was taken, and mix design designation and parameters);

2. Concrete pour sign-off sheets;

3. Bolt torque inspection reports (including location of test, date, bolt size, and recorded torques);

4. Field weld inspection reports (including type of weld, location of weld, inspection of non-destructive testing procedure and results, welder qualifications, certifications, qualified procedure description or number (ref: AWS); and

5. Reports covering other structural activities requiring special inspections shall be in accordance with the 2007 CBC, Chapter 17, section 1704, Special Inspections, and section 1709.1, Structural Observations.

<u>Verification:</u> If a discrepancy is discovered in any of the above data, the project owner shall, within five days, prepare and submit an NCR describing the nature of the discrepancies and the proposed corrective action to the CBO, with a copy of the transmittal letter to the CPM (2007 CBC, Chapter 17, § 1704.1.2, Report Requirements). The NCR shall reference the condition(s) of certification and the applicable CBC chapter and section. Within five days of resolution of the NCR, the project owner shall submit a copy of the corrective action to the CBO and the CPM.

The project owner shall transmit a copy of the CBO's approval or disapproval of the corrective action to the CPM within 15 days. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action necessary to obtain the CBO's approval.

STRUC-3 The project owner shall submit to the CBO design changes to the final plans required by the 2007 CBC, including the revised drawings, specifications, calculations, and a complete description of, and supporting rationale for, the proposed changes, and shall give to the CBO prior notice of the intended filing (2007 CBC, Appendix Chapter 1, § 106.1, Submittal Documents; § 106.4, Amended Construction Documents; 2007 California Administrative Code, § 4-215, Changes in Approved Drawings and Specifications).

<u>Verification:</u> On a schedule suitable to the CBO, the project owner shall notify the CBO of the intended filing of design changes and shall submit the required number of sets of revised drawings and the required number of copies of the other above-mentioned documents to the CBO, with a copy of the transmittal letter to the CPM. The project owner shall notify the CPM, via the monthly compliance report, when the CBO has approved the revised plans.

STRUC-4 Tanks and vessels containing quantities of toxic or hazardous materials exceeding amounts specified in the 2007 CBC, Chapter 3, Table 307.1(2), shall, at a minimum, be designed to comply with the requirements of that chapter.

<u>Verification:</u> At least 30 days (or within a project owner- and CBO-approved alternate time frame) prior to the start of installation of the tanks or vessels containing the above specified quantities of toxic or hazardous materials, the project owner shall submit to the CBO for design review and approval final design plans, specifications, and calculations, including a copy of the signed and stamped engineer's certification.

The project owner shall send copies of the CBO approvals of plan checks to the CPM in the following monthly compliance report. The project owner shall also transmit a copy of the CBO's inspection approvals to the CPM in the monthly compliance report following completion of any inspection.

MECH-1 The project owner shall submit, for CBO design review and approval, the proposed final design, specifications and calculations for each plant major piping and plumbing system listed in **FACILITY DESIGN Table 2**, Condition of Certification **GEN-2**, above. Physical layout drawings and drawings not related to code compliance and life safety need not be submitted. The submittal shall also include the applicable QA/QC procedures. Upon completion of construction of any such major piping or plumbing system, the project owner shall request the CBO's inspection approval of that construction (2007 CBC, Appendix Chapter 1, § 106.1, Submittal Documents; § 109.5, Inspection Requests; § 109.6, Approval Required; 2007 California Plumbing Code, § 301.1.1, Approvals).

The responsible mechanical engineer shall stamp and sign all plans, drawings, and calculations for the major piping and plumbing systems, subject to CBO design review and approval, and submit a signed statement to the CBO when the proposed piping and plumbing systems have been designed, fabricated, and installed in accordance with all of the applicable laws, ordinances, regulations, and industry standards (2007 CBC, Appendix Chapter 1, § 106.3.4, Design Professional in Responsible Charge), which may include, but are not limited to:

- American National Standards Institute (ANSI) B31.1 (Power Piping Code);
- ANSI/NFPA Z223.1 (Fuel Gas Piping Code);
- ANSI B31.3 (Chemical Plant and Petroleum Refinery Piping Code);
- ANSI B31.8 (Gas Transmission and Distribution Piping Code);
- Title 24, California Code of Regulations, Part 5 (California Plumbing Code);
- Title 24, California Code of Regulations, Part 6 (California Energy Code, for building energy conservation systems and temperature control and ventilation systems);
- Title 24, California Code of Regulations, Part 2 (California Building Code);
- Los Angeles County codes; and
- City of Palmdale codes.

The CBO may deputize inspectors to carry out the functions of the code enforcement agency (2007 CBC, Appendix Chapter 1, § 103.3, Deputies).

Verification: At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of any increment of major piping or plumbing construction listed in **FACILITY DESIGN Table 2**, Condition of Certification **GEN-2,** above, the project owner shall submit to the CBO for design review and approval the final plans, specifications, and calculations, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

The project owner shall transmit to the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's inspection approvals.

MECH-2 For all pressure vessels installed in the plant, the project owner shall submit to the CBO and California Occupational Safety and Health Administration (Cal/OSHA), prior to operation, the code certification papers and other documents required by applicable LORS. Upon completion of the installation of any pressure vessel, the project owner shall request the appropriate CBO and/or Cal/OSHA inspection of that installation (2007 CBC, Appendix Chapter 1, § 109.5, Inspection Requests).

The project owner shall:

1. Ensure that all boilers and fired and unfired pressure vessels are designed, fabricated, and installed in accordance with the appropriate section of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, or other applicable code. Vendor certification, with identification of applicable code, shall be submitted for prefabricated vessels and tanks; and

2. Have the responsible design engineer submit a statement to the CBO that the proposed final design plans, specifications, and calculations conform to all of the requirements set forth in the appropriate ASME Boiler and Pressure Vessel Code or other applicable codes.

Verification: At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of on-site fabrication or installation of any pressure vessel, the project owner shall submit to the CBO for design review and approval, the above-listed documents, including a copy of the signed and stamped engineer's certification, with a copy of the transmittal letter to the CPM.

The project owner shall transmit to the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's and/or Cal/OSHA inspection approvals.

MECH-3 The project owner shall submit to the CBO for design review and approval the design plans, specifications, calculations, and quality control procedures for any heating, ventilating, air conditioning (HVAC), or refrigeration system. Packaged HVAC systems, where used, shall be identified with the appropriate manufacturer's data sheets.

The project owner shall design and install all HVAC and refrigeration systems within buildings and related structures in accordance with the CBC and other applicable codes. Upon completion of any increment of construction, the project owner shall request the CBO's inspection and approval of that construction. The final plans, specifications, and calculations shall include approved criteria, assumptions, and methods used to develop the design. In addition, the responsible mechanical engineer shall sign and stamp all plans, drawings, and calculations and submit a signed statement to the CBO that the proposed final design plans, specifications, and calculations conform with the applicable LORS (2007 CBC, Appendix Chapter 1, § 109.3.7, Energy Efficiency Inspections; § 106.3.4, Design Professionals in Responsible Charge).

<u>Verification:</u> At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of construction of any HVAC or refrigeration system, the project owner shall submit to the CBO the required HVAC and refrigeration calculations, plans, and specifications, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with the CBC and other applicable codes, with a copy of the transmittal letter to the CPM.

ELEC-1 Prior to the start of any increment of electrical construction for all electrical equipment and systems 480 Volts or higher (see a representative list, below), with the exception of underground duct work and any physical layout drawings and drawings not related to code compliance and life safety, the project owner shall submit, for CBO design review and approval, the proposed final design, specifications, and calculations (2007 CBC, Appendix Chapter 1, § 106.1, Submittal Documents). Upon approval, the above-listed plans, together with design changes and design change notices, shall remain on the site or at another accessible location for the operating life of the project. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS (2007 CBC, Appendix Chapter 1, § 109.6, Approval Required; § 109.5, Inspection Requests). All transmission facilities (lines, switchyards, switching stations, and substations) are handled in conditions of certification in the **Transmission System Engineering** section of this document.

A. Final plant design plans shall include:

1. one-line diagrams for the 13.8 kV, 4.16 kV, and 480 V systems; and
2. system grounding drawings.

B. Final plant calculations must establish:

1. short-circuit ratings of plant equipment;
2. ampacity of feeder cables;
3. voltage drop in feeder cables;
4. system grounding requirements;
5. coordination study calculations for fuses, circuit breakers, and protective relay settings for the 13.8 kV, 4.16 kV, and 480 V systems;
6. system grounding requirements; and

7. lighting energy calculations.

C. The following activities shall be reported to the CPM in the monthly compliance report:

1. Receipt or delay of major electrical equipment;

2. Testing or energization of major electrical equipment; and

3. A signed statement by the registered electrical engineer certifying that the proposed final design plans and specifications conform to requirements set forth in the Energy Commission decision.

<u>Verification:</u> At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of each increment of electrical construction, the project owner shall submit to the CBO for design review and approval the above-listed documents. The project owner shall include in this submittal a copy of the signed and stamped statement from the responsible electrical engineer attesting compliance with the applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

REFERENCES

COP2008a – City of Palmdale/ S. Williams (tn: 47383). Application for Certification for the Palmdale Hybrid Power Project. Dated on 07/30/08. Submitted to CEC/ Docket Unit on 08/04/08

GEOLOGY AND PALEONTOLOGY

Dal Hunter, Ph.D., C.E.G.

SUMMARY OF CONCLUSIONS

The proposed Palmdale Hybrid Power Project (PHPP) is located in an active geologic area in eastern Los Angeles County, California. Based on the report by the geotechnical consultant, the site has considerable potential for hydrocollapse of near-surface soils which will require additional evaluation during final design. The site also will be subject to intense levels of earthquake-related ground shaking. While the potential for earthquake ground rupture is low, at least 52 major faults are located between 5.5 and 50 miles of the site. The effects of strong ground shaking must be mitigated, to the extent practical, through structural designs required by the California Building Code (CBC 2007). The CBC (2007) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction potential. A design-level geotechnical investigation is required for the project by the California Building Code (Condition of Certification **GEO-1**), and proposed **Facility Design** Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1**, present standard engineering design recommendations for mitigation of settlement due to compressible soils, dynamic compaction, and hydrocompaction. Conditions of Certification **GEO-2** through **GEO-5** are recommended to mitigate fault hazards, liquefaction potential, and landslide risk along appropriate portions of the project linears.

There are no known viable geologic or mineralogical resources at the proposed PHPP site. The paleontological survey by SWCA Environmental Consultants (SWCA) identified a fossil locality near the south end of the transmission line alignment and makes appropriate recommendations for their collection and preservation (SWCA 2008). Potential impacts to paleontological resources due to construction activities could be mitigated through worker training and monitoring by qualified paleontologists, as required by Conditions of Certification, **PAL-1** through **PAL-7**.

Based on its independent research and review, the California Energy Commission (Energy Commission) believes that the potential is low for significant adverse cumulative impacts to the project from geologic hazards during its design life and to potential geologic, mineralogic, and paleontologic resources from the construction, operation, and closure of the proposed project, provided that the recommended Conditions for Certification are met. It is staff's opinion that the PHPP can be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards (LORS), and in a manner that both protects environmental quality and assures public safety, to the extent practical.

INTRODUCTION

In this section, Energy Commission staff discusses the potential impacts of geologic hazards on the proposed PHPP as well as the PHPP's impact on geologic, mineralogic, and paleontologic resources. Staff's objective is to ensure that there would be no consequential adverse impacts to significant geological and paleontological resources during the project construction, operation, and closure and that operation of the plant would not expose occupants to high-probability geologic hazards. A brief geological and paleontological overview is provided. The section concludes with staff's proposed monitoring and mitigation measures for geologic hazards and geologic, mineralogic, and palentologic resources, with the proposed conditions of certification.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Applicable laws, ordinances, regulations and standards (LORS) are listed in the application for certification (AFC) (COP 2008a). The following briefly describes the current LORS for both geologic hazards and resources and mineralogic and paleontologic resources.

Geology and Paleontology Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	The proposed PHPP is not located on federal land. There are no federal LORS for geologic hazards and resources for this site.
State	
California Building Code (2007)	The CBC (2007) includes a series of standards that are used in project investigation, design, and construction (including grading and erosion control). The CBC has adopted provisions in the International Building Code (ICC 2006).
Alquist-Priolo Earthquake Fault Zoning Act, Public Resources Code (PRC), section 2621–2630	Mitigates against surface fault rupture of known active faults beneath occupied structures. Requires disclosure to potential buyers of existing real estate and a 50-foot setback for new occupied buildings.
The Seismic Hazards Mapping Act, PRC section 2690–2699	Areas are identified that are subject to the effects of strong ground shaking, such as liquefaction, landslides, tsunamis, and seiches. Seismic Hazards Maps have been prepared by California Geological Survey (CGS) for the project area.
The Seismic Hazards Mapping Act, PRC section 2693	Areas mapped as zones of required investigation for liquefaction, would require mitigation according to PRC 2693(c). "Mitigation" means those measures that are consistent with established practice and that will reduce seismic risk to acceptable levels.
PRC, Chapter 1.7, sections 5097.5 and 30244	Regulates removal of paleontological resources from state lands, defines unauthorized removal of fossil resources as a misdemeanor, and requires mitigation of disturbed sites.
Warren-Alquist Act, PRC, sections 25527 and 25550.5(i)	The Warren-Alquist Act requires the Energy Commission to "give the greatest consideration to the need for protecting areas of critical environmental concern, including, but not limited to, unique and irreplaceable scientific, scenic, and educational wildlife habitats; unique historical, archaeological, and cultural sites…" With respect to paleontologic resources, the Energy Commission relies on guidelines from the Society for Vertebrate Paleontology (SVP), indicated below.
California Environmental Quality Act (CEQA), PRC sections 15000 et seq., Appendix G	Mandates that public and private entities identify the potential impacts on the environment during proposed activities. Appendix G outlines the requirements for compliance with CEQA and provides a definition of significant impacts on a fossil site.

Applicable Law	Description
Society for Vertebrate Paleontology (SVP 1995)	The “Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontological Resources: Standard Procedures” is a set of procedures and standards for assessing and mitigating impacts to vertebrate paleontological resources. The measures were adopted in October 1995 by the SVP, a national organization of professional scientists.
Local	
City of Palmdale General Plan – Safety Element	Geotechnical reports must be provided for projects located within the Seismic Hazard Zones shown on the latest California Department of Conservation Seismic Hazard Zones Map, to the State Division of Mines and Geology (Policy S1.1.1).
City of Palmdale General Plan – Safety Element	Location of utility lines, whether above or below ground, should be restricted within an appropriate distance from active fault traces, as determined by geotechnical investigation and approved by the City. (Policy S1.1.7).
City of Palmdale General Plan	City staff shall require that new developments protect significant historic, paleontological, or archaeological resources, or provide for other appropriate mitigation (Policy ER7.1.3).

SETTING

The proposed PHPP would be constructed on approximately 377 acres of previously undeveloped land located in the northern portion of the City of Palmdale. The site is located on the northwest side of the LA-Palmdale Regional Airport/Air Force Plant 42, a municipal airport and government-owned/contractor-operated production and flight testing facility. The northeast corner of the PHPP would be at 15th Street East and East Avenue M. The site is presently undeveloped and is vegetated with low desert scrub and Joshua trees.

The proposed power plant would include two natural gas-fired combustion turbine generators, two associated heat recovery steam generators, and a steam turbine generator powered both by the solar equipment and gas-powered heat recovery steam generator systems. The heavy power equipment would be located on a power block approximately 27 acres in area on the east-central portion of the site. Associated equipment would include cooling water tower, a 230 kilovolt (kV) switchyard, a gas metering station, and an operations building. Arrays of solar parabolic troughs, heat-transfer fluid pipelines, and associated equipment would be located on 250 acres of the site.

The southwest corner of the power block would be approximately at level grade, and the northeast corner would require approximately 7 feet of fill relative to existing grade. The solar collector areas would be sloped at 0.5 percent grade towards the northwest with grading to balance overall cuts and fills. Storm water from the northern third of the site would discharge to an infiltration pond along the north edge of the overall site (adjacent to East Avenue M. Storm water from the southern two thirds of the overall plant site would be collected in two infiltration ponds approximately 8 feet deep along the west and south edges of the power block area.

Extensive linear facilities would be required for the PHPP. Gas supply would be provided by a new 8.7-mile-long, 20-inch-diameter gas pipeline to be designed and constructed by Southern California Edison. This pipeline would run approximately 1.5

miles west on East Avenue M, and then south-southeast and south primarily on Sierra Highway and 10th Street East. The last half mile of the proposed pipeline alignment turns east from 10th Street East on East Avenue S to connect to a gas transmission line. The electric transmission line would interconnect to the Vincent Substation 11 miles southwest of the site by a circuitous, 35.6-mile-long route. The first phase of the transmission line would consist of a 23.7-mile-long first phase which runs approximately 11 miles east and 10 miles south to the Pearblossom substation. The second phase would parallel existing electrical transmission lines 11.9 miles west and southwest to the Vincent substation. Reclaimed water for cooling tower makeup would be obtained from a 7.4-mile-long pipeline. This pipeline would follow the same route and use the same trench as the gas supply pipeline for 5 miles, and then would connect 2.4 miles east from 10th Avenue East on East Avenue P to the City of Palmdale Water Reclamation Plant. Sanitary sewer disposal would be provided by new 1.0-mile-long pipelines connecting to existing services to the north along 15th Street East. Potable Water would be obtained from a water line less than 1 mile long along East Avenue M. The plant would be designed for “zero liquid discharge” such that wastewater or cooling water discharge is not expected from the plant operating systems (COP 2008a).

REGIONAL GEOLOGIC SETTING

The proposed PHPP site is located in Antelope Valley, an enclosed drainage basin in the western edge of the Mojave Desert Geomorphic Province. The Mojave Desert is a broad interior region of isolated mountain ranges and vast expanses of internally-drained desert plains which occupies approximately 25,000 square miles in southeastern California and portions of Nevada, Utah, and Arizona. Mountain ranges are primarily Paleozoic and Mesozoic-age igneous and metamorphic basement rocks, and valley fill is Quaternary-age alluvium. In California, its overall topography is dominated by southeast to northwest trending faulting with a secondary east to west trending alignment which is correlateable to Transverse Range faulting.

The proposed PHPP site is located near the western boundary of the Mojave Desert Geomorphic Province where it terminates against the San Andreas Fault. The western edge of the Antelope Valley is sharply delineated by the northwest-southeast trending San Andreas fault system, beyond which rise mountains of the Transverse Ranges geomorphic province including the San Gabriel Range and Sierra Pelona. The San Gabriel Range is composed largely of Mesozoic to Precambrian granitic rocks, and Sierra Pelona is composed of the Pelona schist, a pre-Cretaceous metamorphic unit. Minor intrusive volcanic rocks are also present. Minor exposures of Pelona Schist are present east of the main traces of the San Andreas fault, including Ritter Ridge and Quartz Hill within 4 miles west of the site. Foothills on both sides of the fault include areas of Oligocene, Miocene, Pliocene, and Pleistocene non-marine sediments.

The Mojave segment of the San Andreas fault zone is the closest major active fault, and is classified by the California Division of Mines and Geology (CDMG 1998) as a Type A fault, or a fault with displacement of greater than 5 mm/year. The San Andreas fault system is a major transform fault along the Pacific plate/North American Plate boundary. The San Andreas has multiple traces in a fault zone approximately 1 to 2 miles wide no closer than 5.5 miles southwest of the plant site, and in close proximity to the southern ends of the transmission line and natural gas pipeline linears.

Displacement along this fault is generally accepted to be about 315 km (195 miles) since Miocene time based on exposures at Pinnacles National monument in San Benito County and in Los Angeles County approximately 28 miles west-northwest of the PHPP site (Matthews, 1976). A wide variety of studies on the adjacent Mojave segment indicate average fault slip rates in Holocene time of between ¼ and 1-½ inches per year (7 and 38 mm per year, Bryant and Lundberg, 2002). Earthquakes resulting in surface faulting are estimated to have occurred in the range of every 125 to 150 years over the last 1500 years. Assuming that the maximum slip rate occurs during an earthquake at the estimated 150-year return period, right-lateral slip in the magnitude of 19 feet (5.7 m) of is likely to develop on the San Andreas or parallel faults during a local earthquake on the Mojave segment.

The San Andreas Rift Zone includes multiple traces within the most active fault zone, and within the City of Palmdale also includes outlier faults to the northeast and southwest of the main fault zone. Several faults parallel to the main rift zone, including the named Cemetery fault, are mapped near the southern terminus of the natural gas supply linear near Avenue S East and 10th Street East. The Llano fault system, a series of northwest-southeast trending faults within a 2-mile-square area, is located near the Pearblossom substation at the southeast corner of the transmission line system (CDMG 1974).

PROJECT SITE GEOLOGIC DESCRIPTION

The proposed PHPP site lies in the alluvial plain of Antelope Valley, in a broad area mapped as Quaternary alluvium consisting of gravel, sand, and silt (Diblee, 2008 and CDMG 1969). The site has a gentle (1 percent) gradient towards the north-northwest. Overall, Antelope Valley slopes gently about 20 miles north to Rosamond Lake, a playa lake. Several gently-sloped drainages (cross slopes of 2 to 5 percent, overall relief of 10 to 15 feet relative to adjacent ridges) traverse the site from southwest to northeast.

The project site is underlain by Quaternary alluvium consisting of poorly-graded sand with silt to silty sand, which based on laboratory testing vary from about 4 to 26% non-plastic to low plasticity fines. Minor sandy silt layers are present in the soil profile based on the boring logs, although no grain size distribution tests were performed on these materials. Soils are estimated to be loose to medium dense to 10 to 15 feet depth based on penetration resistance, and are medium dense to dense below that depth. Ground water was not encountered in borings as deep as 76.5 feet, and the ground water table is reported to be approximately 400 feet below ground surface based on nearby wells (Kleinfelder, 2008).

Kleinfelder (2008) reports that deposits from the ground surface to depths as great as 26 feet exhibit moderate to high potential for hydrocollapse. Eleven collapse tests were performed, where the vertical confining pressure was increased to 2000 pounds per square foot, and then water was introduced to saturate the samples. Eight samples under the power block area to a depth of 11 feet exhibited collapse of 1.6 to 6%, and three samples under the solar collector area to a depth of 26 feet exhibited collapse of 1.6 to 4.1% upon saturation.

EQFAULT™ Version 3.00 was used to model peak ground acceleration that would occur at the project site for seismic sources within 50 miles of the PHPP site (Blake, 2006). EQFAULT™ is a computer program for the deterministic estimation of peak site acceleration using three-dimensional articulated planar elements (faults) to model seismogenic sources (Blake, 2006). Additional information for each fault was derived from the State of California Probablistic Seismic Hazard Assessment website (CGS 2002). The various faults are listed below in **Geology and Paleontology Table 2**, along with the distance from the project site and maximum earthquake magnitude. The peak acceleration, fault type, and fault class for each fault is also given. The fault locations can be found on the Fault Activity Map of California (CDMG 1994) and on the Southern California Earthquake Data Center website (SCEC 2008).

Geology and Paleontology Table 2
Active Faults near the Proposed PHPP Site

Fault Name	Distance From Site (miles)	Maximum Earthquake Magnitude (Mw)	Estimated Peak Site Acceleration (g)	Fault Type and Strike	Fault Class
San Andreas (Whole)	5.5	8.0	0.486	Right-Lateral Strike Slip (Northwest)	A
San Andreas (Choalme-Mojave Segment)	5.5	7.8	0.437	Right-Lateral Strike Slip (Northwest)	A
San Andreas (Mohave Segment)	5.5	7.4	0.354	Right-Lateral Strike Slip (Northwest)	A
Sierra Madre	19.4	7.2	0.164	Reverse (West)	B
Sierra Madre (San Fernando)	19.8	6.7	0.124	Reverse (West)	B
Clamshell-Sawpit	22.6	6.5	0.101	Reverse (Northeast)	B
San Andreas (Carrizo Segment)	23.0	7.4	0.132	Right-Lateral Strike Slip (Northwest)	A
Verdugo	23.4	6.9	0.122	Reverse (Northwest)	A
San Gabriel	23.6	7.2	0.116	Right-Lateral Strike Slip (Northwest)	B

Fault Name	Distance From Site (miles)	Maximum Earthquake Magnitude (Mw)	Estimated Peak Site Acceleration (g)	Fault Type and Strike	Fault Class
Santa Susana	26.6	6.7	0.099	Reverse (West)	B
Holser	29.2	6.5	0.083	Reverse (West)	B
Northridge (East Oak Ridge)	30.1	7.0	0.106	Reverse (West)	B
Raymond	31.4	6.5	0.079	Left-Lateral/Reverse/Oblique Slip (West)	B
Garlock (West Segment)	31.9	7.3	0.097	Left-Lateral Strike-Slip (Northeast)	B
Puente Hills Blind Thrust	32.1	7.1	0.106	Reverse (West)	B
Upper Elysian Park Blind Thrust	33.2	6.4	0.071	Reverse (Northwest)	B
Cucamonga	33.6	6.9	0.092	Reverse (West)	B
Hollywood	33.7	6.4	0.071	Left-Lateral Reverse/Oblique Slip (South)	B
Oak Ridge (Onshore Segment)	38.5	7.0	0.087	Reverse (West)	B
Simi-Santa Rosa	38.8	7.0	0.087	Left-Lateral Reverse/ Oblique Slip (West)	B
San Cayetano	39.6	7.0	0.086	Reverse (West)	B
San Jose	40.7	6.4	0.061	Left-Lateral Reverse/ Oblique Slip (Northeast)	B
San Andreas (SB-Coachella)	42.4	7.7	0.096	Right-Lateral Strike Slip (Northwest)	A
San Andreas (San Bernardino)	42.4	7.5	0.087	Right-Lateral Strike Slip (Northwest)	A
Santa Monica	43.0	6.6	0.065	Left-Lateral Reverse/ Oblique Slip (West)	B
Cleghorn	43.2	6.5	0.051	Left-Lateral Strike Slip (Northwest)	B
Whittier	43.2	6.8	0.059	Reverse/Right-Lateral/Oblique Slip (Northwest)	A
Helendale-South Lockhart	43.3	7.3	0.077	Right-Lateral Strike Slip (Northwest)	B
San Jacinto-San Bernardino	43.7	6.7	0.056	Right-Lateral Strike Slip (Northwest)	A
Newport Inglewood (L.A. Basin)	44.1	7.1	0.068	Right-Lateral Strike Slip	B
Lenwood-Lockhart-Old Woman	44.4	7.5	0.084	Right-Lateral Strike Slip	B
Garlock (East)	44.9	7.5	0.083	Left-Lateral Strike-Slip (Northeast)	B
Santa Ynez (East)	45.0	7.1	0.067	Left-Lateral Strike Slip	B
Pleito Thrust	45.4	7.0	0.077	Reverse (South)	B
White Wolf	45.9	7.3	0.089	Reverse Left-Lateral Oblique Slip (West)	B
Malibu Coast	46.4	6.7	0.065	Reverse/Left-Lateral/Oblique Slip (West)	B
Chino-Central Avenue (Elsinore)	46.7	6.7	0.064	Reverse/Right-Lateral/Oblique Slip (Northwest)	B
Anacapa-Dume	50.6	7.5	0.092	Left-Lateral Reverse/ Oblique Slip (West)	B

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section considers two types of impacts. The first is geologic hazards, which could impact the proper functioning of the proposed facility and create life/safety concerns. The second is the potential impacts the proposed facility could have on existing geologic, mineralogic, and paleontologic resources in the area.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

No federal LORS concerning geologic hazards and geologic and mineralogic resources apply to this project. With regard to design of the project to resist geologic hazards, the California Building Standards Code (CBSC) and CBC (2007) provide geotechnical and geological investigation and design guidelines, which engineers must follow when designing a facility. As a result, the criteria used to assess the significance of a geologic hazard include evaluating each hazard's potential impact on the design of the proposed facility. Geologic hazards include faulting and seismicity, liquefaction, hydrocompaction, subsidence, expansive soils, landslides, and others as may be dictated by site-specific conditions. The City of Palmdale has specific requirements with regard to addressing geologic hazards for both structures and utilities.

With regard to protecting resources from impacts by the project, the California Environmental Quality Act (CEQA) guidelines, Appendix G, provide a checklist of questions that lead agencies typically address.

- Section (V) (c) includes guidelines that determine if a project will either directly or indirectly destroy a unique paleontological resource or site, or a unique geological feature.
- Sections (VI) (a), (b), (c), (d), and (e) focus on whether or not the project would expose persons or structures to geologic hazards.
- Sections (X) (a) and (b) concern the project's effects on mineral resources.

Staff has reviewed geologic and mineral resource maps for the surrounding area, as well as site-specific information provided by the applicant, to determine if geologic and mineralogic resources exist in the area and to determine if plant operations could adversely affect any such resources.

Staff reviewed existing paleontologic information and requested records searches from the San Diego Natural History Museum and the Natural History Museum of Los Angeles for the surrounding area. The University of California (at Berkeley) Museum of Paleontology's website, which gives generalized information for locality records of their collection, was reviewed as well (University of California, Museum of Paleontology [UCMP] 2008). Site-specific information generated by the applicant for the PHPP was also reviewed (SWCA 2008). All research was conducted in accordance with accepted assessment protocol (SVP 1995) to determine whether any known paleontologic resources exist in the general area. If present or likely to be present, conditions of certification which outline required procedures to mitigate impacts to potential resources, and proposed as part of the projects approval.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Ground shaking, foundation settlement and/or hydrocollapse settlement represents the main geologic hazards at the proposed PHPP site. Some potential for liquefaction, fault rupture, and landslides has been identified along the alignment proposed for the transmission line. These potential hazards can be effectively mitigated through facility design by incorporating recommendations contained in a project-specific geotechnical report. As required in Condition of Certification **GEO-1**, the preliminary geotechnical report for the site should be updated as a project-specific geotechnical report. The requirements of the proposed **Facility Design** Conditions of Certification **GEN-1, GEN-5,** and **CIVIL-1** in the **Facility Design** section should also aid in mitigating these impacts to a less than significant level. Detailed assessment of geologic hazards along project linears is required in Conditions of Certification **GEO-2** through **GEO-5**.

Numerous historic sand and gravel production pits are present along the length of the Little Rock Wash. However, no viable geologic or mineralogic resources are known to exist within 3 miles of the proposed PHPP plant site or about ½ mile of project linears.

No important paleontological resources were observed on the proposed PHPP site or along the off-site linears except as noted by SWCA (2008) for the southern portion of the electrical transmission line. However, at least five fossil bearing stratigraphic units are known to underlie the proposed PHPP site and/or its linear alignments. The Natural History Museum of Los Angeles County considers the most recent latest Pleistocene to Holocene unconsolidated alluvial deposits, which form much of the natural site surface, to hold little potential for preservation of significant fossil remains. However, the potential for significant fossil deposits is considered to increase with depth within the most recent alluvial deposits (McLeod, 2009). In addition to Quaternary younger alluvial deposits, the proposed PHPP site and linear alignments, particularly the southern portion of the proposed electrical transmission line, are underlain by Pleistocene Older alluvium deposits including the Nadeau Gravel and Harold Formation, Pliocene Anaverde Formation, Late Miocene Punchbowl Formation, and Oligocene to Early Miocene Vasquez Formation. Of these, all but the Vasquez Formation have yielded significant vertebrate fossils, in other areas, and are therefore considered to have a high paleontological resource potential.

Since the proposed PHPP site construction would include significant amounts of grading, excavation, and utility trenching, staff considers the probability that paleontological resources would be encountered during such activities to be high anytime excavation activities fully penetrate the recent alluvial deposits and encounter older Quaternary alluvium. Locations where project linears would cross known outcrops of Miocene through latest Pleistocene strata are also considered to have a high potential to encounter significant fossil deposits. Proposed Conditions of Certification **PAL-1** through **PAL-7** are designed to mitigate paleontological resource impacts, as discussed above, to less than significant levels. These conditions essentially require a worker education program in conjunction with the monitoring of earthwork activities by a qualified professional paleontologist (paleontologic resource specialist; PRS).

The proposed conditions of certification allow the Energy Commission's compliance project manager (CPM) and the applicant to adopt a compliance monitoring scheme ensuring compliance with LORS applicable to geologic hazards and the protection of geologic, mineralogic, and paleontologic resources.

Based on the information below, it is staff's opinion that the potential for significant adverse direct or indirect impacts to the project from geologic hazards, and to potential geologic, mineralogic, and paleontologic resources, from the proposed project, is low assuming the proposed conditions of certification are adopted and enforced.

GEOLOGICAL HAZARDS

The AFC (PHPP, 2008) provides documentation of potential geologic hazards at the proposed plant site. Review of the AFC, coupled with staff's independent research, indicates that the possibility of geologic hazards at the plant site, during its practical design life, is low. Geologic hazards, such as potential for settlement due to hydrocompaction, or dynamic compaction, are addressed in the project geotechnical report per CBC (2007) requirements (Kleinfelder, 2008). The hydrocollapse evaluation and mitigation recommendations are incomplete, and should be re-evaluated for final plant design.

Staff's independent research included the review of available geologic maps, reports, and related data of the PHPP plant site. Geological information was available from the CGS, CDMG, the United States Geological Survey (USGS), and other government organizations. Since 2002, the CDMG has been known as the CGS.

Faulting and Seismicity

Type A faults have slip-rates of ≥5 mm per year and are capable of producing an earthquake of magnitude 7.0 or greater. Type B faults have slip-rates of 2 to 5 mm per year and are capable of producing an earthquake of magnitude 6.5 to 7.0. Nine Type A faults or fault segments and 29 Type B faults have been identified within 50 miles of the proposed PHPP Site. The fault type, potential magnitude, and distance from the site were summarized previously in **Geology and Paleontology Table 2**.

The Alquist-Priolo Act of 1973 and subsequent California state law (California Code of Regulations 2001) require that all occupied structures be set back 50 feet or more from the surface trace of an active fault. Since no active faults have been documented within the PHPP power plant site, setbacks from occupied structures will not be required.

Energy Commission staff reviewed the CDMG publication *Fault Activity Map of California and Adjacent Areas with Locations and Ages of Recent Volcanic Eruptions* (1994) and Alquist-Priolo Special Studies Zone mapping and reports (CDMG 2003; CGS 2003a, b, and c; CGS 2005a and b; and Hart and Bryant, 1999). No active faults are shown on published maps as crossing the proposed PHPP power plant site.

The proposed gas pipeline lies adjacent to or crosses Alquist-Priolo zones for lesser faults parallel to and directly northeast of the San Andreas fault zone. The gas pipeline would travel along 10th Street East on the west edge of an Alquist-Priolo zone for the

Cemetery fault. The south side of East Avenue S includes an Alquist-Priolo Zone for several unnamed fault traces which run parallel to and 300 to 2,000 feet northeast of the main San Andreas Rift Zone.

The City of Palmdale general plan requires restricting location of utility lines, whether above or below ground, within an appropriate distance from active fault traces, as determined by geotechnical investigation and approved by the City. (Policy S1.1.7). We note that Exhibit LU-4, which defines the Fault Hazard Management Zone used by the city, includes more area than the Alquist Priolo maps (CDMG 1979) and includes the southern 1 mile of the proposed natural gas pipeline alignment. Additional geologic investigation of potential fault rupture hazards crossing the natural gas pipeline is recommended (Condition of Certification **GEO-2**).

The electric transmission line crosses the San Andreas fault zone in the southern segment of the alignment. The Alquist Priolo map shows the transmission line crossing at least one trace of the Llano fault in the vicinity of the Pearblossom substation within 500 feet east of 116th Street East (CDMG 1974). The Alquist-Priolo map shows the approximate transmission line route crosses approximately 6 fault traces in a mile-long area where it crosses the San Andreas Rift Zone (Township 5 North, Range 11 West, Sections 22 and 23). Since the electrical facility may be a critical facility for post-earthquake recovery, the transmission line towers should not be sited directly on the active fault traces (Condition of Certification **GEO-3**). Provided that towers are not damaged, typical slack in transmission lines is probably enough to accommodate the likely 19 to 20 feet of fault offset during a local earthquake on the San Andreas fault segments crossed by the transmission lines.

Based on the geotechnical investigation, the site soil class is assumed to be seismic Class D. The estimated peak horizontal ground acceleration for the power plant is 0.40 times the acceleration of gravity (0.40g) for bedrock acceleration based on two thirds of the 2 percent probability of exceedence in 50 years under 2007 CBC criteria (USGS 2007).

Liquefaction

Liquefaction is a condition where in a cohesionless soil may lose shear strength because of sudden increase in pore water pressure caused by an earthquake. Ground water under the project site and most areas of project linears is sufficiently deep that liquefaction is not possible. The seismic hazards zones map for the Lancaster East, Littlerock, Palmdale, and Pacifico Mountain quadrangles where transmission line linear facilities are located indicates the transmission lines cross areas "*…where historic occurrence of liquefaction or local geological, geotechnical, and ground water conditions indicate a potential for permanent ground displacement such that mitigation as defined in Public Resources Code Section 2693(c) would be required*" (CDMG 1999). Based on the materials provided, no geotechnical investigation has been performed for the linears in these areas. Some areas of liquefaction potential may be eliminated by showing that local ground water is considerably deeper than the typical depth of liquefiable materials; other liquefaction hazards may potentially be avoided by spanning select areas with the transmission towers. Some areas may require detailed investigation, or may require actual mitigation. Studies (Conditions of Certification **GEO-4**) need to be completed to assess what mitigation might be necessary.

Lateral Spreading

Lateral spreading of the ground surface can occur within liquefiable beds during seismic events. Lateral spreading generally requires an abrupt change in slope, such as a nearby steep hillside or deeply eroded stream bank, but can also occur on gentle slopes. Other factors such as distance from the epicenter, magnitude of the seismic event, and thickness and depth of liquefiable layers also affect the amount of lateral spreading. There is no potential for lateral spread on the project site, but lateral spread and its impact on electric transmission line facilities needs to be determined with the liquefaction assessment.

Hydrocompaction

Hydrocompaction (also commonly known as hydrocollapse) is generally limited to young soils that were deposited rapidly in a saturated state, most commonly by a flash flood. The soils dry quickly, leaving an unconsolidated, low density deposit with a high percentage of voids. Foundations built on these types of compressible materials can settle excessively, particularly when landscaping irrigation or concentrated infiltration dissolves the weak cementation that is preventing the immediate collapse of the soil structure. The geotechnical report indicates that moderately collapsible soil is present from the ground surface to depths of as much as 26 feet. The proposed mitigation method involves limited depth of over-excavation of soils under foundations and replacement with compacted fill or use of deep foundations (Kleinfelder, 2008; AECOM 2009a). Any necessary mitigation measures for the effects of hydrocompaction of site soils should be addressed as required in the project-specific geotechnical report, per CBC (2007) requirements and proposed Condition of Certification **GEO-1** and **Facility Design** Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1**.

Dynamic Compaction

Dynamic compaction can occur when relatively unconsolidated granular soils experience vibration associated with seismic events. The vibration causes a decrease in soil volume, as the soil grains tend to rearrange into a more dense state (an increase is soil density). The decrease in volume can result in settlement of overlying structural improvements. Geotechnical investigation at the proposed PHPP project site indicates the site surface consists of 10 to 15 feet of loose to medium dense granular alluvium which is underlain by generally medium dense to dense granular soils below 10 to 15 feet depth (Kleinfelder, 2008). The possible occurrence of dynamic compaction of site native and fill soils during an earthquake is not addressed in the preliminary geotechnical report and should be addressed in the final project geotechnical report, per Condition of Certification **GEO-1**. Given the seismic history of the area, it seems likely that any potential dynamic compaction has already occurred.

Expansive Soils

Soil expansion occurs when clay-rich soils with an affinity for water exist at a moisture content below their plastic limit. The addition of moisture from irrigation, precipitation, capillary tension, water line breaks, etc. causes the clay soils to absorb water molecules into their structure, which in turn causes an increase in the overall volume of the soil. Kleinfelder (2008) evaluated the potential for soil expansion and determined that soils have low-plasticity fines and are generally not expansive. Expansive soils will not have a significant impact on linears provided that pipelines are buried several feet below ground surface, and transmission towers are not sensitive to minor soil expansion.

Landslides

The proposed PHPP site slopes gently to the south-southwest at a gradient of approximately 1 percent. The gradual slope of the site coupled with the absence of topographically high ground within or immediately upgradient from the site suggest it is, not susceptible to landslide activity. Transmission tower sites must be investigated to assure they are not located in a potential landslide area (Condition of Certification **GEO-5**).

Flooding

The Federal Emergency Management Agency (FEMA) has identified the proposed PHPP site as lying in Unshaded Zone X, which are "areas determined to be outside the 0.2 percent annual chance flood plain" (FEMA 2008). Lake Palmdale, a dammed reservoir along the San Andreas fault, is located uphill from the proposed PHPP site but if it were to fail, flood waters would not be projected to cross the site. The proposed underground linears are not considered highly susceptible to short-term flooding as would be associated with thunderstorm or dam-related flooding. The electric transmission line linears are not considered significantly susceptible to flooding of this nature. Therefore, the potential for PHPP site inundation due to flooding or risk to offsite linears is considered to be low.

GEOLOGIC, MINERALOGIC, AND PALEONTOLOGIC RESOURCES

Energy Commission staff has reviewed applicable geologic maps and reports for this area (CDC 1992; CDC 2001; CDMG 1969; CDMG 1990; CDMG 1994; CDMG 1998; CDMG 1999; Dibblee, 2008). Historically, minor quantities of gold copper, and other minerals were obtained from the Transverse Ranges to the west (CDMG 1998). Alluvium of Little Rock Creek have yielded primarily aggregate in the form of sand and gravel. Other sources of sand and gravel aggregates are present in older Quaternary deposits in the vicinity of the San Andreas fault near the transmission line linear.

Energy Commission staff has reviewed the Paleontological Resources assessment in Section 5.9 and Paleontological Records Search and Literature Review (Confidential) in Appendix J of the AFC (SWCA 2008). Staff has also reviewed the paleontological literature and records searches conducted by the Natural History Museum of Los Angeles County (NHMLC) (McCleod, 2009) as well as the online records database maintained by the UCMP (2008). The SWCA survey identified fossil plant site within the project plant site or linears and makes appropriate recommendations for their collection and preservation. No other fossil collection localities have been documented within the project boundaries or along project linear alignments.

CONSTRUCTION IMPACTS AND MITIGATION

The design-level geotechnical investigation required for the project by the CBC (2007), proposed Conditions of Certification **GEO-1**, and **GEN-1**, **GEN-5** and **CIVIL-1** (under **Facility Design**) provide standard engineering and design recommendations for mitigation of excessive settlement due to collapsible/compressible soils or dynamic compaction, as appropriate.

As noted above, no viable geologic or mineralogic resources, including oil or gas fields, are known to exist within the proposed PHPP construction site or linear routes, although historic high-grade aggregate pits are present in the site vicinity. The potential to impact significant paleontological resources in older Quaternary (older Pleistocene) sediments, especially in deeper excavations, is considered to be high. Construction of the proposed project will include grading, excavation, and utility trenching. Staff considers the probability of encountering paleontological resources to be generally high in excavations which penetrate through the recent alluvium and encounter older Quaternary alluvium. The potential for encountering fossils will increase with the depth of cut. Locations where project linears would cross known outcrops of Miocene through latest Pleistocene strata are also considered to have a high potential to encounter significant fossil deposits.

Proposed Conditions of Certification **PAL-1** through **PAL-7** are designed to mitigate any paleontological resource impacts, as discussed above, to a less than significant level. Essentially, these conditions require a worker education program in conjunction with monitoring of earthwork activities by qualified professional paleontologists (paleontologic resource specialist; PRS). Earthwork is halted any time potential fossils are recognized by either the paleontologist or the worker. When properly implemented, the conditions of certification yield a net gain to the science of paleontology since fossils that would not other wise have been discovered can be collected, identified, studied, and properly curated. A paleontological resource specialist is retained, for the project by the applicant, to produce a monitoring and mitigation plan, conduct the worker training, and provide the on site monitoring. During the monitoring, the PRS can and often does petition the CEC for a change in the monitoring protocol. Most commonly, this is a request for lesser monitoring after sufficient monitoring has been performed to ascertain that there is little chance of finding significant fossils. In other cases, the PRS can propose increased monitoring due to unexpected fossil discoveries or in response to repeated out-of-compliance incidents by the earthwork contractor.

Based upon the literature and archives search, field surveys, and compliance documentation for the proposed PHPP, the applicant has proposed monitoring and mitigation measures to be followed during the construction of the project. Energy Commission staff believes that the facility can be designed and constructed to minimize the effect of geologic hazards at the site during project design life and that impacts to vertebrate fossils encountered during construction of the power plant and associated linears would be mitigated to a level of insignificance.

OPERATION IMPACTS AND MITIGATION

Operation of the proposed plant facilities should not have any adverse impact on geologic, mineralogic, or paleontologic resources. Potential geologic hazards, including strong ground shaking, foundation settlement due to compressible soils, and hydrocompaction, can be effectively mitigated through facility design (see **Proposed Conditions of Certification GEO-1** and **GEN-1, GEN-5 and CIVIL-1** in the **Facility Design** section) such that these potential hazards should not affect operation of the facility.

CUMULATIVE IMPACTS AND MITIGATION

The proposed PHPP project site is situated in an active geologic environment. Strong ground shaking potential must be mitigated through foundation and structural design as required by the CBC (2007). Soils that may be subject to excessive settlement due to hydrocollapse or dynamic compaction, must be mitigated in accordance with the design-level geotechnical investigation as required by the CBC (2007), and proposed Conditions of Certification **GEO-1**, and **GEN-1, GEN-5, and CIVIL-1** under **Facility Design**. No paleontological resources have been documented in the general area of the project site, but units with high potential for paleonotological materials and recorded paleontological resources are present along the southern leg of the transmission line alignment. The potential impacts to paleontological resources due to construction activities will be mitigated as required by proposed Conditions of Certification **PAL-1** through **PAL-7**.

Staff believes that the potential for significant adverse cumulative impacts to the proposed project from geologic hazards except ground shaking and hydrocompaction, during the project's design life, is low, and that the potential for cummulative impacts to geologic and mineralogic resources is very low. The potential to impact paleontolgoical resources is high and could be cumulative with impacts from other construction projects.

Based upon the literature and archives search, field surveys and compliance documentation for the proposed PHPP project, the applicant proposes monitoring and mitigation measures for construction of the project. Energy Commission staff agrees with the applicant that the project can be designed and constructed to minimize the effects of geologic hazards at the site, and that impacts to scientifically significant vertebrate and invertebrate fossils encountered during construction would be mitigated to levels of less than significant.

The proposed conditions of certification allow the Energy Commission (CPM) and the applicant to adopt a monitoring scheme ensuring compliance with applicable LORS for geologic hazards and geologic, mineralogic, and paleontologic resources.

FACILITY CLOSURE

Facility closure activities are not expected to impact geologic or mineralogic resources since no such resources are known to exist at either the project location or along its proposed linears. In addition, the decommissioning and closure of the project should not negatively affect geologic, mineralogic, or paleontologic resources since the majority of the ground disturbed during plant decommissioning and closure would have been already disturbed, and mitigated as required, during construction and operation of the project.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff has not received any agency or public comments regarding geologic hazards, mineral resources, or paleontology at this time.

CONCLUSIONS

The applicant will be able to comply with applicable LORS, provided that the proposed conditions of certification are adopted and enforced. The design and construction of the project should have no adverse impact with respect to geologic, mineralogic, and paleontologic resources. Staff proposes to ensure compliance with applicable LORS through the adoption of the proposed conditions of certification listed below.

PROPOSED CONDITIONS OF CERTIFICATION

General conditions of certification with respect to engineering geology are proposed under Conditions of Certification **GEN-1, GEN-5, and CIVIL-1** in the **FACILITY DESIGN** section. Proposed geologic conditions of certification follow in **GEO-1** through **GEO-5**. Proposed paleontological conditions of certification follow in **PAL-1** through **PAL-7**. It is staff's opinion that the likelihood of encountering paleontologic resources is moderate on the plant site and most of the project linears, but is high along the transmission lines between Pearblossom substation and Vincent substation. Staff will consider reducing monitoring intensity, at the recommendation of the project PRS, following examination of sufficient, representative, deep excavations to fully detail site stratigraphy.

GEO-1 A project-specific geotechnical report shall be prepared, by review of detailed project foundation plans and requirements, and updating the preliminary geotechnical report for the project. This requirement is based on the CBSC Section 1802.2 through 1802.7, where a *preliminary* report (1802.1) is only used for initial submission to the county for tentative or final mapping of subdivisions.

Verification: The design-level geotechnical investigation report for the proposed PHPP site shall be submitted to the CPM at least 60 days prior to start of plant construction.

GEO-2 Additional fault investigation shall be performed for the southern end of the natural gas pipeline, in conjunction with City of Palmdale approval, in accordance with City of Palmdale General Plan S1.1.7, which requires that utility locations be limited in areas with exposure to faulting, and based on the City of Palmdale General Plan faulting hazards map (Figure LU-4).

Verification: A fault investigation report for the southern end of the proposed natural gas line shall be submitted to the CPM at least 60 days prior to start of pipeline construction. Recommendations for mitigation, as appropriate, shall be included.

GEO-3 Additional fault investigation shall be performed for the southern end of electric transmission line where it crosses the Llano fault Alquist-Priolo Zone and the San Andreas Fault Alquist-Priolo zone. This investigation is suggested to include fault trenching to verify that towers would not be directly impacted by fault rupture.

Verification: A fault investigation report for the southern end of the proposed transmission line shall be submitted to the CPM at least 60 days prior to start of transmission line construction. Recommendations for mitigation, as appropriate, shall be included.

GEO-4 Additional geotechnical investigation shall be performed for the electric transmission line where it crosses areas of projected liquefaction hazards per the Seismic Hazard Reduction Act. This geotechnical investigation shall be prepared and provided to the City of Palmdale as per the General Plan Safety Element Policy S1.1.1.

Verification: The design-level geotechnical investigation report for the proposed transmission line shall be submitted to the CPM at least 60 days prior to start of transmission line construction.

GEO-5 Additional geologic or geotechnical investigation shall be performed along the southern alignment between the San Andreas Fault and the Vincent substation, to evaluate and mitigate the risk of landslide failure affecting the transmission line towers. This requirement is per PHPP, 2008 Page 5.5-7, which states that careful route selection for [this segment of] the transmission line will help minimize the slopes encountered and the risk of impacts from landslides.

Verification: The design-level engineering geological or geotechnical investigation report for the proposed transmission line shall be submitted to the CPM at least 60 days prior to start of transmission line construction.

PAL-1 The project owner shall provide the Compliance Project Manager (CPM) with the resume and qualifications of its Paleontological Resource Specialist (PRS) for review and approval. If the approved PRS is replaced prior to completion of project mitigation and submittal of the Paleontological Resources Report, the project owner shall obtain CPM approval of the replacement PRS. The project owner shall keep resumes on file for qualified Paleontological Resource Monitors (PRMs). If a PRM is replaced, the resume of the replacement PRM shall also be provided to the CPM.

The PRS resume shall include the names and phone numbers of references. The resume shall also demonstrate to the satisfaction of the CPM the appropriate education and experience to accomplish the required paleontological resource tasks.

As determined by the CPM, the PRS shall meet the minimum qualifications for a vertebrate paleontologist as described in the Society of Vertebrate Paleontology (SVP) guidelines of 1995. The experience of the PRS shall include the following:

1. Institutional affiliations, appropriate credentials, and college degree;
2. Ability to recognize and collect fossils in the field;
3. Local geological and biostratigraphic expertise;
4. Proficiency in identifying vertebrate and invertebrate fossils; and
5. At least three years of paleontological resource mitigation and field experience in California and at least one year of experience leading paleontological resource mitigation and field activities.

The project owner shall ensure that the PRS obtains qualified paleontological resource monitors to monitor as he or she deems necessary on the project. Paleontologic Resource Monitors (PRMs) shall have the equivalent of the following qualifications:

- BS or BA degree in geology or paleontology and one year of experience monitoring in California; or
- AS or AA in geology, paleontology, or biology and four years' experience monitoring in California; or
- Enrollment in upper division classes pursuing a degree in the fields of geology or paleontology and two years of monitoring experience in California.

Verification: (1) At least 60 days prior to the start of ground disturbance, the project owner shall submit a resume and statement of availability of its designated PRS for on-site work.

(2) At least 20 days prior to ground disturbance, the PRS or project owner shall provide a letter with resumes naming anticipated monitors for the project, stating that the identified monitors meet the minimum qualifications for paleontological resource monitoring required by the condition. If additional monitors are obtained during the project, the PRS shall provide additional letters and resumes to the CPM. The letter shall be provided to the CPM no later than one week prior to the monitor's beginning on-site duties.

(3) Prior to the termination or release of a PRS, the project owner shall submit the resume of the proposed new PRS to the CPM for review and approval.

PAL-2 The project owner shall provide to the PRS and the CPM, for approval, maps and drawings showing the footprint of the power plant, construction lay down areas, and all related facilities. Maps shall identify all areas of the project where ground disturbance is anticipated. If the PRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the PRS and CPM. The site grading plan and plan and profile drawings for the utility lines would be acceptable for this purpose. The plan drawings should show the location, depth, and extent of all ground disturbances and be at a scale between 1 inch = 40 feet and 1 inch = 100 feet range. If the footprint of the project or its linear facilities change, the project owner shall provide maps and drawings reflecting those changes to the PRS and CPM.

If construction of the project proceeds in phases, maps and drawings may be submitted prior to the start of each phase. A letter identifying the proposed schedule of each project phase shall be provided to the PRS and CPM. Before work commences on affected phases, the project owner shall notify the PRS and CPM of any construction phase scheduling changes.

At a minimum, the project owner shall ensure that the PRS or PRM consults weekly with the project superintendent or construction field manager to confirm area(s) to be worked the following week, and until ground disturbance is completed.

<u>Verification:</u> (1) At least 30 days prior to the start of ground disturbance, the project owner shall provide the maps and drawings to the PRS and CPM.

(2) If there are changes to the footprint of the project, revised maps and drawings shall be provided to the PRS and CPM at least 15 days prior to the start of ground disturbance.

(3) If there are changes to the scheduling of the construction phases, the project owner shall submit a letter to the CPM within 5 days of identifying the changes.

PAL-3 The project owner shall ensure that the PRS prepares, and the project owner submits to the CPM for review and approval, a paleontological resources monitoring and mitigation plan (PRMMP) to identify general and specific measures to minimize potential impacts to significant paleontological resources. Approval of the PRMMP by the CPM shall occur prior to any ground disturbance. The PRMMP shall function as the formal guide for monitoring, collecting, and sampling activities, and may be modified with CPM approval. This document shall be used as the basis of discussion when on-site decisions or changes are proposed. Copies of the PRMMP shall reside with the PRS, each monitor, the project owner’s on-site manager, and the CPM.

The PRMMP shall be developed in accordance with the guidelines of the Society of Vertebrate Paleontology (SVP 1995) and shall include, but not be limited, to the following:

1. Assurance that the performance and sequence of project-related tasks, such as any literature searches, pre-construction surveys, worker environmental training, fieldwork, flagging or staking, construction monitoring, mapping and data recovery, fossil preparation and collection, identification and inventory, preparation of final reports, and transmittal of materials for curation will be performed according to PRMMP procedures;
2. Identification of the person(s) expected to assist with each of the tasks identified within the PRMMP and the conditions of certification;

3. A thorough discussion of the anticipated geologic units expected to be encountered, the location and depth of the units relative to the project when known, and the known sensitivity of those units based on the occurrence of fossils either in that unit or in correlative units;
4. An explanation of why, how, and how much sampling is expected to take place and in what units. Include descriptions of different sampling procedures that shall be used for fine-grained and coarse-grained units;
5. A discussion of the locations of where the monitoring of project construction activities is deemed necessary, and a proposed plan for monitoring and sampling;
6. A discussion of procedures to be followed in the event of a significant fossil discovery, halting construction, resuming construction, and how notifications will be performed;
7. A discussion of equipment and supplies necessary for collection of fossil materials and any specialized equipment needed to prepare, remove, load, transport, and analyze large-sized fossils or extensive fossil deposits;
8. Procedures for inventory, preparation, and delivery for curation into a retrievable storage collection in a public repository or museum, which meet the Society of Vertebrate Paleontology's standards and requirements for the curation of paleontological resources;
9. Identification of the institution that has agreed to receive data and fossil materials collected, requirements or specifications for materials delivered for curation, and how they will be met, and the name and phone number of the contact person at the institution; and
10. A copy of the paleontological conditions of certification.

Verification: At least 30 days prior to ground disturbance, the project owner shall provide a copy of the PRMMP to the CPM. The PRMMP shall include an affidavit of authorship by the PRS, and acceptance of the PRMMP by the project owner evidenced by a signature.

PAL-4 Prior to ground disturbance and for the duration of construction activities involving ground disturbance, the project owner and the PRS shall prepare and conduct weekly CPM-approved training for the following workers: project managers, construction supervisors, foremen and general workers involved with or who operate ground-disturbing equipment or tools. Workers shall not excavate in sensitive units prior to receiving CPM-approved worker training. Worker training shall consist of a CPM-approved video or in-person presentation. The training program may be combined with other training programs prepared for cultural and biological resources, hazardous materials, or other areas of interest or concern. No ground disturbance shall occur prior to CPM approval of the Worker Environmental Awareness Program (WEAP), unless specifically approved by the CPM.

The WEAP shall address the possibility of encountering paleontological resources in the field, the sensitivity and importance of these resources, and legal obligations to preserve and protect those resources.

The training shall include:

1. A discussion of applicable laws and penalties under the law;
2. Good quality photographs or physical examples of vertebrate fossils for project sites containing units of high paleontologic sensitivity;
3. Information that the PRS or PRM has the authority to halt or redirect construction in the event of a discovery or unanticipated impact to a paleontological resource;
4. Instruction that employees are to halt or redirect work in the vicinity of a find and to contact their supervisor and the PRS or PRM;
5. An informational brochure that identifies reporting procedures in the event of a discovery;
6. A WEAP certification of completion form signed by each worker indicating that he/she has received the training; and
7. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

Verification: (1) At least 30 days prior to ground disturbance, the project owner shall submit the proposed WEAP, including the brochure, with the set of reporting procedures for workers to follow.

(2) At least 30 days prior to ground disturbance, the project owner shall submit the script and final video to the CPM for approval if the project owner is planning to use a video for interim training.

(3) If the owner requests an alternate paleontological trainer, the resume and qualifications of the trainer shall be submitted to the CPM for review and approval prior to installation of an alternate trainer. Alternate trainers shall not conduct training prior to CPM authorization.

(4) In the monthly compliance report (MCR, the project owner shall provide copies of the WEAP certification of completion forms with the names of those trained and the trainer or type of training (in-person or video) offered that month. The MCR shall also include a running total of all persons who have completed the training to date.

PAL-5 The project owner shall ensure that the PRS and PRM(s) monitor consistent with the PRMMP all construction-related grading, excavation, trenching, and augering in areas where potential fossil-bearing materials have been identified, both at the site and along any constructed linear facilities associated with the project. In the event that the PRS determines full-time monitoring is not necessary in locations that were identified as potentially fossil-bearing in the PRMMP, the project owner shall notify and seek the concurrence of the CPM.

The project owner shall ensure that the PRS and PRM(s) have the authority to halt or redirect construction if paleontological resources are encountered. The project owner shall ensure that there is no interference with monitoring activities unless directed by the PRS. Monitoring activities shall be conducted as follows:

1. Any change of monitoring from the accepted schedule in the PRMMP shall be proposed in a letter or email from the PRS and the project owner to the CPM prior to the change in monitoring and will be included in the monthly compliance report. The letter or email shall include the justification for the change in monitoring and be submitted to the CPM for review and approval.
2. The project owner shall ensure that the PRM(s) keep a daily monitoring log of paleontological resource activities. The PRS may informally discuss paleontological resource monitoring and mitigation activities with the CPM at any time.
3. The project owner shall ensure that the PRS notifies the CPM within 24 hours of the occurrence of any incidents of non-compliance with any paleontological resources conditions of certification. The PRS shall recommend corrective action to resolve the issues or achieve compliance with the conditions of certification.
4. For any significant paleontological resources encountered, either the project owner or the PRS shall notify the CPM within 24 hours, or Monday morning in the case of a weekend event where construction has been halted because of a paleontological find.

The project owner shall ensure that the PRS prepares a summary of monitoring and other paleontological activities placed in the monthly compliance reports. The summary will include the name(s) of PRS or PRM(s) active during the month, general descriptions of training and monitored construction activities, and general locations of excavations, grading, and other activities. A section of the report shall include the geologic units or subunits encountered, descriptions of samplings within each unit, and a list of identified fossils. A final section of the report will address any issues or concerns about the project relating to paleontologic monitoring, including any incidents of non-compliance or any changes to the monitoring plan that have been approved by the CPM. If no monitoring took place during the month, the report shall include an explanation in the summary as to why monitoring was not conducted.

Verification: The project owner shall ensure that the PRS submits the summary of monitoring and paleontological activities in the MCR. When feasible, the CPM shall be notified 10 days in advance of any proposed changes in monitoring different from the plan identified in the PRMMP. If there is any unforeseen change in monitoring, the notice shall be given as soon as possible prior to implementation of the change.

PAL-6 The project owner, through the designated PRS, shall ensure that all components of the PRMMP are adequately performed including collection of fossil materials, preparation of fossil materials for analysis, analysis of fossils, identification and inventory of fossils, the preparation of fossils for curation, and the delivery for curation of all significant paleontological resource materials encountered and collected during project construction.

Verification: The project owner shall maintain in his/her compliance file copies of signed contracts or agreements with the designated PRS and other qualified research specialists. The project owner shall maintain these files for a period of three years after project completion and approval of the CPM-approved paleontological resource report (see **PAL-7**). The project owner shall be responsible for paying any curation fees charged by the museum for fossils collected and curated as a result of paleontological mitigation. A copy of the letter of transmittal submitting the fossils to the curating institution shall be provided to the CPM.

PAL-7 The project owner shall ensure preparation of a Paleontological Resources Report (PRR) by the designated PRS. The PRR shall be prepared following completion of the ground-disturbing activities. The PRR shall include an analysis of the collected fossil materials and related information, and submit it to the CPM for review and approval.

The report shall include, but is not limited to, a description and inventory of recovered fossil materials; a map showing the location of paleontological resources encountered; determinations of sensitivity and significance; and a statement by the PRS that project impacts to paleontological resources have been mitigated below the level of significance.

Verification: Within 90 days after completion of ground-disturbing activities, including landscaping, the project owner shall submit the PRR under confidential cover to the CPM.

Certification of Completion
Worker Environmental Awareness Program
Palmdale Hybrid Power Plant (08-AFC-9)

This is to certify these individuals have completed a mandatory California Energy Commission-approved Worker Environmental Awareness Program (WEAP). The WEAP includes pertinent information on cultural, paleontological, and biological resources for all personnel (that is, construction supervisors, crews, and plant operators) working on site or at related facilities. By signing below, the participant indicates that he/she understands and shall abide by the guidelines set forth in the program materials. Include this completed form in the Monthly Compliance Report.

No.	Employee Name	Title/Company	Signature
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Cultural Trainer: ______________ Signature:___________________ Date: ___/___/____

PaleoTrainer: _______________ Signature:___________________ Date: ___/___/____

Biological Trainer: ______________Signature:________________ Date:___/___/_____

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POWER PLANT EFFICIENCY

Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

The Palmdale Hybrid Power Project (PHPP), if constructed and operated as proposed, would generate 590 megawatts (MW) (maximum net output with the duct burners turned down and the solar system turned on at full load) of electricity at an overall project fuel efficiency of 59% lower heating value (LHV),. While it will consume substantial amounts of energy, it will do so in the most efficient manner practicable and will produce up to 50 MW of electricity using renewable solar energy. It will not create significant adverse effects on energy supplies or resources, will not require additional sources of energy supply, and will not consume energy in a wasteful or inefficient manner. No energy standards apply to this project. Staff therefore concludes that this project would present no significant adverse impacts on energy resources.

INTRODUCTION

One of the responsibilities of the California Energy Commission (Energy Commission) is to make findings on whether the energy use by a power plant, including the proposed PHPP power plant, will result in significant adverse impacts on the environment, as defined in the California Environmental Quality Act (CEQA). If the Energy Commission finds that PHPP's energy consumption creates a significant adverse impact, it must further determine if feasible mitigation measures could eliminate or minimize that impact. In this analysis, staff addresses the inefficient and unnecessary consumption of energy.

In order to support the Energy Commission's findings, this analysis will:

- Examine whether the facility will likely present any adverse impacts upon energy resources;
- Examine whether these adverse impacts are significant; and if so,
- Examine whether feasible mitigation measures or alternatives could eliminate those adverse impacts or reduce them to a level of insignificance.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

No federal, state, or local/county laws, ordinances, regulations, and standards (LORS) apply to the efficiency of this project.

SETTING

The City of Palmdale, the applicant, proposes to build and operate PHPP, a 590 MW (maximum net output[1]) hybrid combined cycle solar thermal power plant, employing the General Electric's (GE) rapid start combined cycle technology, to serve California's

[1] With the duct burners turned down and the solar system turned on at full load

energy needs (COP 2008a, AFC §1.3). The project's combined cycle equipment will consist of two General Electric (GE) Frame 7FA combustion gas turbine generators (combustion turbines) with an evaporative inlet air cooling system (COP 2008a, AFC §§1.1, 2.1, 2.4.2), two multi-pressure heat recovery steam generators (HRSGs) with duct burners, and one three-pressure, reheat, condensing steam turbine generator arranged in a two-on-one combined cycle train. The gas turbines and HRSGs will be equipped with dry low-NOx combustors and selective catalytic reduction to control air emissions (COP 2008a, AFC §§1.4.1, 2.4.2, 2.4.3.1). The solar thermal equipment utilizes arrays of parabolic trough solar collectors that heat a working fluid used to generate steam. At full load solar operation, heat from the solar field can replace the equivalent of approximately 50 MW of duct firing.

Natural gas will be delivered to PHPP via a new 8.7-mile-long gas line that will be designed and constructed by the Southern California Gas Company (SCGC) (COP 2008a, AFC §§1.1, 2.1, 2.4.5.1).

ASSESSMENT OF IMPACTS

METHOD AND THRESHOLD FOR DETERMINING THE SIGNIFICANCE OF ENERGY RESOURCES

CEQA guidelines state that the environmental analysis "…shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy" (Title 14 CCR §15126.4[a][1]). Appendix F of the guidelines further suggests consideration of such factors as the project's energy requirements and energy use efficiency; its effects on local and regional energy supplies and energy resources; its requirements for additional energy supply capacity; its compliance with existing energy standards; and any alternatives that could reduce the wasteful, inefficient, and unnecessary consumption of energy (Title 14, CCR §15000 et seq., Appendix F).

The inefficient and unnecessary consumption of energy, in the form of non-renewable fuels such as natural gas and oil, constitutes an adverse environmental impact. An adverse impact can be considered significant if it results in:

- Adverse effects on local and regional energy supplies and energy resources;
- A requirement for additional energy supply capacity;
- Noncompliance with existing energy standards; or
- The wasteful, inefficient, and unnecessary consumption of fuel or energy.

PROJECT ENERGY REQUIREMENTS AND ENERGY USE EFFICIENCY

Any power plant large enough to fall under Energy Commission siting jurisdiction (50 MW or greater) will, by definition, consume large amounts of energy. Under normal conditions, PHPP will burn natural gas at a nominal rate of approximately 2,975 million British thermal units (MMBtu) per hour, LHV, during base load operation (COP 2008a, AFC §2.4.5.1, Figure 2-7a). The estimated fuel consumption under normal conditions with full load duct firing and the solar system turned off is approximately 3,768 MMBtu per hour, LHV (COP 2008a, AFC §2.4.5.1, Figure 2-7b). This is a substantial rate of energy consumption that could potentially impact energy supplies. Under expected project conditions, electricity will be generated at a full load efficiency of approximately 59% LHV (COP 2008a, AFC, Figure 2-7c). This efficiency level compares very favorably with the average fuel efficiency of a typical base load combined cycle power plant.

ADVERSE EFFECTS ON ENERGY SUPPLIES AND RESOURCES

The applicant has described its sources of natural gas to operate the project (COP 2008a, AFC §§1.1, 2.1, 2.4.5.1, 2.4.7.1). Natural gas for PHPP will be supplied from a SCGC's main line via a new pipeline connection. The SCGC system is capable of delivering the gas that PHPP will require to operate. This natural gas supply is a reliable source of natural gas for this project. It therefore appears unlikely that the project would create a substantial natural gas demand increase.

ADDITIONAL ENERGY SUPPLY REQUIREMENTS

Natural gas fuel will be supplied to the project by SCGC via a new pipeline connection (COP 2008a, AFC §§2.4.5.1, 2.4.7.1). There appears to be little likelihood that PHPP will require additional capacity since regional supplies are currently plentiful.

COMPLIANCE WITH ENERGY STANDARDS

No standards apply to the efficiency of PHPP or other non-cogeneration projects.

ALTERNATIVES TO REDUCE WASTEFUL, INEFFICIENT, AND UNNECESSARY ENERGY CONSUMPTION

PHPP could create significant adverse impacts on energy resources if alternatives reduced the project's fuel use. The evaluation of alternatives to the project (that could reduce wasteful, inefficient, or unnecessary energy consumption) first requires the examination of the project's energy consumption. Project fuel efficiency, and therefore its rate of energy consumption, is determined by both the configuration of the power producing system and the selection of equipment used to generate its power.

Project Configuration

PHPP will be a combined cycle power plant. Electricity will be generated by two gas turbines and a reheat steam turbine operating on heat energy recovered from the gas turbines' exhaust (COP 2008a, AFC §§1.1, 2.1, 2.4.2, 2.4.3). By recovering this heat, which would otherwise be lost up the exhaust stacks, the efficiency of any combined cycle power plant is increased considerably from that of either gas turbines or a steam turbine operating alone. This configuration is well suited to the large, steady loads met by a base load plant that generates energy efficiently over long periods of time.

The applicant proposes to install evaporative inlet air coolers, HRSG duct burners (re-heaters), three-pressure HRSGs, a reheat steam turbine unit, a solar thermal field, and a circulating cooling water system (COP 2008a, AFC §§1.1, 2.1, 2.4.2, 2.4.3). Staff believes these features to be meaningful efficiency enhancements to PHPP. The two-train combustion turbine/HRSG configuration is also highly efficient during unit turndown since one gas turbine can be shut down, leaving the other fully loaded. This allows the efficient operation of one gas turbine instead of the operation of two gas turbines operating at a less efficient 50% of load.

PHPP also includes HRSG duct burners, which will partially replace heat to the steam turbine cycle during high ambient temperatures when gas turbine capacity drops (resulting in less heat available to the steam turbine cycle), and partially add power. Duct firing provides a number of additional operational benefits including load following and balancing and optimization of the steam cycle operation.

This project also utilizes parabolic solar thermal collector technology. In this technology, solar collectors track the sun and absorb its thermal energy. This heat is then transferred to a heat transfer fluid circulating through a boiler, where the heat is used to generate high-pressure steam for the steam turbine. This system could replace the equivalent of approximately 50 MW of duct firing. The solar technology would enhance the project's overall efficiency by reducing the consumption of natural gas (see below for further explanation).

The PHPP's design will incorporate the GE's rapid start technology, which will allow the combustion turbine to reach base load more quickly while reducing fuel consumption and improving the overall thermal efficiency of the project, as compared to a typical combined cycle project without the rapid start technology. This technology combines the fast start capability of the simple cycle gas turbine technology and the efficiency of the combined cycle technology. This technology is designed to start quickly, and while in startup phase, to operate at an efficiency rating comparable to a typical simple cycle plant. Within minutes, the steam turbine generator would begin producing power, aided by the small natural gas-fired auxiliary boiler. The PHPP would then operate at a typical combined cycle efficiency rating.

Equipment Selection

The F-class of advanced gas turbines to be installed in PHPP represents one of the most modern and efficient machines available. The applicant will install two GE Frame 7FA combustion gas turbine generators in a two-on-one combined cycle power train nominally rated at 530 MW and 56.5% maximum full load efficiency[2] LHV under the International Organization for Standardization (ISO) conditions (GTW 2008). PHPP will also employ GE's rapid start technology that effectively reduces time required for startup and shutdown of the turbine generators, further improving the overall thermal efficiency of the project.

One possible alternative is the Siemens SCC6-5000F, nominally rated in a two-on-one train combined cycle configuration at 598 MW and 57.3% efficiency LHV at ISO conditions (GTW, 2008).

Another alternative is the Alstom Power KA24, nominally rated in a two-on-two configuration at 560 MW with an efficiency rating of 57.3% LHV at ISO conditions (GTW 2008).

[2] Does not account for the efficiency enhancement offered by the solar system

Any differences among the GE 7FA, SCC6-5000F, and Alstom KA24 in actual operating efficiency will be insignificant. Selecting among these machines is thus based on other factors such as generating capacity, cost, commercial availability, and the ability to meet air pollution limitations.

Efficiency of Alternatives to the Project

PHPP's objectives include the generation of base load electricity and ancillary services at all hours of the day to serve energy needs of the City of Palmdale and surrounding areas (COP 2008a, AFC §§1.3, 2.1, 2.4.2).

Alternative Generating Technologies

Alternative generating technologies for PHPP are considered in the AFC (COP 2008a, AFC §4.4). For purposes of this analysis, combined cycle without solar thermal technology, other fossil fuels, nuclear, biomass, hydroelectric, wind, and geothermal technologies are all considered. Given the project objectives, location, air pollution control requirements, and the commercial availability of the above technologies, staff agrees with the applicant that only natural gas-burning technologies (whether coupled with solar technology or not) are feasible.

Natural Gas-Burning Technologies

Fuel consumption is one of the most important economic factors in selecting an electric generator; fuel typically accounts for over two-thirds of the total operating costs of a fossil fuel-fired power plant (Power, 1994). Under a competitive power market system, where operating costs are critical in determining the competitiveness and profitability of a power plant, the plant owner is strongly motivated to purchase fuel-efficient machinery.

Modern gas turbines represent the most fuel-efficient electric generating technology available today. Currently available large combustion turbine models can be grouped into three categories: conventional, advanced, and next generation. Advanced combustion turbines have advantages for PHPP. Their higher firing temperatures offer higher efficiencies than conventional turbines. They offer proven technology with numerous installations and extensive run times in commercial operations. Emission levels are also proven, and guaranteed emission levels have been reduced based upon the operational experience and design optimization of their manufacturers.

One possible alternative to an advanced F-class gas turbine is the next generation G-class machine, such as the Siemens-Westinghouse 501G gas turbine generator, which uses partial steam cooling to allow slightly higher temperatures, yielding slightly greater efficiency. In actual operation, one would expect to see the difference in efficiency diminish, since larger-capacity G-class turbines run at less than optimum (full) output more frequently than smaller-capacity F-class turbines. (Gas turbine efficiency drops rapidly at less than full load.). Given the minor efficiency improvement promised by the G-class turbine, and since this machine would have to operate at less than optimum base load efficiency in order to meet the project load capacity requirements, staff believes the applicant's decision to purchase F-class machines is reasonable.

Another possible alternative to the F-class advanced gas turbine is an H-class next generation machine with a claimed fuel efficiency of 60 percent LHV at ISO conditions. This high efficiency is achieved through a higher pressure ratio and firing temperature, made possible by cooling the initial turbine stages with steam instead of air. The first Frame 7H machine has only recently completed commissioning at the Inland Empire Energy Center in Riverside County, California. Given the lack of commercial experience with this machine and the project load requirements, staff agrees with the applicant's decision to use F-class machines.

Capital cost is also important when selecting generating machinery. Recent progress in the development of gas turbines, incorporating technological advances made in the development of aircraft (jet) engines, combined with the cost advantages of assembly-line manufacturing, has produced machines that both offer the lowest available fuel cost and sell at the lowest per-kilowatt capital cost.

Solar Thermal Technology

A combined cycle configuration without solar technology would fail to take advantage of this valuable solar energy resource available in the project area.

With the duct burners turned on at full load and the solar system turned off, the project would generate approximately 617 MW of electricity (maximum net output) at an overall efficiency of approximately 53% LHV (COP 2008a, AFC, Figure 2-7b). With the duct burners turned down and the solar system turned on at full load, the project can generate approximately 590 MW of electricity (maximum net output) at an overall efficiency of approximately 59% LHV (COP 2008a, AFC, Figure 2-7c). As seen above, the solar system would enhance the project's overall efficiency by six percentage points. Therefore, adding solar thermal technology at PHPP appreciably increases efficiency while reducing natural gas consumption.

Inlet Air Cooling

Other alternatives include gas turbine inlet air cooling methods. The two most common techniques are evaporative coolers or foggers, and chillers. Both increase power output by cooling gas turbine inlet air. A mechanical chiller offers greater power output than the evaporative cooler on hot, humid days; however, it consumes electric power to operate its refrigeration process, slightly reducing its overall net power output and overall efficiency. An absorption chiller uses less electricity but necessitates the use of a substantial amount of ammonia. An evaporative cooler or fogger boosts power output most efficiently on dry days; it uses less electricity than a mechanical chiller, possibly producing a slightly higher operating efficiency. Efficiency differences between these alternatives are relatively insignificant.

Given the climate at the project site and the relative lack of clear superiority of one system over another, staff agrees that the applicant's choice of an evaporative gas turbine inlet air cooling system will have no significant adverse energy impacts.

Staff concludes that the selected project configuration (hybrid combined cycle solar thermal) and generating equipment (F-class gas turbines) represent the most efficient feasible combination for satisfying the project's objectives. The two-train combustion turbine/HRSG configuration also allows for high efficiency during unit turndown since one combustion turbine can be shut down, leaving one fully loaded, efficiently operating combustion turbine instead of having two combustion turbines operate at a less efficient 50% of load. This offers an efficiency advantage over the larger machines during unit turndown. The solar technology proposed for this project would enhance the overall project's efficiency while reducing fuel consumption. There are no alternatives that would significantly reduce energy consumption while satisfying the project's objectives of producing base load electricity and ancillary services.

Staff, therefore, believes that PHPP will not constitute a significant adverse impact on energy resources.

CUMULATIVE IMPACTS

The only nearby power plant that could potentially impact cumulative energy consumption, when aggregated with this project, is the High Desert Power Project. As discussed above, the natural gas supply system has enough capacity to supply both projects. Staff knows of no other projects that could produce cumulative energy impacts.

Staff believes that the construction and operation of the project would not create indirect impacts (in the form of additional fuel consumption), that would not have otherwise occurred without this project. Older, less efficient power plants consume more natural gas than new, more efficient plants such as PHPP. Natural gas is burned by the most competitive power plants on the spot market, and the most efficient plants run the most frequently. The high efficiency of the proposed PHPP should allow it to compete favorably, run at high capacity, and replace less efficient power generating plants. The project would therefore not impact the cumulative amount of natural gas consumed for power generation.

NOTEWORTHY PUBLIC BENEFITS

The applicant expects to increase power supply reliability in the California electricity market by both meeting the state's energy needs and contributing to regional electricity reserves. By doing so in a fuel-efficient manner, through installing the most modern fast start F-class gas turbine generator available in a hybrid combined cycle solar thermal configuration, PHPP will benefit electric consumers of California.

CONCLUSIONS AND RECOMMENDATIONS

The project, if constructed and operated as proposed, would generate 590 MW (maximum net output[3]) of electric power at an overall project fuel efficiency of 59% LHV. While it will consume substantial amounts of energy, it will do so in the most efficient manner practicable. It will not create significant adverse effects on energy supplies or resources, will not require additional sources of energy supply, and will not consume energy in a wasteful or inefficient manner. No energy standards apply to the project.

[3] With the duct burners turned down and the solar system turned on at full load

Staff therefore concludes that the project would present no significant adverse impacts upon energy resources.

No cumulative impacts on energy resources are likely. Facility closure would not likely present significant impacts on electric system efficiency.

PROPOSED CONDITIONS OF CERTIFICATION

No conditions of certification are proposed.

REFERENCES

COP 2008a – City of Palmdale/ S. Williams (tn: 47383). Application for Certification for the Palmdale Hybrid Power Project. Dated on 07/30/08. Submitted to CEC/ Docket Unit on 08/04/08.

GTW 2008 — Gas Turbine World 2008 performance specs, 25th Edition, pp. 29-35.

Power 1994 — “Operating and Maintaining IPP/Cogen Facilities” Power, September 1994, p. 14.

POWER PLANT RELIABILITY

Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

The City of Palmdale, the applicant, predicts an equivalent availability factor[1] of 90-95%, which staff believes is achievable. Based on a review of the proposal, staff concludes that the Palmdale Hybrid Power Project (PHPP) will be built and will operate in a manner consistent with industry norms for reliable operation, with the exception of the source of water supply.

INTRODUCTION

In this analysis, California Energy Commission (Energy Commission) staff addresses the reliability issues of the project by determining if the power plant is likely to be built in accordance with typical industry norms for reliable power generation. Staff uses this level of reliability as a benchmark because it ensures that the resulting project would not be likely to degrade the overall reliability of the electric system it serves (see the **SETTING** section, below).

The scope of this power plant reliability analysis covers:

- equipment availability;
- plant maintainability;
- fuel and water availability; and
- power plant reliability in relation to natural hazards.

Staff examined the project design criteria to determine if the project is likely to be built in accordance with typical industry norms for reliable power generation. While the applicant has predicted an equivalent availability factor of 90-95% for the PHPP (see below), staff uses typical industry norms as a benchmark, rather than the applicant's projection, to evaluate the project's reliability.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

No federal, state, or local/county laws, ordinances, regulations, or standards (LORS) apply to the reliability of this project.

SETTING

In the restructured competitive electric power industry, the responsibility for maintaining system reliability falls largely to the state's control area operators, such as the California Independent System Operator (California ISO), which purchase, dispatch, and sell

[1] Equivalent availability factor is the percentage of time a unit is available for dispatch, and reflects the probability of forced (unexpected) outages.

electricity throughout the state. How the California ISO and other control area operators ensure system reliability is an ongoing process; protocols are still being developed and put in place to provide sufficient reliability in the competitive market system. “Must-run” power purchase agreements and “participating generator” agreements are two mechanisms that ensure an adequate supply of reliable power.

The California ISO also requires that power plants selling ancillary services, as well as those holding reliability must-run contracts, fulfill certain requirements, including:

- filing periodic reports on plant reliability;
- reporting all outages and their causes; and
- scheduling all planned maintenance outages with the California ISO.

The California ISO’s mechanisms to ensure adequate power plant reliability have apparently been developed with the assumption that individual power plants competing to sell power into the system will exhibit reliability levels similar to those of power plants of past decades. However, there is reason to believe that, with free market competition, financial pressures on power plant owners to minimize their capital outlays and maintenance expenditures may ultimately reduce the reliability of many existing and newly constructed power plants (McGraw-Hill, 1994). It is possible that, if enough power plants exhibit reliability levels sufficiently lower than historical levels, the assumptions used by the California ISO to ensure system reliability could be invalid, causing serious repercussions. Until the state’s restructured competitive electricity market has undergone a shakeout period and the effects of varying power plant reliability are thoroughly understood and compensated for, staff recommends that power plant owners continue to build and operate their projects to the industry’s current level of reliability.

The applicant proposes to operate the 590 megawatt (MW) (maximum net output with the duct burners turned down and the solar system turned on at full load) PHPP, a hybrid combined cycle solar thermal power plant, with operating flexibility (that is, ability to start up, shut down, turn down, and provide peaking power) so that its operation can be readily adapted to changing conditions in the energy and ancillary services markets (COP 2008a, AFC §2.4.2). During periods when the solar collectors are in use (when the sun is shining on the site), heat collected by the solar field would generate steam to augment the steam generated in the heat recovery steam generator. At full load solar operation, the heat from the solar field can replace the equivalent of approximately 50 MW of duct firing, which would maintain electrical output while reducing fuel consumption.

The project is expected to achieve an equivalent availability factor in the range of 90 to 95% (COP 2008a, AFC §2.4.2). The project’s capacity factor will depend on provisions in its bilateral power sales contracts, as well as market prices for electricity, ancillary services, and natural gas (COP 2008a, AFC §2.4.2).

ASSESSMENT OF IMPACTS

METHOD FOR DETERMINING RELIABILITY

The Energy Commission must make findings as to how the project is designed, sited, and operated in order to ensure its safe and reliable operation (Title 20, CCR §1752[c]). Staff will conclude that a project is acceptable if it does not degrade the reliability of the utility system to which it is connected. This will be the case if a project is at least as reliable as other power plants on that system.

The availability factor of a power plant is the percentage of time it is available to generate power; both planned and unplanned outages subtract from this availability. Measures of power plant reliability are based upon both the plant's actual ability to generate power when it is considered to be available, and upon starting failures and unplanned (or forced) outages. For practical purposes, reliability can be considered a combination of these two industry measures, making a reliable power plant one that is available when called upon to operate. Throughout its intended 30-year life, the PHPP is expected to operate reliably. Power plant systems must be able to operate for extended periods without shutting down for maintenance or repairs. Achieving this reliability requires adequate levels of equipment availability, plant maintainability with scheduled maintenance outages, fuel and water availability, and resistance to natural hazards. Staff examines these factors for a project and compares them to industry norms. If they compare favorably for this project, staff will then conclude that the PHPP will be as reliable as other power plants on the electric system and will not degrade system reliability.

EQUIPMENT AVAILABILITY

Equipment availability will be ensured by adopting appropriate quality assurance/quality control (QA/QC) programs during the design, procurement, construction, and operation of the plant and by providing for the adequate maintenance and repair of the equipment and systems discussed below.

Quality Control Program

The applicant describes a quality assurance/quality control (QA/QC) program (COP 2008a, AFC §2.4) that is typical of the power industry. Equipment will be purchased from qualified suppliers based on technical and commercial evaluations. Suppliers' personnel, production capability, past performance, QA/QC programs and quality history will be evaluated. The project owner will perform receipt inspections, test components, and administer independent testing contracts. Staff expects that implementation of this program will result in standard reliability of design and construction. To ensure this implementation, staff has proposed appropriate conditions of certification in the section of this document entitled **FACILITY DESIGN**.

PLANT MAINTAINABILITY

Equipment Redundancy

A generating facility operating in base-load service for long periods of time must be capable of being maintained while operating. A typical approach to this is to provide redundant examples of those pieces of equipment that are most likely to require service or repair.

The applicant plans to provide an appropriate redundancy of function for the project (COP 2008a, AFC §§2.4.4.6, 2.4.4.7, 2.4.5.8). Because the project consists of two combustion turbine generators, operating in parallel as independent equipment trains, it is inherently reliable. A single equipment failure cannot disable more than one train, which allows the plant to continue to generate, but at reduced output. All plant ancillary systems are also designed with adequate redundancy to ensure their continued operation if equipment fails. Staff believes that this project's proposed equipment redundancy will be sufficient for its reliable operation.

Maintenance Program

Equipment manufacturers provide maintenance recommendations for their products, and the applicant is expected to base the project's maintenance program on those recommendations. The program would encompass both preventive and predictive maintenance techniques. Maintenance outages would probably be planned for periods of low electricity demand. Staff expects that the project will be adequately maintained to ensure an acceptable level of reliability.

FUEL AND WATER AVAILABILITY

The long-term availability of fuel and of water for cooling or process use is necessary to ensure the reliability of any power plant. The need for reliable sources of fuel and water is obvious; lacking long-term availability of either source, the service life of the plant could be curtailed, threatening both the power supply and the economic viability of the plant.

Fuel Availability

Natural gas will be delivered to PHPP via a new 8.7-mile gas line that will be designed and constructed by the Southern California Gas Company (SCGC) (COP 2008a, AFC §§1.1, 2.1, 2.4.5.1). SCGC's natural gas system represents a resource of considerable capacity and offers access to adequate supplies of gas from the Southwest, the Rocky Mountains, and Canada. Staff agrees with the applicant's claim that there will be adequate natural gas supply and pipeline capacity to meet the project's needs.

Water Supply Reliability

The PHPP will use reclaimed water from the City of Palmdale Water Reclamation Plant via a new 7.4-mile pipeline for cooling tower makeup and other industrial uses. A Conditional Will Serve letter is included in the AFC, confirming the availability of the necessary quantities of water for this project (COP 2008a, AFC Appendix E). However, at this time, there is no signed agreement between the applicant and the County of Los Angeles to provide this water. Therefore, at this time, staff believes the source of water supply does not represent a reliable source for the project. For further discussion of water supply, see the **SOIL AND WATER RESOURCES** section of this document.

POWER PLANT RELIABILITY IN RELATION TO NATURAL HAZARDS

Natural forces can threaten the reliable operation of a power plant. High winds, tsunamis (tidal waves), and seiches (waves in inland bodies of water) are not likely to present hazards for this project, but seismic shaking (earthquakes) and flooding could present credible threats to the project's reliable operation.

Seismic Shaking

The site lies within Seismic Zone 4 (COP 2008a, AFC §§1.4.4, 5.5; Appendix B); see the **GEOLOGY AND PALEONTOLOGY** section of this document. The project will be designed and constructed to the latest appropriate LORS (COP 2008a, AFC Appendix C). Compliance with current seismic design LORS represents an upgrading of performance during seismic shaking compared to older facilities since these LORS have been continually upgraded. Because it will be built to the latest seismic design LORS, this project will likely perform at least as well as, and perhaps better than, existing plants in the electric power system. Staff has proposed conditions of certification to ensure this; see the section of this document entitled **FACILITY DESIGN**. In light of the general historical performance of California power plants and the electrical system in seismic events, staff has no special concerns with the power plant's functional reliability during seismic events.

Flooding

The project site is largely flat, with elevations ranging from approximately 2,493 to 2,535 feet above mean sea level. The site is not within a 100-year flood plain or a 500-year flood plain (COP 2008a, AFC §§2.3.1, 2.4.6.7, 2.4.6.8, 5.17.2.3). Mass grading of the site will occur at the beginning of the project construction phase. The solar field area, approximately 250 acres, will be graded to slope gently toward the northeast at a rate of 0.5 percent. The power block area, approximately 20 acres, will be on elevated fill area to avoid flooding during any major rainfall event. Staff believes there are no special concerns with power plant functional reliability due to flooding. For further discussion, see **SOIL AND WATER RESOURCES**, and **GEOLOGY AND PALEONTOLOGY**.

COMPARISON WITH EXISTING FACILITIES

Industry statistics for availability factors (as well as other related reliability data) are maintained by the North American Electric Reliability Corporation (NERC). NERC regularly polls North American utility companies on their project reliability through its Generating Availability Data System, and periodically summarizes and publishes those statistics on the Internet [http://www.nerc.com]. The NERC reported the following generating unit statistic for the years 2002 through 2006 (NERC 2007):

For combined cycle units (all MW sizes):

Availability Factor = 89.86 percent

The project’s gas turbines have been on the market for several years now and are expected to exhibit typically high availability. The applicant’s expectation of an annual availability factor of 90-95% (COP 2008a, AFC §2.4.2) appears reasonable when compared with NERC figures for similar plants throughout North America (see above). In fact, these machines can well be expected to outperform the fleet of various (mostly older and smaller) gas turbines that make up NERC statistics. Additionally, because the plant will consist of two parallel gas turbine generating trains, maintenance can be scheduled during times of the year when the full plant output is not required to meet market demand, which is typical of industry standard maintenance procedures. The solar technology employed in the PHPP will be similar to that at the solar power plants at Kramer Junction, which have demonstrated availability factors in the 99% range in recent years. The applicant’s estimate of plant availability, therefore, appears to be realistic. Stated procedures for assuring the design, procurement, and construction of a reliable power plant appear to be consistent with industry norms, and staff believes they are likely to ultimately produce an adequately reliable plant.

NOTEWORTHY PROJECT BENEFITS

This project would enhance power supply reliability in the California electricity market by meeting the state’s growing energy demand, contributing to electricity reserves in the region, and providing operating flexibility (that is, the ability to start up, shut down, turn down, and provide load following and spinning reserve). The fact that the project consists of two combustion turbine generators, configured as independent equipment trains, provides inherent reliability. A single equipment failure cannot disable more than one train, thereby allowing the plant to continue to generate, though at reduced output.

At full load solar operation, the heat from the solar system can replace the equivalent of approximately 50 MW of duct firing. The solar system would enhance the project’s ability to respond to the energy markets by providing peaking power during periods of peak electricity demand (e.g., hot summer afternoons), while reducing the natural gas consumption required to fire the duct burners at full load. During periods of peak demand, the sun will typically shine on the project site; solar energy should therefore be available when needed. If a malfunction prevented the use of the solar technology, natural gas could be burned in the duct burners to make up for that loss. This provides a reliable source of energy, which enhances both the project’s overall reliability and availability.

CONCLUSION

The applicant predicts an equivalent availability factor of 90-95 percent, which staff believes is achievable. Based on a review of the proposal, staff concludes that the plant would be built and operated in a manner consistent with industry norms for reliable operation, with the exception of the source of water supply. No conditions of certification are proposed.

PROPOSED CONDITIONS OF CERTIFICATION

No conditions of certification are proposed.

REFERENCES

COP 2008a – City of Palmdale/ S. Williams (tn: 47383). Application for Certification for the Palmdale Hybrid Power Project. Dated on 07/30/08. Submitted to CEC/ Docket Unit on 08/04/08.

McGraw-Hill (McGraw-Hill Energy Information Services Group). 1994. Operational Experience in Competitive Electric Generation. Executive Report.

NERC (North American Electric Reliability Council). 2007. 2002–2006 Generating Availability Report.

TRANSMISSION SYSTEM ENGINEERING

Laiping Ng and Mark Hesters

SUMMARY OF CONCLUSIONS

The proposed Palmdale Hybrid Power Project (PHPP) outlet and terminations require more definition and further study in order to determine feasibility. The proposed 230 kV generator tie-line would be 35.6 miles in length, with 23.7 miles (segment 1) being located in new and existing rights-of-way and 11.9 miles (segment 2) being located in an existing right-of-way. In addition, the 11.9 miles of the existing Southern California Edison (SCE) Vincent-Pearblossom 230 kV line would be reconductored and relocated to the new PHPP double circuit poles.

- SCE performed the Tehachapi Queue Cluster Window System Impact Study (SIS) analyzed the proposed PHPP interconnection to the Vincent Substation, but replacement and reconductoring of the 11.9 mile segment between the Vincent and Pearblossom substations was not included in the SIS.
- The addition of the PHPP would require expansion and upgrade of the Vincent Substation and the full extent of these substation changes has not been identified. The California Independent System Operator (California ISO) Facilities Study (FS) will identify the specific modifications at the Vincent Substation required for the interconnection of the PHPP.
- SCE will conduct a ROW Study to determine the feasibility of replacing and relocating the existing Vincent-Pearblossom 230 kV transmission line. The SCE ROW Study is required to evaluate the possible use of the SCE ROW, possible impacts to Los Angeles Department of Water and Power (LADWP), and California Department of Water Resource (CDWR) facilities

Staff requires the FS and ROW Study be completed by the California ISO and SCE, respectively, to complete the Final Staff Assessment.

The SCE SIS concluded that with both the SCE Antelope Transmission Project (ATP) and the Tehachapi Renewable Transmission Project (TRTP) in service, the addition of the Tehachapi Wind Resource Area (TWRA) queue cluster window, including the proposed 570 MW PHPP, would not cause any transmission line overloads under normal conditions. Overloads under single and double contingency conditions would be mitigated with the modification of existing special protection system (SPS), installing new SPS, operation procedures, and by reducing generation in the TWRA queue. Thus, the PHPP would have no adverse downstream impacts to the planned transmission system.

INTRODUCTION

STAFF ANALYSIS

This Transmission System Engineering (TSE) analysis examines whether this project’s proposed interconnection conforms to all Laws, Ordinances, Regulations and Standards

(LORS) required for safe and reliable electric power transmission. Additionally, under the California Environmental Protection Act (CEQA), the California Energy Commission (Energy Commission) must conduct an environmental review of the “whole of the action,” which may include facilities not licensed by the Energy Commission (California Code of Regulations, title 14, §15378). The Energy Commission must therefore identify the system impacts and necessary new or modified transmission facilities downstream of the proposed interconnection that are both required for interconnection and represent the “whole of the action.”

Energy Commission staff relies upon the interconnecting authority, in this case the California ISO, for the analysis of impacts on the transmission grid from the proposed interconnection, as well as the identification and approval of new or modified facilities downstream that could be required for mitigation.

The proposed PHPP would connect to the SCE transmission system and require both analysis by SCE and approval by the California ISO.

SOUTHERN CALIFORNIA EDISON’S ROLE

SCE is responsible for ensuring electric system reliability on its transmission system with the addition of proposed transmission modifications, and determines both the standards necessary to ensure reliability and whether the proposed transmission modifications conform to existing standards. SCE will provide both the analysis and necessary reports in its System Impact and Facilities studies and its approval for both the facilities and required changes to its transmission system. Also, because of the proposed modification of the Vincent-Pearblossom transmission line, SCE will conduct a ROW Study.

CALIFORNIA ISO’S ROLE

The California ISO is responsible for dispatching generating units in California, establishing the order in which electricity will be used, ensuring electric system reliability for all participating transmission owners and is also responsible for developing the standards and procedures necessary for system reliability. The California ISO will review SCE’s studies to ensure the adequacy of the proposed PHPP transmission interconnection. The California ISO will also determine the reliability impacts of the proposed transmission modifications on SCE’s transmission system in accordance with all applicable reliability criteria. According to the California ISO’s tariff, the “need” for transmission additions or upgrades downstream from the interconnection point must be determined in light of overall system reliability. The California ISO will review the System Impact Study performed by SCE and/or a third party, provide its analysis, conclusions, and recommendations, and ultimately issue a preliminary approval or concurrence letter to SCE. Upon completion of the Facilities Study, the California ISO will provide conclusions and recommendations for interconnection of the proposed PHPP. If necessary, the California ISO will provide written and verbal testimony in support of its findings at Energy Commission hearings.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

- The North American Electric Reliability Council's (NERC) Reliability Standards for the bulk electric transmission systems of North America provide national policies, standards, principles and guides to assure the adequacy and security of the electric transmission system. The NERC planning standards provide for system performance levels for both normal and contingency conditions. With regard to power flow and stability simulations, while these Standards are similar to NERC/WECC Planning 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's planning standards apply not only to interconnected system operation but to individual service areas as well (NERC 2006).
- NERC/WECC Planning Standards: The Western Electricity Coordinating Council (WECC) Planning Standards are merged with the NERC Reliability Standards to provide the system performance standards used to assess the reliability of the interconnected system. These standards require the uninterrupted continuity of service as their first priority, and the preservation of interconnected operation as their secondary priority. Some aspects of NERC/WECC standards are more stringent or specific than NERC standards alone. 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 upon 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 allowable variations in thermal loading, voltage and frequency, and the loss of load that could 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 the loss of either multiple 500 kV lines along a common right-of-way, and/or the loss of multiple generators). While controlled loss of generation or load or system separation is permitted under certain circumstances, uncontrolled loss is not permitted (WECC 2002).
- California Public Utilities Commission (CPUC) General Order 95 (GO-95*), Rules for Overhead Electric Line Construction,* sets forth uniform requirements for the construction of overhead lines. Compliance with this order ensures both adequate service and the safety of both the public and the people who build, maintain, and operate overhead electric lines.
- CPUC General Order 128 (GO-128), *Rules for Construction of Underground Electric Supply and Communications Systems*, sets forth uniform requirements and minimum standards for underground supply systems to ensure adequate service and the safety of both the public and the people who build, maintain, and operate underground electric lines.

- National Electric Safety Code, 1999, provides electrical, mechanical, civil, and structural requirements for overhead electric line construction and operation.
- California ISO Planning Standards also provide standards and guidelines that assure the adequacy, security and reliability during the planning process of the California ISO's electric transmission facilities. The California ISO Planning Standards incorporate both NERC and WECC Planning Standards. With regard to power flow and stability simulations, the California ISO's Planning Standards are similar to those of the NERC and WECC and to the NERC Planning Standards for transmission system contingency performance. However, the California ISO's standards also provide additional requirements that are not found in the NERC, WECC, or NERC planning standards. The California ISO standards apply to all participating transmission owners that interconnect to both the California ISO-controlled transmission grid and to neighboring grids not operated by the California ISO (California ISO 2002a).
- California ISO and Federal Energy Regulatory Commission (FERC) electric tariffs provide guidelines for the construction of all transmission additions and upgrades (projects) within the California ISO-controlled grid. The California ISO also determines the "need" for the proposed project where it will promote economic efficiency and maintain system reliability. The California ISO also determines the cost responsibility of the proposed project and provides operational review for all facilities that are to be connected to the California ISO grid (California ISO 2003a).

PROJECT DESCRIPTION

The applicant has proposed to interconnect the 570 MW PHPP to the SCE Vincent Substation with a proposed commercial operation date of summer 2013. The PHPP would be a natural gas-fired combined-cycle power generating facility located in the City of Palmdale, California. The project would consist of two combustion turbine generators (CTG) each rated at 195.5 MVA with a power factor of 0.85 and one steam turbine generator (STG) rated at 355 MVA with a power factor of 0.85. Each CTG is expected to generate at 154 MW and the STG is expected to generate at 169 MW under average ambient conditions. With the duct burners in-service, the steam turbine generator would generate at its peak at 267 MW. At full load solar operation, solar field can generate heat to replace equivalent of approximately 50 MW of duct firing. The total output of the PHPP would be approximately 570 MW (COP2008a, section 2.1, section 2.4.2, Figure 2.10).

The two combustion turbine generators and the steam turbine generator each would interconnect to the low side of its dedicated 18/230 kV oil-filled, generator step-up transformer through an 8,000-Amp gas insulated circuit breaker and a disconnect switch. The step-up transformers for the combustion turbine generating units would be rated at 18/230 kV and 118/157/196 megavolt ampere (MVA), while the transformer for the steam turbine generating unit would be rated at 18/230 kV and 180/240/300 MVA. The high side of each generator step-up transformer would be connected to the project switchyard through a 1,200-ampere disconnect switch and overhead conductors (COP2008a, section 2.4.4.3, Figure 2-10).

SWITCHYARDS AND INTERCONNECTION FACILITIES

The proposed project switchyard would be in a breaker and one-half configuration. It would consist of six 2,000-ampere 230 kV circuit breakers. The switchyard would be connected to the SCE Vincent Substation via a new, 35.6 mile long, 230 kV generation tie-line. This single, bundled 1590 ACSR generator tie-line conductor would be constructed in two segments (segment 1 and segment 2).

Segment 1

The proposed 23.7 miles, segment 1, of the generator tie-line, being located in new and existing rights-of-way, would proceed north and east, then south, between the PHPP site to the north of the CDWR Pearblossom Pumping Station. The 230 kV single circuit generator tie-line would be supported by new double circuit steel poles.

Segment 2

The remaining 11.9 miles, segment 2, of the proposed 230 kV generator tie-line would proceed from north of the Pearblossom Pumping Station southwest to the Vincent Substation. In addition to the proposed 230 kV generator tie-line, approximately 11.9 miles of the existing SCE Vincent-Pearblossom 230kV line will be reconductored and relocated to the new PHPP double circuit poles.

Before connecting to the Vincent Substation, the PHPP 230 kV generator tie-line and the Vincent–Pearblossom 230 kV line, supported by the new PHPP double circuit poles, would cross under two 500 kV lines owned by SCE and two 500 kV lines owned by LADWP. The PHPP generation would be distributed to the SCE grid through the Vincent Substation (COP2008a section 2.1, section 2.5, Figure 2-10, Figure 2-10B, AECOM2009 TSE, Figure 2).

The existing Vincent–Pearblossom 230 kV transmission line transmits power to CDWR Pearblossom water pumping plant from the Vincent Substation. This 230 kV line, except for the last half-mile before connecting to the Pearblossom Pumping Station, would be reconductored to 1590 ACSR bundled conductors, and would be relocated from the existing H-frame supporting structures to the proposed PHPP double circuit steel poles. The existing H-frame structures would be removed. The Vincent-Pearblossom 230 kV line is the sole source of power for the CDWR's Pearblossom Pumping Station and any outage of the line must be carefully coordinated with CDWR. Data requests from CDWR regarding impacts to the Pearblossom Pumping Station have not been answered by the applicant. Staff is working with CDWR staff on conditions required for certification of the proposed project.

The proposed generator tie-line route has not been approved by SCE. A detailed ROW Study, required by SCE to evaluate the feasibility of using the existing Vincent-Pearblossom corridor, is needed. The ROW Study will evaluate the ground and line clearances for the proposed 230 kV double circuit line which would cross under existing 500 kV lines owned by SCE and the LADWP. Staff has requested the ROW Study to complete the analysis of the proposed PHPP (SCE2009a, CEC2009v).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

For the interconnection of either a proposed generating unit or transmission facility to the grid, the interconnecting utility (SCE in this case) and the control area operator (California ISO) are jointly responsible for ensuring the grid's reliability. These entities together determine the project's impact on the transmission system and any needed mitigation measures to ensure system conformance with utility reliability criteria, NERC planning standards, WECC reliability criteria, and California ISO reliability criteria. A SIS and a FS are used to determine the impacts of the proposed project on the transmission grid. Staff relies on the studies and any review conducted by the California ISO to determine the project's effect on the transmission grid and to identify necessary downstream facilities or indirect project impacts required to bring the transmission system into compliance with applicable reliability standards.

The SIS and FS analyze the grid both with and without the proposed project, under conditions specified in the planning standards and reliability criteria. The standards and criteria define the assumptions used in the study and establish the thresholds through which grid reliability is determined. The studies must analyze the impact of the project for the proposed first year of operation, and are thus are based upon a forecast of loads, generation, and transmission. Load forecasts are developed by the interconnecting utility and the California ISO. 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.

If the studies show that the interconnection of the project could cause the grid to be out of compliance with reliability standards, then the study will identify mitigation alternatives or ways in which the grid could be brought into compliance with reliability standards. When a project connects to the California ISO-controlled grid, both the studies and mitigation alternatives must be reviewed and approved by the California ISO. If the mitigation identified by the California ISO or interconnecting utility includes transmission modifications or additions that require CEQA review as the "whole of the action," the Energy Commission must then analyze the environmental impacts of these modifications or additions.

STATUS OF CALIFORNIA ISO AND SCE STUDIES

SCE has performed the Tehachapi Queue Cluster Window SIS which included the proposed PHPP. The SIS studied a 15.7 mile-long generator tie-line connecting directly to the Vincent substation. The route in the SIS is different from the route proposed in the AFC. SCE requires a ROW Study to determine the feasibility of using the proposed route. The California ISO Facilities Study is also required to determine the necessary system upgrades due to the integration of PHPP (SCE2009a).

SCOPE OF SYSTEM IMPACT STUDY

The SIS was performed by SCE at the request of the project owners, to identify transmission system impacts caused by all the projects in TWRA queue cluster window, including the PHPP, on SCE's transmission system. The SIS included a Power Flow study, Transient Stability study, Post-Transient Voltages Stability study, and Short Circuit study. The SIS modeled projects in the TWRA queue cluster window, totaling 4,229 MW, including the proposed 570 MW PHPP.

The base cases included all transmission upgrade projects, including the ATP and the TRTP, in SCE area, major path flow limits of the Southern California import transmission limit, East-Of-River and West-Of-River limits. Generation included planned generating facilities ahead of the TWRA queue cluster window and all regulatory must-take generation units in SCE area. Power Flow studies were conducted both with and without projects in the TWRA queue cluster and the portions of the TRTP project needed to integrate all the projects in the TWRA queue cluster window, including the proposed PHPP connection to the SCE grid, at the Vincent Substation. The Power Flow modeled 2014 heavy summer conditions and a sensitivity case modeled localized light load conditions. Detailed study assumptions are described in the SIS. The Power Flow study assessed the project's impact on the thermal loading of the transmission lines and equipment. The Transient Stability study and the Post-Transient Voltages Stability study were conducted using the 2014 heavy summer base cases to determine whether all the projects in TWRA queue cluster window, including the PHPP, the ATP, and the TRTP would create instability in the system following certain selected outages. The Short Circuit study was conducted with all the transmission upgrades and generation projects ahead of the TWRA, and generation projects in the TWRA queue cluster window. The Short Circuit study is to determine if its interconnection could overstress the existing substation facilities (COP2008a**,** Appendix F).

Power Flow Study Results and Mitigations

Base Case Study

The initial base case study modeled the transmission system, excluded generation projects in the TWRA queue cluster and the TRTP transmission upgrade project, but included the ATP transmission upgrade project segment 1 (new 500 kV line between the Antelope and the Pardee Substations), and segment 2 (new 500 kV line between the Antelope and the Vincent Substations). The initial power flow study identified no pre-project transmission line overloads in either the 2014 heavy summer or the 2014 local area light load cases.

With the addition of the generation projects in the TWRA queue cluster, including the PHPP and a portion of the TRTP transmission upgrade project as shown in Figure 2-1 of the SIS, transmission line overloads appear in both study cases under normal conditions. The Antelope-Mesa 230 kV line is loaded to 137% and 152% of its normal rating, and the Vincent-Mesa 230 kV line is loaded to 104% and 107% of its normal rating, for the 2014 heavy summer and 2014 local area light load cases, respectively. Table 2-5 of the SIS listed base case power flow study results (COP2008a Appendix F).

Revised Base Case Study – Normal Conditions

A revised base case was used to model the transmission system with all required transmission upgrades, as shown in Figure 2-6, including the ATP and TRTP in service.

- Power Flow Study identified no normal transmission line overloads that are triggered by the TWRA. The TWRA, including the PHPP, can be integrated to the SCE system.

Revised Base Case Study – Contingency Conditions

The SIS identified transmission line overloads under N-1and N-2 contingency conditions for both the 2014 heavy summer and 2014 local area light load cases. The study results are shown in Table 2-10, Table 2-11, and Table 2-12 of the SIS.

- The N-1 overloads can be mitigated by operating procedures, installing new Special Protection Systems (SPS), wave trap replacements, and by modifying existing SPS.
- The N-2 overloads can be mitigated with modification of the existing SPS, installation of new SPS, and by triping portions of the TWRA generation.

Since this SIS is a cluster study which analyzed a large scale of transmission system and the necessary system upgrades required for integration of a total of 4,229 MW new generation, including the proposed 570 MW PHPP, no specific downstream impacts due to any specific generation project were identified. The SIS as a whole analyzes impacts to the SCE system and proposed mitigations measures which are required for resolving the problems. Thus, no downstream facilities are required for the reliable interconnect the PHPP (COP2008a Appendix F).

Dynamic Stability Study Results

Dynamic Stability studies (Transient Stability and Post-Transient Voltage Stability Studies) for projects in the TWRA queue cluster window, including the PHPP were conducted using 2014 heavy summer base cases to determine if the projects would create any adverse impact on the stable operation of the transmission grid in the event of selected N-1 and N-2 outages. The results indicate with both of the ATP and TRTP transmission projects in service, the PHPP will not cause adverse impacts on the stable operation of the transmission system following these selected disturbances, as shown in the SIS for integration of the project (COP2008a Appendix F).

Short Circuit Study Results and Mitigations

Short Circuit studies were conducted to determine the degree to which the addition of all of the projects in the TWRA queue cluster window, including the PHPP, and all necessary transmission upgrades including ATP and TRTP, increases fault duties at SCE's substations, adjacent utility substations, and other 230 kV and 500 kV busses within the study area. The busses at locations where faults were simulated, the maximum three phase and single line-to-ground fault currents at these busses, both with and without the ATP and TRTP transmission upgrade projects, and information on the breaker duties at each location are summarized in Table 2-1 (Three Phase (3PH) Short Circuit Duty Study Results) and Table 2-2 (Single-Line-to-Ground (1PH) Short Circuit Duty Study Results). The three phase short circuit duty study shows that the addition of all the generation projects in the TWRA queue cluster, and the addition of ATP and TRTP transmission upgrade projects would increase short circuit duties by 0.1

kA or more at four 500 kV and thirty nine 230 substation breakers. The single-line-to-ground short circuit duty study shows that three 500 kV and twenty-seven 230 kV substation breakers would increase short circuit duties by 0.1 kA or more. The FS will determine the specific details of breaker replacement (COP2008a Appendix F).

COMPLIANCE WITH LORS

Staff requires the FS and the ROW studies be completed in order to make a LORS finding for the PHPP. The FS will identify the equipment needed at the Vincent substation for the project interconnection. The ROW Study will determine whether or not the replacement of the existing single circuit Vincent-Pearblossom 230 kV line with a double circuit line is feasible. Without the FS and the ROW studies, staff is unable to make a LORS finding concerning the proposed transmission line and the PHPP interconnection at the Vincent substation.

The SIS indicates that the project interconnection would comply with all NERC/WECC planning standards and California ISO reliability criteria.

CONCLUSIONS AND RECOMMENDATIONS

The addition of the PHPP would require expansion and modification of the Vincent Substation. Since the Vincent Substation upgrade is also part of the TRTP, the proposed PHPP cannot be connected to the Vincent Substation until the expansion and modification is in place. A FS is required to evaluate the specific interconnection location, interconnection equipment, and protection equipment at the point of interconnection at the Vincent Substation.

The proposed interconnection for the PHPP includes reconductoring 11.9 miles of the existing SCE Vincent–Pearblossom 230 kV line and relocating this line to the new PHPP double circuit poles. There are several unresolved issues with the proposed interconnection. The Vincent-Pearblossom 230 kV line is the only source of power for the CDWR Pearblossom Pumping Station and the proposed interconnection would take this line out of service for an unspecified amount of time and would require close coordination with the CDWR. The existing 230 kV line crosses under several 500 kV transmission lines and the assessment of the ground clearances and line clearances of the cross under ROW Study.

The TWRA Queue Cluster Window SIS concluded that with both of the ATP and TRTP transmission upgrade projects in service, all of the generation projects in the TWRA, totaling 4,229 MW, including the proposed 570 MW PHPP, can be integrated to the SCE system. The addition of the PHPP would not cause any overloads under normal conditions. Overloads under single and double contingency conditions would be mitigated by modifying of existing SPS, installing new SPS, by operating procedures, and by reducing generation.

The Vincent-Pearblossom 230 kV line provides electricity to the CDWR pumping plant. Reconductoring and relocation of this line would have direct impact to the water pumping facility. Data requests from CDWR regarding impacts to the Pearblossom pumping plant have not been answered by the applicant. Operation related and transmission line construction related information is required by the CDWR to proceed with their analysis.

Staff cannot make a LORS determination until the required FS is provided for further analysis.

CONDITIONS OF CERTIFICATION FOR TSE

TSE-1 The project owner shall provide the Compliance Project Manager (CPM) and the Chief Building Official (CBO) with 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 both a description and a 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.

<u>Verification:</u> At least 60 days (or fewer, if mutually agreed upon by the project owner and the CBO) before the start of construction, the project owner shall submit the schedule, a master drawing list, and a master specifications list to both the CBO and 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 both 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
Take-off facilities
Electrical control building
Switchyard control building
Transmission pole/tower
Grounding system

TSE-2 Before the start of construction, the project owner shall assign to the project an electrical engineer and at least one of each of the following:

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 and 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 either a civil engineer or a 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, or 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 as required by 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 earth work and require changes; if site conditions are unsafe or do not conform with the predicted conditions used as the basis for design of earth work 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 fewer if mutually agreed to by the project owner and the CBO) before 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 (2001 California Building Code, 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 refer to 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 the disapproval, along with 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 construction until plans for that increment of construction 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 fewer if mutually agreed to by the project owner and the CBO) before 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, and outlet line and termination, including a copy of the signed and stamped statement from the responsible electrical engineer verifying compliance with all 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, and the requirements listed below. The project owner shall submit the required number of copies of the design drawings and calculations, as determined by the CBO.

a) The PHPP project will be interconnected to SCE's Vincent Substation via a single, bundled, 230 kV transmission lines, approximately 35.6-mile-long, with 1590 ACSR bundled conductors or conductors with a higher rating.

b) The Vincent Substation will have to be expanded and upgraded to interconnect the PHPP. The breaker, bay arrangement, and protection requirements have not been finalized. The PHPP cannot be interconnected to the Vincent Substation until the upgrade is in place.

c) The power plant 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.

d) Breakers and busses in the power plant switchyard and other switchyards, where applicable, shall be sized to comply with a short-circuit analysis.

e) 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.

f) The project conductors shall be sized to accommodate the full output of the project.

g) Termination facilities shall comply with applicable SCE interconnection standards.

h) The project owner shall provide to the CPM:

    i) the final Detailed Facility Study (DFS), including a description of facility upgrades, operational mitigation measures, and/or special protection system sequencing and timing if applicable;

    ii) executed project owner and California ISO facility interconnection agreement.

Verification: At least 60 days before the start of construction of transmission facilities (or fewer days if mutually agreed upon 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 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*, CA ISO standards, National Electric Code (NEC) and related industry standards, for the poles/towers, foundations, anchor bolts, conductors, grounding systems, and major switchyard equipment;

b) For each element of the transmission facilities identified above, the submittal package to the CBO shall contain the design criteria, a discussion of the calculation method(s), a sample calculation based on "worst case conditions"[1] and a statement signed and sealed by the registered engineer in responsible charge, or other acceptable alternative verification, that the transmission element(s) will conform with CPUC General Order 95 or National Electric Safety Code (NESC); Title 8 of the California Code and Regulations (Title 8); Articles 35, 36 and 37 of the *High Voltage Electric Safety Orders*, California ISO standards, National Electric Code (NEC), and related industry standards;

[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 charge, a route map, and an engineering description of the equipment and configurations covered by requirements **TSE-5** a) through h), above;

d) the final DFS, including a description of facility upgrades, operational mitigation measures, and/or SPS sequencing and timing if applicable, shall be provided concurrently to the CPM;

e) 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 which may not conform to the facilities described in this condition and request approval to implement such changes.

TSE-6 The project owner shall provide the following notice to the California ISO prior to synchronizing the facility with the California electric transmission system:

a) at least one week prior to synchronizing the facility with the grid for testing, provide the California ISO with a letter stating the proposed date of synchronization; and

b) at least one business day prior to synchronizing the facility with the grid for testing, provide telephone notification to the California ISO's 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 before initial synchronization with the grid. The project owner shall contact the California ISO's outage coordination department (Monday through Friday, between the hours of 7:00 a.m. and 3:30 p.m. at (916) 351-2300) at least one business day prior to synchronizing the facility with the grid for testing. A report of that conversation with the California ISO shall be provided electronically to the CPM one day before synchronizing the facility with the California electric transmission system for the first time.

TSE-7 The project owner shall be responsible for inspection of the transmission facilities during and after project construction, and for any subsequent CPM- and CBO-approved changes, to ensure conformance with CPUC General Order 95 or National Electric Safety Code (NESC); Title 8 of the California Code and Regulations (Title 8); Articles 35, 36 and 37 of the *High Voltage Electric Safety Orders*, California ISO standards, National Electric Code (NEC) and related industry standards. In cases of non-conformance, the project owner shall inform the CPM and CBO, in writing and within 10 days of the discovery of such non-conformance, and the actions that will be taken to correct it.

<u>Verification:</u> Within 60 days after the 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 charge. A statement verifying conformity with CPUC General Order 95 or National Electric Safety Code (NESC); Title 8 of the California Code and Regulations (Title 8); Articles 35, 36 and 37 of the *High Voltage Electric Safety Orders*, California ISO standards, National Electric Code (NEC) and related industry standards;

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 charge or an 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.

TSE-8 The project owner shall be responsible for limiting output of the proposed facility to 698 MW. If the proposed facility exceeds the output pursuant to the limitations of the transmission interconnection study, the project owner shall appear before the Energy Commission to request an amendment to the project.

Verification: The project owner will submit quarterly reports to the CPM indicating maximum quarterly output.

REFERENCES

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NERC (North American Electric Reliability Council) 2006. Reliability Standards for the Bulk Electric Systems of North America, May 2 2006

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URS 2007a - URS Corporation (tn 40001) Application for Certification for San Gabriel Generating Station. 4/12/2007

URS 2007e - URS Corporation/ D. Heick (tn 40528) Supplemental Information in Response to CEC Data Adequacy Request. 5/21/2007

URS 2007f - URS Corporation/ D. Heick (tn 41887) Responses to Data Request Set 1 (#1-59). 8/10/2007

URS 2007k - URS Corporation/ D. Heick (tn 41941) Supplement B to the SGGS AFC, August 2007. 8/15/2007

WECC (Western Electricity Coordinating Council) 2002. NERC/WECC Planning Standards, August 2002

DEFINITION OF TERMS

AAC	All aluminum conductor
ACSR	Aluminum conductor steel-reinforced
ACSS	Aluminum conductor steel-supported
Ampacity	Current-carrying capacity, expressed in amperes, of a conductor at specified ambient conditions, at which damage to the conductor is nonexistent or deemed acceptable based on economic, safety, and reliability considerations
Ampere	The unit of current flowing in a conductor
Bundled	Two wires, 18 inches apart
Bus	Conductors that serve as a common connection for two or more circuits
Conductor	The part of the transmission line (the wire) that carries the current.

Congestion Management A scheduling protocol that ensures dispatched generation and transmission loading (imports) will not violate criteria

Double Contingency Also known as emergency or N-2 condition, occurs when a forced outage of two system elements occurs -- usually (but not exclusively) caused by one single event. Examples of an N-2 contingency include loss of two transmission circuits on single tower line or loss of two elements connected by a common circuit breaker due to the failure of that common breaker

Emergency Overload See Single Contingency condition. This is also called an N-1.

Kcmil or KCM Thousand circular mil. A unit of the conductor's cross sectional area; when divided by 1,273, the area in square inches is obtained.

Kilovolt (kV) A unit of potential difference, or voltage, between two conductors of a circuit, or between a conductor and the ground

Loop An electrical cul de sac. A transmission configuration that interrupts an existing circuit, diverts it to another connection, and returns it back to the interrupted circuit, thus forming a loop or cul de sac

Megavar One megavolt ampere reactive

Megavars Mega-volt-ampere-reactive. One million volt-ampere-reactive. Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system

Megavolt Ampere (MVA) A unit of apparent power, equals the product of the line voltage in kilovolts, current in amperes, the square root of 3, divided by 1,000

Megawatt (MW) A unit of power equivalent to 1,341 horsepower

N-0 Condition See Normal Operation/Normal Overload, below

Normal Operation/ Normal Overload (N-0) When all customers receive the power hey 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, below

N-2 Condition See Double Contingency, above

Outlet Transmission facilities (circuit, transformer, circuit breaker, etc.) linking generation facilities with the main grid

Power Flow Analysis A power flow analysis is a forward-looking computer simulation of essentially all generation and transmission system facilities that identifies overloaded circuits, transformers, and other equipment and system voltage levels

Reactive Power Reactive power is generally associated with the reactive nature of 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 A remedial action scheme is an automatic control provision that, as one example, will trip a selected generating unit when a circuit overloads

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

Special Protection Scheme/System Detects a transmission outage (either a single or credible multiple contingency) or an overloaded transmission facility and then trips or runs back generation output to avoid potential overloaded facilities or other criteria violations

Switchyard A power plant switchyard is an integral part of a power plant that is used as an outlet for one or more electric generators

Thermal Rating See ampacity.

TSE Transmission System Engineering

Tap A transmission configuration that creates an interconnection through a short single circuit to a small or medium-sized load or 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.

ALTERNATIVES

Hedy Born Koczwara

SUMMARY OF CONCLUSIONS

In the analysis of the Palmdale Hybrid Power Project (PHPP), three alternative project sites and three alternative transmission routes were examined, as well as several alternative energy producing technologies. The proposed PHPP site alone has preliminarily been determined to be environmentally superior to the alternative sites and generation technologies. However, the 35.6-mile transmission line connection from the PHPP site to Vincent 500/230 kV Substation has not been approved by Southern California Edison (SCE) and a Right-of-Way (ROW) Study has not yet been completed. As a result, the ultimate feasibility and environmental impacts of the proposed 230 kV transmission route is unknown at this time. For the purposes of a preliminary analysis, this section compares three alternative routes with the Applicant's proposed transmission line route. However, the evaluation of alternative transmission corridors is incomplete, and definitive information regarding the proposed route location is needed in order to complete the analysis and confirm final comparative conclusions. A ROW Study by SCE has been required in the **TRANSMISSION SYSTEM ENGINEERING** section of this Preliminary Staff Assessment (PSA) in order to determine the feasibility of using the proposed route and complete the Final Staff Assessment.

Three alternative sites that are similar to the proposed project in location and land characteristics were analyzed. All alternative sites are located within reasonable proximity to infrastructure connections compared with the proposed PHPP site (i.e., transmission lines, gas lines, and water lines). Pending a final proposed transmission route comparison, none of the alternative sites are considered to be superior to the Applicant's proposed site. While all three alternative sites are in land use areas zoned industrial, the alternative sites themselves have greater disadvantages than advantages when compared to the proposed project. If for any reason a transmission line to Vincent 500/230 kV Substation is found to be infeasible or substantially altered, then the conclusions regarding site alternatives may change.

Alternative Site 1, located three miles southeast of the proposed site, would not be large enough to include the 250-acre solar array field, and thus the site was eliminated from consideration. Alternative Site 2, located one mile west of the PHPP site, would be less desirable because the land acquisition process would be more complex with multiple privately-owned parcels, and the site is bisected by a major intermittent streambed, which would require greater landform modifications and could lead to increased erosion and problems for the solar troughs. Alternative Site 3, located to the east of U.S. Air Force Plant 42, would eliminate construction of 14 miles of new 230 kV transmission line, but it would create greater environmental impacts namely to biological resources, visual resources and traffic due to its remote location and lack of existing infrastructure in the area.

As discussed above, three alternative transmission routes were preliminarily considered to reduce the length of the 35.6-mile 230 kV transmission interconnection included in the Application for Certification (AFC). The 10th Street W. Route (Alternative Route 1) would shorten the length of the currently-proposed transmission interconnection, but it would travel through a busy commercial district, creating increased traffic and visual impacts, and the existing SCE easement would not be wide enough to support a 230 kV line. The Division Street Route (Alternative Route 2) would be closer to sensitive receptors and would result in greater visual impacts, because it would create an entirely new transmission corridor, it would be located in a more developed area, and it would require several crossings of Division Street to avoid a housing subdivision and other homes in the area. Additionally, the route would be located less than 250 feet from the Palmdale Learning Plaza. The Underground along Sierra Highway (Alternative Route 3) would also be shorter and would eliminate visual impacts for the 5.5-mile underground segment, but it would be less environmentally preferred, because it would have increased short-term construction impacts in a more populated and heavily-traveled area, costs of construction and maintenance would be higher, and the alternative would also increase seismic concerns and maintenance response times. SCE also stated that it would not accept ownership of an underground line. Pending a final proposed transmission route and assuming that the route would not be substantially altered, none of the alternative routes are considered to be superior to the Applicant’s proposed route in the AFC.

Eight renewable and non-renewable alternative technologies were examined as possible alternatives to the project. Geothermal and hydroelectric alternatives were determined not to be viable options, as there are no adequate geothermal or hydrological resources located near the City of Palmdale. Fuel cells are not yet a commercially viable technology and California law currently prohibits the construction of any new nuclear power plants in California. Wind power is not considered a feasible alternative as the area around City of Palmdale is not identified as a productive area for development of commercial wind power, and wind turbines may interfere with operations at U.S. Air Force Plant 42. Feedstock for biomass power would likely have to be transported over long distances from agricultural residues in California’s Central Valley, and lacking sufficient feedstock in the greater Palmdale area, biomass is not a practical alternative.

Staff considered the use of solar PV on existing rooftops to replace the solar thermal component and to reduce land disturbance, however, if the solar component is not located at the proposed PHPP, then it would not be able to offset the natural gas-fired component to increase project efficiency and reduce the need for duct burning, which is an important element of the project. While an all-solar energy project would utilize an available renewable natural resource within a region of California where its potential for power production is among the highest in the state, an all-solar energy project would not fully meet the project objectives to provide a reliable source of power generation that would supply electrical energy night and day.

On the other hand, a natural gas-only plant (without the solar thermal component of the project) would provide reliable power and would reduce land disturbance as well, but its air emissions would be greater and it would not meet project objectives nor contribute towards the development of renewable energy for the state and region as a whole. Since an objective of the project is to provide 570 MW of electricity with minimal impacts to the environment and provide the public with an efficient, reliable source of electrical power, staff concludes the alternative technologies examined are not feasible and/or do not meet project objectives.

Staff also believes that the “No Project Alternative” is not superior to the proposed project. The No Project scenario would likely delay development of reliable electrical resources required for the region and could impact electrical supply reliability throughout California. Therefore, at this time staff does not recommend alternative generation technologies, alternative sites, nor alternative transmission routes over the technology and site proposed by the City of Palmdale. A final conclusion regarding the alternative transmission line routes will be made following completion of a ROW Study by the Applicant and/or route approval for ownership transfer by SCE.

INTRODUCTION

The purpose of staff’s alternatives analyses is to describe a range of reasonable project alternatives that could feasibly attain the objectives of the proposed PHPP, and avoid or substantially lessen one or more of the significant effects of the project. This will comply with state environmental laws by providing an analysis of a reasonable range of feasible alternative which could substantially reduce or avoid any potentially significant adverse impacts of the proposed project (Cal. Code Regs., tit. 14, § 15126.6; Cal. Code Regs., tit. 20, § 1765). If the Energy Commission determines that the proposed project will result in significant adverse impacts that cannot be mitigated, it cannot license the project unless it finds that alternatives are infeasible and that the benefits of the project outweigh the impacts. However, the Energy Commission does not have the authority to require alternative configurations, require alternative technology designs, or to require the Applicant to move the proposed project to another location. If the Applicant moves its proposed project to one of the alternative sites, Energy Commission staff will analyze any new proposed site at the same level of detail as the original proposed site.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

ENERGY COMMISSION SITING REGULATIONS

Energy Commission siting regulations require the examination of the “feasibility of available site and facility alternatives to the Applicant’s proposal which substantially lessen the significant adverse impacts of the proposal on the environment” (Title 20, California Code of Regulations, §1765).

CEQA *Guidelines* Section 15126.6(a) (Title 14, California Code of Regulation) requires an evaluation of “a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project.” In addition, the analysis must address the “no project” alternative (Title 14, California Code of Regulation, §15126.6(e)).

The range of alternatives is governed by the “rule of reason,” which requires consideration only of those alternatives necessary to permit informed decision-making and public participation. CEQA *Guidelines* state that an environmental document does not have to consider an alternative of which the effect cannot be reasonably ascertained and of which the implementation is remote and speculative (Title 14, California Code of Regulation, §15126.6(f)(3)).

SCOPE AND METHODOLOGY OF THE ALTERNATIVES ANALYSIS

In order to provide a reasonable range of feasible alternatives that could substantially reduce or avoid any potentially significant adverse impacts of the proposed project, staff must first determine the appropriate scope of analysis. It is necessary to identify and determine the potentially significant impacts of the proposed project and then focus on alternatives that are capable of reducing or avoiding significant impacts.

To prepare this alternative analysis, the staff used the following methodology:

- Describe the basic objectives of the project;
- Identify the potential significant environmental impacts of the project;
- Identify and evaluate alternative sites for the project to determine whether these sites could reduce or eliminate project impacts;
- Identify and evaluate alternative routes for the transmission line to determine whether these routes could reduce or eliminate project impacts;
- Identify and evaluate technology alternatives to the project that could mitigate project impacts; and
- Evaluate the “No Project” alternative to determine whether this alternative would be superior to the project as proposed.

Alternatives to the proposed project include three general types: (1) other sites where the proposed project (a hybrid of natural gas-fired combined-cycle generating equipment integrated with solar thermal generating equipment) could be utilized, (2) alternative routes along which the transmission line could be cited, and (3) different power generation technologies. These alternatives are discussed and evaluated below.

PROJECT OBJECTIVES

After studying the Applicant’s AFC, Energy Commission staff has determined City of Palmdale’s project objectives to be:

- Provide an efficient, reliable, and environmentally sound power generating facility to meet future electrical power needs of the rapidly growing City of Palmdale and surrounding area, as well as provide additional generating capacity for the region and California;
- Locate the facility within the boundaries of the City of Palmdale and under City ownership and control. The City can, thereby, increase its level of assurance that

residential, commercial, and industrial power needs in the City can be met, while at the same time supplying power to the regional grid;

- Use solar technology to generate a portion of the facility's power output and thereby support the State of California's goal of increasing the percentage of renewable energy in the state's electricity mix;
- Integrate the solar component of the project and its combined-cycle component in a way that maximizes the synergies between the two technologies to increase project efficiency; and
- Site the facility in a location zoned and planned for industrial use in an industrial area and with ready access both to adequate supplies of non-potable water to meet the facility's process water needs and to a natural gas pipeline that can supply the Project without requiring significant modifications to the regional gas supply system. (Palmdale 2008a)

SUMMARY DESCRIPTION OF PROPOSED PROJECT

The proposed PHPP would have a nominal electrical output of 570 megawatts (MW), with construction planned to take approximately 27 months and commercial operation planned by summer of 2013. Primary equipment for the generating facility would include two natural gas-fired combustion turbine-generators (CTGs) rated at 172 MW each, two heat recovery steam generators (HRSGs), one steam turbine-generator (STG) rated at 292 MW, and 250 acres of parabolic solar-thermal collectors with associated heat transfer equipment. The solar-thermal collectors would contribute up to 10 percent of the peak power generated by the facility.

The PHPP plant site is located south of East Avenue M1 (E. Avenue M) in the northernmost areas of the City of Palmdale. The 377-acre plant site is part of an approximately 600-acre City-owned property that is bounded by Sierra Highway to the west, E. Avenue M to the north, and U.S. Air Force Plant 42 on the south and east. The main access to the site during construction and operation would be via a new street and signalized intersection at 10th Street, which would be developed by the City.

The current condition of the site is vacant and undisturbed and it is surrounded by vacant, undisturbed land. The site is largely flat, with elevations ranging from approximately 2,493 to 2,535 feet above mean sea level. Existing site topography shows an average slope of one percent toward the north to northeast.

Including the land required for the solar collectors, the footprint of the power plant would require grading of approximately 327 acres to achieve a project footprint for the power block and solar field, and construction laydown would require the use of one separate temporary area of 50 acres, adjacent to the site to the west. The power plant site would require 250 acres for the solar field, 26 acres for the power block, and 51 acres combined for the access road, setbacks and drainage facilities.

The PHPP transmission line would be approximately 35.6 miles long and would consist of two segments. Segment 1 would begin on the PHPP onsite switchyard and extend approximately 23.7 miles through new and existing right-of-ways (ROWs) to Southern

California Edison's (SCE) existing Pearblossom Substation and would involve stringing conductors on new steel poles. Average pole spacing would be approximately 750 feet; pole heights would range from 100 feet to 135 feet. Segment 2 would be approximately 11.9 miles long and the conductors would be strung on new steel poles in the existing SCE ROW between Pearblossom and the Vincent Substation. The route would travel through and near a mixture of disturbed and undisturbed areas, which includes desert areas, agricultural properties, industrial and residential areas (Palmdale 2008a).

Reclaimed water for the proposed project's cooling tower makeup and other industrial uses would be supplied from the City of Palmdale Water Reclamation Plant located south of the plant site through a new 7.4-mile 14-inch pipeline. Southern California (SoCal) Gas would construct an 8.7-mile, 20-inch fuel gas supply line to serve the project as well. The pipeline would originate at the SoCal Gas facility on E. Ave S and would terminate at the PHPP plant site.

The plant site and most linear facilities routes would be entirely within the City of Palmdale. However, a small portion of the Segment 1 transmission line and all of Segment 2 would be in unincorporated Los Angeles County. Similarly, a small portion of the reclaimed water supply pipeline in the immediate area of the PWRP would be in unincorporated Los Angeles County with the remainder within the City of Palmdale. The gas pipeline would be entirely within the City of Palmdale in existing street ROWs. The transmission line and various pipeline easements would be either along City-controlled parcels, land owned by the applicable utility (e.g., SoCal Gas and SCE), or would be on land that the City intends to purchase. The City has the power to condemn any necessary easements if purchase cannot be arranged.

POTENTIAL SIGNIFICANT ENVIRONMENTAL IMPACTS

Staff's assessments of environmental impacts associated with the proposed PHPP are presented in detail in the individual sections of this PSA. The issues of most concern for the Palmdale project are summarized below and discussed in detail in the appropriate technical sections in the PSA.

- **Air Quality:** Staff recognizes that the construction of the PHPP project has the potential to degrade the area's existing air quality by increasing emissions of particulate matter less than 10 microns in size (PM10), particularly during construction associated with fugitive dust. The project owner intends to ensure that the impacts from operation of the project for nitrogen oxides (NOx), carbon monoxide (CO), sulfur oxides (SOx) and precursor organic compounds (POC) and any other air quality issues are fully mitigated. In addition, PM10 emissions would be subject to mitigation measures, and the Applicant would be required to reduce overall air emissions in the surrounding area. These mitigation measures would reduce impacts to air quality to a less than significant level. A thorough discussion of air quality impacts and mitigation measures is presented in the **AIR QUALITY** section.
- **Land Use:** The PHPP transmission line would be approximately 35.6 miles long and would consist of two segments. The need for ROW acquisition for a new, lengthy transmission line proposal could be complex and factor into the overall project

schedule considering numerous small parcels are involved in the Palmdale region. A thorough discussion of land use impacts and mitigation measures is presented in the **LAND USE** section.

- **Traffic and Transportation (Aviation Safety):** The PHPP would be located adjacent to U.S. Air Force Plant 42, which includes the operation of a passenger terminal on the Plant 42 site known as the Palmdale Regional Airport. The proximity of the project to these facilities could cause aviation safety impacts related to airport operations. Staff's analysis includes consideration of project effects from thermal and visible plumes, possible glare from the solar collectors, as well as the proximity of the project to the traffic pattern of the airport. A thorough discussion of traffic and transportation impacts and mitigation measures is presented in the **TRAFFIC AND TRANSPORTATION** section.
- **Transmission System Engineering**: The 35.6-mile transmission line corridor from the PHPP site to Vincent 500/230 kV Substation has not been approved by SCE and a ROW Study has not yet been completed. As a result, the feasibility and environmental impacts of the proposed 230 kV transmission route are unknown at this time. A ROW Study has been requested in the **TRANSMISSION SYSTEM ENGINEERING** section of this Preliminary Staff Assessment.

SCREENING CRITERIA USED TO SELECT ALTERNATIVE SITES

The purpose of this section is to evaluate alternative project sites. The evaluation criteria for each site are the following: (1) Will the alternative fulfill the project objectives and siting criteria? (2) Will it reduce the potential significant impacts identified for the proposed project? (3) Will it cause other significant environmental impacts?

In considering site alternatives, staff defined a geographic area within which alternative sites were evaluated. Since alternatives must consider the underlying objectives of the proposed project, staff confined the geographic area for location alternatives to the area within close proximity to the City of Palmdale which would allow for City ownership and control and increase the City's level of assurance that residential, commercial, and industrial power needs in the City can be met. These site location alternatives are consistent with the Applicant's project objectives and siting criteria. Potential impacts that would affect all alternative sites are air emissions and loss of habitat for biological resources. Land use compatibility was also evaluated for each alternative site. In addition, for each alternative site, the advantages and disadvantages of each site are compared to the proposed project site.

Using well-defined criteria, the Applicant considered potential alternatives sites. Staff evaluated and considered these criteria, found them sound, and used them as a rationale for alternative site consideration. The criteria identified by the Applicant in the AFC Alternatives section are as follows:

- Within the City of Palmdale boundaries in an area with existing and planned industrial development and where the power plant is a compatible land use;
- Within the City of Palmdale in order to maximize benefits to the City as the Project owner in terms of tax base, jobs; local purchases of materials, supplies, services and control of electrical generation;

- Sufficiently large (approximately 350 to 400 acres) and largely flat land, so that the site can accommodate a 250-acre solar array field capable of generating approximately 50 MW along with combined–cycle generating equipment, support facilities, and access road yielding an overall 570 MW generating facility;
- Within an area with a high level of insolation (amount of solar energy potentially available), allowing for a high renewable energy contribution per acre and thus reducing the amount of acreage needed and associated impacts;
- Largely undeveloped to minimize the need to relocate residents or disrupt other current land uses;
- In reasonable proximity to a natural gas supply pipeline with adequate capacity to supply the facility;
- In reasonable proximity to high voltage transmission lines that connect to the southern California grid;
- In reasonable proximity to a source (wastewater treatment plant) with available non-potable water of adequate quantity and quality that can be used to meet power plant cooling and process water needs.
- In reasonable proximity to available reliable backup cooling source in case of outages in the primary cooling water supply system (Palmdale, 2008a).

Note the criteria that would require the PHPP to be located within the City limits of Palmdale could also be satisfied by locating the power project on the City limits and annexing the power plant site into the City of Palmdale.

ALTERNATIVE SITES ANALYZED

Using the criteria listed above, three alternative site locations were identified and analyzed. All three sites would be within the city limits of Palmdale and they are shown on **Alternatives Figure 1**. The following three alternative sites were examined:

- **Alternative Site 1**: located adjacent to the Palmdale Water Reclamation Plant on E. Avenue P.
- **Alternative Site 2**: located on the south side of W. Avenue M, a short distance west of Sierra Highway (Palmdale, 2008a).
- **Alternative Site 3**: located east of the Los Angeles World Airport (LAWA); bordered on the west by 100th Street, on the north by E. Avenue O, on the east by 110th St, and on the south by E. Avenue P. The proposed transmission line would bisect the site.

ALTERNATIVE SITE 1

Description

Alternative Site 1 is located three miles southeast of the proposed site and south of U.S. Air Force Plant 42. The site would be adjacent to the Palmdale Water Reclamation Plant (PWRP) on E. Avenue P and 30th Street E., as is shown on **Alternatives Figure 1**.

With use of Alternative Site 1 the reclaimed water pipeline to the PWRP would be much shorter than the proposed 7.4-mile pipeline from the PHPP site, and the gas pipeline would be approximately two miles shorter as well. In addition, if the transmission line route follows E. Avenue P to rejoin the proposed route at 100 Street E., then the transmission component would be approximately six miles shorter as well.

Advantages

Alternative Site 1 is flat and undeveloped and largely similar to the proposed site. The site is located within the City of Palmdale and is zoned airport industrial, and as such the land use is compatible with existing industrial development, such as the adjacent PWRP. It is also owned by a public agency.

Alternative Site 1 has the advantages that it would be closer to the SoCal Gas gas line tie-in at the SoCal Gas facility on E. Avenue S, and it would be adjacent to the cooling water supply source. Construction impacts associated with trenching and pipeline installation in roadways, such as Sierra Highway and 10th Street E, would be greatly reduced. The site would also be closer to Vincent Substation, therefore, requiring a six-mile shorter transmission interconnection.

Disadvantages

The available acreage at Alternative Site 1 would be too small to include the 50 MW solar component. The 150 acres available for solar facilities at Alternative Site 1 would yield a maximum of only 30 MW of solar, which would be insufficient to meet the project objective of maximum synergy (the Applicant has stated that the proposed 50 MW of solar would be the optimum fit from the standpoint of project design). As such, Alternative Site 1 would not achieve the project objective of a sufficiently large (approximately 350 to 400 acres for a 250-acre solar array field) site that could accommodate a solar array field capable of generating approximately 50 MW of power. Due to failure to meet project objectives given the size of the site and the acreage required for the 50 MW solar component, Alternative Site 1 is not being further considered.

ALTERNATIVE SITE 2

Description

As shown in **Alternatives Figure 1**, this alternative site is located approximately one mile west of the proposed project site, to the south side of E. Avenue M (Columbia Way) between Division Street and 10th Street W. in the City of Palmdale. The associated water and gas pipelines in Sierra Highway would be slightly shorter; however, the transmission line would be about one mile longer. The site is large enough to accommodate the 50 MW solar field, which requires a minimum of 250 acres.

Advantages

The alternative site is similar to the proposed site; flat and undeveloped, large enough to accommodate the proposed combined-cycle and solar facilities and within reasonable proximity to access natural gas, primary and backup cooling water supply sources and transmission system interconnection locations. The associated water and gas pipelines would be shorter than from the proposed PHPP site. The site is zoned Planned Industrial (M-4), and as such the land use is compatible with existing industrial development.

Disadvantages

The alternative site has the disadvantage of being composed of multiple, privately-owned parcels and the land acquisition process would likely prove problematic. Additionally, the site is bisected by a major intermittent streambed, which regularly fills with water during rainstorms, and could lead to increased erosion and problems for the solar troughs. Landform modifications and grading would be needed, and the associated engineering and environmental issues would potentially be greater at Alternative Site 2 than at the proposed site. For these reasons, and that Alternative Site 2 would not avoid or substantially lessen the environmental effects of the proposed project, this site would be less environmentally preferable.

ALTERNATIVE SITE 3

Description

In order to shorten the proposed transmission route and reduce potential land use impacts caused by the transmission line, staff considered an alternative site east of LAWA near the proposed transmission line corridor (see **Alternatives Figure 1**). A sufficiently-sized site was sought that would be within the City of Palmdale limits, would be located in an area zoned for industrial use, and would consist of relatively few privately-owned parcels.

Alternative Site 3 is located approximately 9.5 miles east-southeast of the proposed site. It is bordered by E. Avenue P to the south, 110th Street E. to the east, E. Avenue O to the north, and roughly 105th Street E. to the west. The proposed transmission line ROW would intersect Alternative Site 3 at 105th Street E. and E. Avenue O, thereby eliminating approximately 14 miles of new 230 kV transmission line. The reclaimed water supply pipeline from Alternative Site 3 to PWRP would be 8.5 miles long and the natural gas pipeline would require 6.5 additional miles of new pipeline to the SoCal Gas facility on E. Avenue S (Palmdale 2009a).

Advantages

Alternative Site 3 is similar to the proposed site, is flat and undeveloped, and is large enough to accommodate the proposed combined-cycle and solar facilities. The site is zoned Planned Industrial (M-4), and as such the land use would be compatible with industrial development.

The site is closer to the SCE Vincent Substation, which would eliminate approximately 14 miles of a transmission interconnection. A shorter transmission route would affect the length and intensity of short-term construction impacts and ground disturbance, decreasing impacts in air quality, noise, transportation and traffic, hazardous materials related to environmental contamination, and geologic resources related to soil erosion. The potential to disturb unknown cultural resources and impact vegetation and wildlife is also decreased with less ground disturbance. Decreased disturbance and less removal of vegetation could decrease the chance of noxious weed introduction as well as the removal of less native desert vegetation. It would also reduce the length of permanent visual impacts of the overhead transmission line.

Disadvantages

Alternative Site 3 has the disadvantage of being composed of up to eight different parcels, and the land acquisition process could prove problematic. In addition, the visual impacts of the alternative site would be greater, because it would be located in an undeveloped rural area and would not be located nearby to existing industrial development.

According to Supplemental Responses to CEC Data Requests Set 1 (dated February 13, 2009), the site would require construction on previously undisturbed areas to connect with the natural gas, potable water, reclaimed water and sanitary sewer pipelines (Palmdale 2009a). However, it should be noted that in Supplemental Responses to CEC Data Requests Set 1 (dated March 2, 2009), the City of Palmdale states that an additional goal of the City in citing the transmission line east of LAWA would be to support the development in the transmission deficient eastern parts of the city (Palmdale 2009b). In order to support development in the eastern part of the City of Palmdale, connection with natural gas, potable water, reclaimed water, and sanitary sewer pipelines through previously undisturbed land would be necessary.

Alternative Site 3 would require 6.5 additional miles of gas pipeline, resulting in increased costs and potential impacts. Use of Alternative Site 3 would also require construction of new reclaimed water pipeline. On the other hand, the reclaimed water pipeline to the proposed PHPP site would be located along the already-planned Antelope Valley water supply backbone that is going to connect the Lancaster Water Reclamation Plant with the PWRP.

The pipeline required for Alternative Site 3 would cross the Little Rock Wash Significant Ecological Area for approximately one mile. In addition, the site would be located near the Alpine Butte Significant Ecological Area. It would be difficult for the water pipeline to reach any site located east of LAWA without crossing the Little Rock Wash, potentially causing greater impacts to biological resources than would be created at the proposed site. If the pipeline were to stay in existing paved roadways, such as E. Palmdale Boulevard, then the route would become substantially longer. As such, this site is considered less suitable, and would not avoid or substantially lessen the environmental effects of the proposed project without creating additional impacts namely to biological resources, visual resources and traffic due to its remote location and lack of existing infrastructure in the area. Therefore, assuming feasibility of the proposed transmission line, Alternative Site 3 is found to be less environmentally preferable.

ALTERNATIVE TRANSMISSION LINE ROUTES ANALYZED

The Vincent 500/230 kV Substation was chosen as the interconnection of the PHPP with the regional transmission system. According to Supplemental Responses to CEC Data Requests Set 2 (dated May 1, 2009), the Applicant considered an interconnection to the Antelope Substation at the initial stages of project development; however, SCE recommended the interconnection with the Vincent Substation to avoid operating constraints (Palmdale 2009c). SCE identified the Vincent Substation, approximately 11 miles south of PHPP site, as the primary point of interconnection to the California Independent System Operator system, and this substation was subject of the System Impact Study for the PHPP project.

The most direct route from the PHPP to the Vincent Substation would be to follow Sierra Highway; however, an overhead line along this route would have conflicted with U.S. Air Force Plant 42's operation. As such, the most direct route was not considered for an overhead line. The Applicant did consider three transmission line routes west of the project before concluding that an eastern route that would avoid the restricted use areas would be most appropriate, and this is the route that was proposed in the PHPP AFC (08-AFC-9).

However, the proposed 35.6-mile transmission line corridor from the PHPP site to Vincent 500/230 kV Substation has not been approved by SCE for the transfer of ownership and a ROW Study has not yet been completed. As a result, the feasibility and environmental impacts of the proposed 230 kV transmission route is unknown at this time. For the purposes of a preliminary analysis, this Alternatives section compares the following three alternative routes with the Applicant's proposed transmission line route:

- Alternative Route 1: 10th Street W. Route
- Alternative Route 2: Division Street Route
- Alternative Route 3: Underground along Sierra Highway

However, the final evaluation of the alternative transmission corridors is incomplete, and definitive information regarding the feasibility of the proposed route location is needed in order to complete the analysis and finalize comparative conclusions in the Final Staff Assessment.

If PHPP receives a certification from the Energy Commission, the Applicant has stated that it would work with SCE as appropriate to obtain any additional permitting approvals that would be required by the California Public Utilities Commission for the siting of a transmission line.

ALTERNATIVE ROUTE 1: 10TH STREET W. ROUTE

Description

The Applicant considered a route along 10th Street W. This route would exit the project site west on East Avenue M before heading south on 10th Street W. for four miles to W. Palmdale Boulevard. At W. Palmdale Boulevard, the transmission route would turn southeast and follow W. Palmdale Boulevard for 1.2 miles until Division Street.

At Division Street the alternative route could either turn east along E. Palmdale Boulevard for 0.75 mile until reaching Sierra Highway or turn south along Division Street to E. Avenue R. At E. Avenue R, the line would turn east for 0.75 mile to its intersection with Sierra Highway. At Sierra Highway the line would turn south and follow Sierra

Highway for approximately 5.5 miles until shortly before the Vincent Substation where the line would follow the Angeles Forest Highway until reaching the Vincent Substation (see **Alternatives Figure 1**).

Advantages

The 10th Street W. Route would meet aviation requirements and avoid conflicts with Air Force Plant 42's flight operations. The 10th Street W. Route would be approximately 15 miles in length. This route would be approximately 20 miles shorter than the proposed route, which will affect the length and intensity of short-term construction impacts and ground disturbance, decreasing impacts in air quality, noise, hazardous materials related to environmental contamination, and geologic resources related to soil erosion. The potential to disturb unknown cultural resources and impact vegetation and wildlife is also decreased with less ground disturbance. Decreased disturbance and less removal of vegetation could decrease the chance of noxious weed introduction as well as the removal of less native desert vegetation. Additionally it would help consolidate existing transmission infrastructure as this street has a SCE subtransmission 66 kV line with 12 kV distribution line underbuild and two multi-circuit phone cables (Palmdale 2009c). The width of the existing easement is 15 feet behind curb face (bcf). In general, consolidating transmission lines within common utility corridors is desirable because it minimizes land disturbance and additional visual impacts that typically result from separate transmission line corridors.

Disadvantages

The City of Palmdale was concerned with the duration of construction of the transmission line because 10 Street W. is a busy retail area in Palmdale and a prolonged disruption to City residences and businesses could result in a potential loss of revenue due to construction outages. Because 10th Street W. hosts a variety of shopping and retail centers, traffic impacts of the route would likely be greater than along the proposed route, which follows less travelled streets and undisturbed land. A route along 10th Street W. would also result in a high viewer exposure because transmission line structures would be in the primary cone of vision for both northbound and southbound travelers along the heavily travelled 10th Street W. However, consolidating transmission lines within common utility corridors would diminish additional visual impacts that typically result from separate transmission line corridors.

The Applicant stated in Data Response Set 1 (dated March 2, 2009), that siting a 230 kV upgrade along the existing SCE ROW would be difficult because it would have to cross the Antelope Valley freeway (I-14) as well as the local shopping mall parking lot. Staff disagrees with this statement; stringing transmission lines across a freeway is a relatively common occurrence. The existing SCE easement and 66 kV subtransmission line crosses the freeway and runs alongside the mall parking lot and could be used for the 230 kV upgrade.

The ROW along 10th Street W. is owned by the City of Palmdale, the SCE existing easement within this ROW is a standard 15-foot bcf easement (Palmdale 2009c). The existing transmission poles along 10th Street W. hold an SCE 66 kV three-wire circuit, an existing 12 kV four wire circuit, and two multi-circuit phone cables (Palmdale 2009c). While placing the 230 kV transmission line along the existing poles on 10th Street W.

would consolidate the existing transmission infrastructure in Palmdale, as the Applicant states, the existing SCE easement is only 15 feet bcf wide. The ROW requirements for a 230 kV vary, but would likely be at least 60 to 80 feet wide. This ROW requirement would not fit in the 15-foot bcf easement SCE currently has for the existing 66 kV and 12 kV circuits along 10th Street W. As such, using the existing easement would not be a viable option and this alternative route is not being considered further.

ALTERNATIVE ROUTE 2: DIVISION STREET ROUTE

Description

The Applicant considered a western route along Division Street, located between 10th Street W. and Sierra Highway. As shown in **Alternatives Figure 1**, this route would exit the proposed site west along East Avenue M for less than one mile until reaching Division Street at which point the line would turn south. The line would follow Division Street for 4.5 miles until reaching either E. Palmdale Boulevard or E. Avenue R.

This alternative would be the same as Alternative Route 1: 10th Street W. Route from this point to Vincent Substation. At either E. Palmdale Boulevard or E. Avenue R, the line would turn east for 0.75 mile until reaching Sierra Highway. At Sierra Highway the line would turn south and follow Sierra Highway for 5.5 miles until shortly before the Vincent Substation where the line would follow the Angeles Forest Highway to Vincent Substation.

Advantages

The Division Street Route would meet aviation requirements and would avoid conflicts with Air Force Plant 42’s flight operations. The Division Street Route would be approximately 13.5 miles in length, approximately 21.5 miles shorter than the proposed route. The shorter transmission line will affect the length and intensity of short-term construction impacts and ground disturbance, decreasing impacts in air quality, noise, transportation and traffic, hazardous materials related to environmental contamination, and geologic resources related to soil erosion. The potential to disturb unknown cultural resources and impact vegetation and wildlife is also decreased with less ground disturbance. Decreased disturbance and less removal of vegetation could decrease the chance of noxious weed introduction as well as the removal of less native desert vegetation.

Disadvantages

The Division Street Route would have greater visual impacts, because it would not be located in or adjacent to an existing SCE transmission ROW, it would be located in a more developed area, and it would require several crossings of Division Street to avoid a housing subdivision and other homes in the area.

Additionally, the route would be located less than 250 feet from the Palmdale Learning Plaza at the corner of Rayburn and Division Street. The California Department of Education has established a 150-foot “setback” limit for locating any part of a school site property line near the edge of the easements for a 220 kV to 230 kV transmission line (CDE 2009). Assuming the transmission line were located on the eastern side of Division Street, the route would adhere to the California Department of Education regulations. Due to greater visual impacts and proximity to sensitive receptors and residences, Alternative Route 2: Division Street Route would not avoid or substantially lessen the environmental effects of the proposed route in the AFC.

ALTERNATIVE ROUTE 3: UNDERGROUND ALONG SIERRA HIGHWAY

Description

The Applicant discussed the possibility of undergrounding the route along the Sierra Highway in the vicinity of the airport runway, thereby avoiding aviation concerns and reducing the length of the transmission line. The Applicant dismissed this option in the AFC because SCE stated it would not accept ownership of underground lines (Palmdale 2008a). However, the Applicant states in Data Request 2 that SCE would not be the owner of the 230 kV interconnection line and that PHPP would retain ownership of the line at this time (Palmdale 2009c). An underground transmission line in Sierra Highway would require approximately 12.75 miles of transmission line, of which approximately 5.5 miles would be undergrounded.

The most direct route between the proposed PHPP site and the Vincent Substation would be to exit the PHPP as an overhead line west along E. Avenue M (Columbia Way) until reaching Sierra Highway. As shown in **Alternatives Figure 1**, the route would then transition underground and travel south within Sierra Highway. The line would remain underground along Sierra Highway for approximately 5.5 miles until just past East Avenue R (approximately Garnet Avenue), at which point the line would transition from underground to overhead again.

At this point, the line would be approximately 0.86 miles from the Palmdale Learning Center mentioned under Alternative Route 2: Division Street Route above. The line would follow Sierra Highway above ground from East Avenue R until Angeles Forest Highway. Because SCE stated that it would not allow the PHPP line to enter from the north, the line would follow Sierra Highway past the Vincent Substation and west along Hillside Drive to enter the substation from the south (Palmdale 2009b). The entire route would be approximately 12.75 miles (22.85 miles shorter than the proposed route).

In order to avoid interference with the aviation requirement for Plant 42, the route would be underground in Sierra Highway from the intersection of E. Avenue M (Columbia Way) and Sierra Highway until Garnet Avenue. The underground segment would transition to overhead north of the San Andreas Fault and so the line would cross the fault as an overhead transmission line.

The Applicant stated that the width of the road ROW in Sierra Highway is between 120 and 160 feet (Palmdale 2009c). The existing ROW has a number of existing utilities, which are listed in Alternatives Table 1. Additionally, the proposed PHPP would locate both the 20-inch natural gas supply and 14-inch reclaimed water supply pipelines in Sierra Highway for 2.5 miles, as are shown in Alternatives Table 2.

Alternatives Table 1
Existing Utilities in Sierra Highway ROW

Type of Utility	Owner	Pipeline Diameter
Distribution Lines	SCE	12 kV (overhead)
Water Main	LADWP	12-inch
Sewer Line	LADWP	10-inch
Gas Line	SCG&E	10-inch
C.A.T.V.	Time Warner Communication	3-inch cable bundle
Telephone line	Verizon	3-inch cable bundle
Railroad	Union Pacific	50-foot ROW

Source: Palmdale 2009c.

Alternatives Table 2
Planned PHPP Utilities in Sierra Highway ROW

Type of Utility	Location	Pipeline Diameter
Fuel Gas Supply	On Sierra Avenue from East Avenue M to Lockheed Way before turning east on Blackbird Lane (approximately 2.5 miles)	20-inch
Reclaimed Water Supply	On Sierra Avenue from East Avenue M to Lockheed Way before turning east on Blackbird Land (approximately 2.5 miles)	14-inch

Source: Palmdale 2009c.

While a number of existing and planned utilities are located in the Sierra Highway, there is still available space that could be used to underground a 230 kV line. The trench for an underground 230 kV transmission line would be approximately seven feet wide and six feet deep. As the trench for the underground transmission line is completed, installation of the cable conduit, reinforcement bar, ground wire, and concrete conduit encasement, which collectively comprise the duct bank, would begin. The duct bank for the 230 kV underground transmission lines would typically measure approximately 3.5 feet by 3.5 feet. Ducts for communication cables, which are required for system protection and communication purposes, would be installed in the same duct bank as the transmission cables. Where the electrical transmission duct bank would cross or run parallel to other substructures that operate at normal soil temperature (gas lines, telephone lines, water mains, storm drains, sewer lines), a minimal radial clearance of 12 inches (for crossing) and 24 inches (for paralleling) would be required. Ideal clearances would be 2 to 5 feet. Clearances and depths would meet requirements set forth with Rule 33.4 of CPUC General Order 128.

Advantages

The Alternative Route 3: Underground along Sierra Highway Route would meet aviation requirements and avoid conflicts with U.S. Air Force Plant 42's flight operations. The route would be approximately 12.75 miles in length, approximately 22.85 miles shorter than the proposed route. Approximately 5.5 miles of underground 230 kV line would be required for the route. Once the installation is complete, the operational visual impacts of the underground segment through the City would be eliminated and the shorter line length would reduce impacts of the proposed 35.6-mile overhead line.

The Underground along Sierra Highway would be located in public ROW which is already proposed to be disturbed for the fuel gas supply and reclaimed water supply pipelines for approximately 2.5 miles, thereby lessening the additional undergrounding trench requirements. While the alternative would be approximately 22.85 miles shorter than the proposed route in the AFC, it would require 5.5 miles of continuous trenching within a roadway. Because construction would occur in a paved roadway, which is in good condition, vegetation and wildlife habitat, especially to the Mohave ground squirrel which is assumed to be present along the proposed transmission corridor, would not be disturbed and the potential to impact known or unknown cultural or archaeological resources is less. Less removal of vegetation along the roadways and from the shorter route could decrease the chance of noxious weed introduction as well as the removal of less native desert vegetation.

Disadvantages

Undergrounding a 230 kV line along Sierra Highway would require continuous trenching for 5.5 miles, which would involve much greater ground disturbance and construction-related impacts, especially to traffic, air quality and dust, and noise. There is also a greater potential to encounter contaminated soils due to the greater ground disturbance. While approximately 2.5 miles of the underground trenching along Sierra Highway would be required for the fuel gas and water pipelines, a 230 kV underground trench would require a substantially larger trench along the route than the pipelines. Therefore, this alternative would result in increased impacts to local traffic and circulation, because of increased reliance on burial in heavily traveled roadways.

In addition, although the route would transition to overhead to cross the San Andres Fault north of Lake Palmdale, a seismic event could result in the rupture of multiple sections of duct bank and a much slower recovery time in the event of an outage. Although the ultimate ownership of the line is unknown, the PHPP plant owner will contract with either SCE or another private transmission contractor to engineer, procure and construct the transmission line, as well as perform maintenance for its operating life. SCE stated in an email to the Applicant (dated April 29, 2009) that SCE is not interested in owning or operating an underground 230 kV circuit, primarily for the reasons of high maintenance cost, seismic concerns, technical challenges, and safety concerns (Palmdale 2009c).

The Applicant states that a primary concern regarding undergrounding the 230 kV transmission line is the additional cost the City of Palmdale would incur; as a public agency the City of Palmdale is charged with ensuring its Project use the most cost effective means of interconnection that does not incur significant impacts (Palmdale 2009c). The Applicant states that SCE estimates that an underground 230 kV transmission line would cost approximately $100 million per mile to construct compared with approximately $5 to 10 million per mile for an overhead 230 kV transmission line (Palmdale 2009c). However, the PG&E Jefferson-Martin 27-mile 230 kV Transmission Line (24 miles of which were underground) was constructed at a cost of $221 million or $8.1 million per mile (PGE 2006). In general, the cost differential between underground versus overhead construction of a given transmission line is so project specific that generic ratios are rarely of much value. The reported cost ratios for overhead versus underground construction range from a low of 2 to 3 times up to a high of 20 times. An example of a project which would be expected to have a lower underground to overhead cost ratio would be one where the ability and/or cost of acquiring ROW is a major factor. Projects where the terrain is a significant issue would typically be associated with higher cost ratios. The most common, and apparent, cost differential is the relative expense of constructing continuous underground conduits versus building overhead transmission towers at regular intervals. Over fairly level, easily excavated, and readily accessible terrain, which is the case for both the underground and overhead transmission routes for the PHPP, the typical cost differential is at least four to five times for underground versus overhead transmission.

An underground route along Sierra Highway would significantly shorten the proposed transmission route and associated impacts. However, an additional economic cost may be associated with this route which may be contrary to the City of Palmdale’s purpose. In addition to the environmental and economic disadvantages of a westerly route transmission line, the Applicant states that “none of the proposed westerly routes met the City’s goal of supporting future development in the transmission deficient eastern parts of the City” (Palmdale 2009b).

The installation of an underground transmission line would require more time than construction of an equivalent length of overhead line because of the time required for excavating trenches, constructing the duct banks, fluid reservoirs, and/or stop joints. In addition, maintenance and restoration time in the event of an outage would also be more difficult and could result in longer outages and repair times. Accessing manholes or performing duct repair would require traffic control and lane closures. Underground lines are also more susceptible to third party dig-in accidents and outages. Although electric fields are reduced with increasing burial depth, magnetic fields above underground conductors are generally higher than from overhead lines due to closer proximity to the conductors to the ground.

The underground alternative would result in increased short-term impacts in a more populated and heavily-traveled area, costs of construction and maintenance would be higher, and the alternative would also increase seismic concerns and maintenance response times. Coupled with SCE’s statement that it would not accept ownership of an underground line and given that the proposed overhead route would be located in a largely undeveloped area, preliminarily this alternative is not considered environmentally preferred to the route proposed in the AFC.

GENERATION TECHNOLOGY ALTERNATIVES

Staff considered various alternative generation technologies and evaluated which of these would meet the project's objectives. Technologies examined were those which do not burn fossil fuels: wind, biomass, geothermal, fuel cell, and hydropower. Staff also considered construction of a natural gas-fired power plant without the solar component and nuclear power.

WIND GENERATION

Modern wind turbines can represent viable alternatives to large bulk power fossil power plants as well as small-scale distributed systems. Wind turbines currently being manufactured have power ratings ranging from 250 watts to 5 MW, and units larger than 7 MW in capacity are now under development (AWEA 2008). The average capacity of wind turbines installed in the United States in 2007 was 1.65 MW (EERE 2008).

Although air emissions would be significantly reduced or eliminated for wind facilities, they can have significant visual effects and wind turbines also cause bird mortality (especially for raptors) resulting from collision with rotating blades. Additionally, erosion can be a concern in certain habitats such as the desert or mountain ridgelines. Standard engineering practices can be used to reduce erosion potential.

Wind resources would require large land areas in order to generate 570 MW of electricity. Depending on the size of the wind turbines and the wind conditions of the region, wind energy generation requires between 5 and 17 acres per MW of energy created (between 2,850 to 9,690 acres for 570 MW). Comparatively, the proposed project would be contained within approximately 377 acres.

Even if adequate land were available, wind generation technology is not a feasible alternative as the area immediately around Palmdale is not considered a productive resource area for development of commercial wind energy because it has a wind speed of less than 6.7 meters/second (RETI 2008). It should be noted that a region with high wind energy potential is located west of Palmdale (RETI 2008a). Because Plant 42's aviation concerns, siting wind turbines such that they would be within or adjacent to the City of Palmdale and would not interfere with the Plant 42's operation would potentially be a concern. Wind energy would also disturb significantly more acres of habitat for desert tortoise, and would not fully meet the objectives of the project to provide a reliable source of power generation for supplying electrical energy night and day. With these considerations, wind energy generation is neither feasible nor environmentally preferable in this location.

BIOMASS GENERATION

Biomass generation typically uses a feedstock consisting of waste vegetation such as wood chips (the preferred source) or agricultural waste. The feedstock is most commonly burned to generate steam in a boiler, and the steam is harnessed in a steam turbine-generator to produce electricity. Currently, nearly 19 percent of the state's renewable electricity derives from biomass and waste-to-energy sources (CEC 2007). Most biomass plant capacities are in the 3- to 10-MW range and typically operate as baseload capacity. The average size of a sales generation biomass plant is 21 MW (CBEA 2008). Unlike other renewables, the locational flexibility of biomass facilities would reduce the need for significant transmission and/or pipeline investments.

The emissions due to biomass fuel-fired power plant operation are generally unavoidable. Direct impacts of criteria pollutants could cause or contribute to a violation of the ambient air quality standards. Significant impacts can potentially occur for PM10 and ozone because emissions of particulate matter and precursors and ozone precursors would contribute to existing violations of the PM10 and ozone standards. Biomass/biogas facility emissions could also adversely affect visibility, air quality and vegetation. Toxic air contaminants from routine operation would also cause health risks that could locally adversely affect sensitive receptors. In addition, biomass plants in California are typically sized to generate less than 50 MW, substantially less than the capacity of the proposed 570 MW PHPP. Numerous biomass units would be required to meet the project goal of generating 570 MW. Generally, small amounts of land are required for biomass power facilities; however, a biomass facility should be sited near a relatively large source of biomass in order to minimize the cost of bringing the biomass waste to the facility. While a small biomass facility may be feasible in the Palmdale region using the existing urban wood waste in the region, significant biomass waste would likely have to be transported over long distances from agricultural residues such as in the Central Valley of the state to reach the project goal of 570 MW. Lacking sufficient feedstock in the greater Palmdale area, biomass is not a practical alternative.

GEOTHERMAL

Geothermal technologies use steam or high-temperature water obtained from naturally occurring geothermal reservoirs to drive steam turbine/generators. There are vapor dominated resources (dry, super-heated steam) and liquid-dominated resources where various techniques are utilized to extract energy from the high-temperature water.

Geothermal plants account for approximately 5% of California's power and range in size from under 1 MW to 110 MW. Geothermal plants typically operate as baseload facilities and require 0.2 to 0.5 acre per MW, so a 570-MW facility would require up to 285 acres. California is the largest geothermal power producer in the United States, with about 1,800 installed capacity; in 2007, 13,000 gigawatt hours of electricity were produced in California (CEC 2008). Geothermal plants provide highly reliable baseload power, with capacity factors from 90 to 98%.

Concerns regarding geothermal power plants include land use, water use, visibility, and hazardous materials, specifically gaseous emission. Geothermal power projects use less land than almost any other energy source; however, geothermal plants must be built where the resource is since the steam cannot be piped long distances without significant heat loss. This results in a predictable fuel supply but inflexibility in siting. It may also result in a long interconnection requirement to reach a transmission system. Because there are no viable geothermal resources in the Palmdale region and attaining 570 MW of geothermal energy would require importing energy from numerous geothermal units, geothermal energy is not a practical alternative.

HYDROPOWER

Hydropower facilities require large quantities of water diverted from streams and rivers that must be sustained during dry seasons by either the presence of adequate natural flows or by impounding water in a reservoir during wet seasons for use during dry seasons. The energy potential of using water to generate power is also a function of having sufficient topography to allow water to drop in elevation and pressurize before flowing through a turbine. Neither the water resources nor the topographic conditions are present in the project region.

FUEL CELL

Various types of fuel cell technologies, such as those that use hydrogen and oxygen, are available, but have not been proven to work on a commercial scale, such as for 570 MW proposed by the PHPP. Using fuel cells as an alternative power generation technology was therefore ruled out as a project alternative.

SOLAR ENERGY

Power plants using all solar technology, whether solar-thermal or photovoltaic (PV), would require large areas of land for siting equipment. Solar power plants use between 4 acres per MW for the Linear Fresnel Technology to 10 acres per MW. The average land required for a solar power plant is 8 acres per MW. Approximately 2,280 to 5,700 acres of land would be required to create a source of power generation equivalent to the proposed project capacity of 570 MW. If a larger area could be acquired and dedicated for a solar project, one of its most significant benefits would include eliminating air emissions during project operations, although some air emissions would occur during the maintenance of the power plants because of the cleaning of the mirrors.

Additionally, some technologies, such as the solar power tower, include a gas turbine component and therefore do have some air emissions. Among the negative effects would be the greater loss of habitat for desert tortoise and other species of concern. Impacts to soil erosion may occur due to the large amount of grading required and it may be difficult to acquire sufficient land for the plant with appropriate conditions.

Rooftop PV installations by their nature would reduce the amount of new or disturbed land required. In fact, SCE plans to install 250 MW of solar panels on two square miles of commercial rooftop (in 150 installations) in the next five years. In December 2008, SCE dedicated its first rooftop solar installation, 33,700 solar panels on a 600,000 square-foot rooftop in Fontana (SCE 2008). However, if the solar PV rooftop component is not located in the area of the proposed PHPP, then it would not maximize the synergies between the solar and natural gas technologies to increase project efficiency and reduce the need for duct burning. Although California's investor-owned utilities, such as SCE, have announced major small-scale solar projects throughout the state, rooftop solar alone in the vicinity of the PHPP (e.g., Palmdale and Lancaster) would provide significantly less energy than the proposed PHPP and would not be feasible.

In addition, solar power plants alone do not produce reliable energy generation night and day. Energy production would either have to be supplemented by a storage facility to produce during the evening and night hours or would be available only throughout the daylight hours. Because of the limited energy during night hours, Palmdale would not increase its level of assurance that residential, commercial, and industrial power needs in the City would be met, which is one of the PHPP project objectives.

NATURAL GAS-FIRED COMBINED-CYCLE COMPONENT ONLY

This generation alternative would consist of only the natural gas combined-cycle component of the PHPP project, and it would not include construction of the 250-acre solar thermal array field. Although land disturbance would be reduced, the solar thermal input is proposed to provide approximately 10% of the peak power generated by the PHPP during the daily periods of highest energy demand, and so this additional output would not be available. At full load solar operation, the heat from the solar field is proposed to replace the equivalent of approximately 50 MW of duct firing, thereby improving PHPP's overall heat rate and reducing air emissions.

A stated project objective is to integrate the solar component of the project and its combined-cycle component in a way that maximizes the synergies between the two technologies to increase project efficiency. In addition, the solar steam addition would reduce the need for duct burning to meet peak power demands and would support the State of California's goal of increasing the percentage of renewable energy in the state's electricity mix. Without the solar thermal component of the project, two of the five project objectives would not be met, air emissions would be greater, and PHPP would not contribute towards providing development of renewable energy for the state and region as a whole.

NUCLEAR

California law currently prohibits the construction of any new nuclear power plants in California until the California Energy Commission finds that there exists a demonstrated and federally-approved technology for the permanent disposal of spent fuel from these facilities.

THE "NO PROJECT" ALTERNATIVE

CEQA *Guidelines* and Energy Commission regulations require consideration of the "No Project" alternative. This alternative assumes that the project is not constructed, and the impacts of that scenario are compared to those of the proposed project.

The "No Project" Alternative would not provide an efficient and reliable power generating facility to meet future electrical power needs of the rapidly growing City of Palmdale and surrounding area, as well as provide additional generating capacity contributing towards development of renewable energy for the state and region as a whole. Also, the "No Project" Alternative would eliminate the expected economic benefits the proposed project would bring to the City of Palmdale, including increased property taxes, employment, sales taxes, and sales of services, manufactured goods, and equipment.

In the absence of the PHPP, however, other power plants, both renewable, nonrenewable, and hybrid would have to be constructed to serve the demand for electricity. It is also likely that existing gas-fired plants could operate longer.

The “No Project” Alternative would eliminate all impacts to the environment that would result from the construction and operation of the plant at the proposed site and the associated linear facilities.

CONCLUSIONS AND RECOMMENDATION

In the analysis of the PHPP, three alternative project sites were examined, as well as three alternative transmission line routes, and several alternative energy producing technologies. The alternative sites discussed in this section offer some advantages, but no substantial reduction of environmental impacts without creating other environmental impacts or feasibility issues of their own. The alternative sites and generation technologies would not be environmentally superior to the proposed PHPP site.

Although the proposed PHPP site itself has preliminarily been determined to be environmentally superior to the alternative sites, the 35.6-mile transmission line corridor from the PHPP site to Vincent 500/230 kV Substation has not been approved by SCE and a ROW Study has not yet been completed. As a result, the feasibility and environmental impacts of the proposed 230 kV transmission route is unknown at this time. For the purposes of a preliminary analysis, this Alternatives section compares three alternative routes with the Applicant’s proposed transmission line route. Staff preliminarily finds that the proposed route in the AFC is environmentally preferable. However, the evaluation of alternative transmission corridors is incomplete, and definitive information regarding the feasibility of the proposed route location is needed in order to complete the analysis and confirm the comparative conclusions. A ROW Study has been required in the **TRANSMISSION SYSTEM ENGINEERING** section of this PSA in order to complete the Final Staff Assessment.

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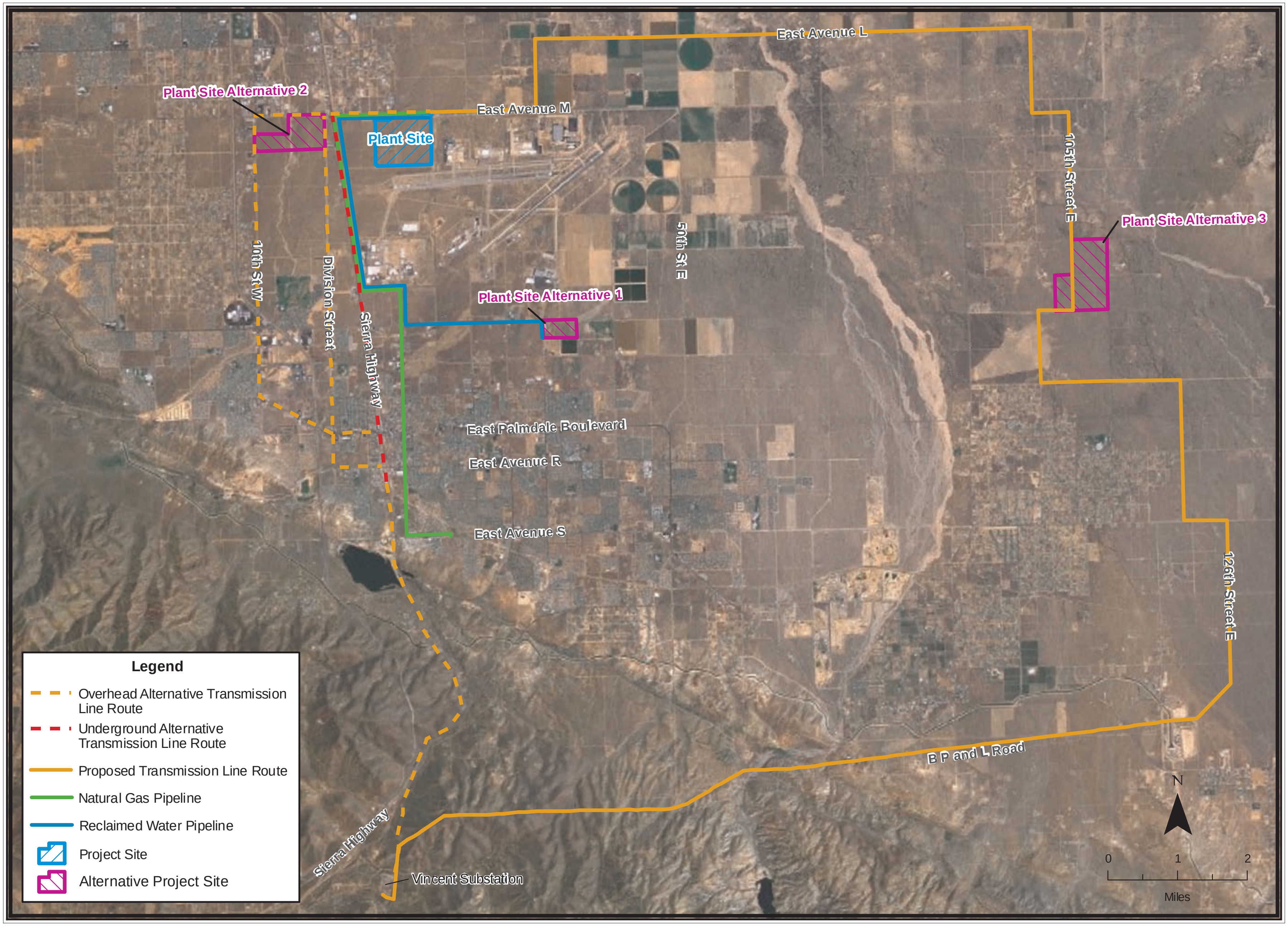
ALTERNATIVES - FIGURE 1

Palmdale Hybrid Power Project - Alternative Sites and Transmission Line Routes



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMETAL PROTECTION DIVISION, SEPTEMBER 2009

SOURCE: AFC, 2008

GENERAL CONDITIONS
INCLUDING
COMPLIANCE MONITORING AND CLOSURE PLAN

Chris Davis

INTRODUCTION

The project's General Compliance Conditions of Certification, including Compliance Monitoring and Closure Plan (Compliance Plan) have been established as required by Public Resources Code section 25532. The plan provides a means for assuring that the facility is constructed, operated and closed in compliance with public health and safety, environmental and other applicable regulations, guidelines, and conditions adopted or established by the California Energy Commission and specified in the written decision on the Application for Certification or otherwise required by law.

The Compliance Plan is composed of elements that:

- set forth the duties and responsibilities of the Compliance Project Manager (CPM), the project owner, delegate agencies, and others;
- set forth the requirements for handling confidential records and maintaining the compliance record;
- state procedures for settling disputes and making post-certification changes;
- state the requirements for periodic compliance reports and other administrative procedures that are necessary to verify the compliance status for all Energy Commission approved conditions of certification;
- establish requirements for facility closure plans; and
- specify conditions of certification for each technical area containing the measures required to mitigate any and all potential adverse project impacts associated with construction, operation and closure below a level of significance. Each specific condition of certification also includes a verification provision that describes the method of assuring that the condition has been satisfied.

DEFINITIONS

The following terms and definitions are used to establish when Conditions of Certification are implemented.

PRE-CONSTRUCTION SITE MOBILIZATION

Site mobilization is limited preconstruction activities at the site to allow for the installation of fencing, construction trailers, construction trailer utilities, and construction trailer parking at the site. Limited ground disturbance, grading, and trenching associated with the above mentioned pre-construction activities is considered part of site mobilization. Walking, driving or parking a passenger vehicle, pickup truck and light vehicles is allowable during site mobilization.

CONSTRUCTION

Onsite work to install permanent equipment or structures for any facility.

Ground Disturbance

Construction-related ground disturbance refers to activities that result in the removal of top soil or vegetation at the site beyond site mobilization needs, and for access roads and linear facilities.

Grading, Boring, and Trenching

Construction-related grading, boring, and trenching refers to activities that result in subsurface soil work at the site and for access roads and linear facilities, e.g., alteration of the topographical features such as leveling, removal of hills or high spots, moving of soil from one area to another, and removal of soil.

Notwithstanding the definitions of ground disturbance, grading, boring and trenching above, construction does **not** include the following:

1. the installation of environmental monitoring equipment;
2. a soil or geological investigation;
3. a topographical survey;
4. any other study or investigation to determine the environmental acceptability or feasibility of the use of the site for any particular facility; and
5. any work to provide access to the site for any of the purposes specified in “Construction” 1, 2, 3, or 4 above.

START OF COMMERCIAL OPERATION

For compliance monitoring purposes, “commercial operation” begins after the completion of start-up and commissioning, when the power plant has reached reliable steady-state production of electricity at the rated capacity. At the start of commercial operation, plant control is usually transferred from the construction manager to the plant operations manager.

COMPLIANCE PROJECT MANAGER RESPONSIBILITIES

The Compliance Project Manager (CPM) shall oversee the compliance monitoring and is responsible for:

1. Ensuring that the design, construction, operation, and closure of the project facilities are in compliance with the terms and conditions of the Energy Commission Decision;
2. Resolving complaints;
3. Processing post-certification changes to the conditions of certification, project description (petition to amend), and ownership or operational control (petition for change of ownership) (See instructions for filing petitions);
4. Documenting and tracking compliance filings; and
5. Ensuring that compliance files are maintained and accessible.

The CPM is the contact person for the Energy Commission and will consult with appropriate responsible agencies, Energy Commission, and staff when handling disputes, complaints, and amendments.

All project compliance submittals are submitted to the CPM for processing. Where a submittal required by a condition of certification requires CPM approval, the approval will involve all appropriate Energy Commission staff and management. All submittals must include searchable electronic versions (pdf or word files).

PRE-CONSTRUCTION AND PRE-OPERATION COMPLIANCE MEETING

The CPM usually schedules pre-construction and pre-operation compliance meetings prior to the projected start-dates of construction, plant operation, or both. The purpose of these meetings is to assemble both the Energy Commission's and project owner's technical staff to review the status of all pre-construction or pre-operation requirements, contained in the Energy Commission's conditions of certification. This is to confirm that all applicable conditions of certification have been met, or if they have not been met, to ensure that the proper action is taken. In addition, these meetings ensure, to the extent possible, that Energy Commission conditions will not delay the construction and operation of the plant due to oversight and to preclude any last minute, unforeseen issues from arising. Pre-construction meetings held during the certification process must be publicly noticed unless they are confined to administrative issues and processes.

ENERGY COMMISSION RECORD

The Energy Commission shall maintain the following documents and information as a public record, in either the Compliance file or Dockets file, for the life of the project (or other period as required):

- All documents demonstrating compliance with any legal requirements relating to the construction and operation of the facility;
- All monthly and annual compliance reports filed by the project owner;
- All complaints of noncompliance filed with the Energy Commission; and
- All petitions for project or condition of certification changes and the resulting staff or Energy Commission action.

PROJECT OWNER RESPONSIBILITIES

The project owner is responsible for ensuring that the compliance conditions of certification and all other conditions of certification that appear in the Commission Decision are satisfied. The compliance conditions regarding post-certification changes specify measures that the project owner must take when requesting changes in the project design, conditions of certification, or ownership. Failure to comply with any of the conditions of certification or the compliance conditions may result in reopening of the case and revocation of Energy Commission certification; an administrative fine; or other action as appropriate. A summary of the Compliance Conditions of Certification is included as **Compliance Table 1** at the conclusion of this section.

COMPLIANCE CONDITIONS OF CERTIFICATION

Unrestricted Access (COMPLIANCE-1)

The CPM, responsible Energy Commission staff, and delegated agencies or consultants shall be guaranteed and granted unrestricted access to the power plant site, related facilities, project-related staff, and the records maintained on-site, for the purpose of conducting audits, surveys, inspections, or general site visits. Although the CPM will normally schedule site visits on dates and times agreeable to the project owner, the CPM reserves the right to make unannounced visits at any time.

Compliance Record (COMPLIANCE-2)

The project owner shall maintain project files on-site or at an alternative site approved by the CPM for the life of the project, unless a lesser period of time is specified by the conditions of certification. The files shall contain copies of all “as-built” drawings, documents submitted as verification for conditions, and other project-related documents.

Energy Commission staff and delegate agencies shall, upon request to the project owner, be given unrestricted access to the files maintained pursuant to this condition.

Compliance Verification Submittals (COMPLIANCE-3)

Each condition of certification is followed by a means of verification. The verification describes the Energy Commission’s procedure(s) to ensure post-certification compliance with adopted conditions. The verification procedures, unlike the conditions, may be modified as necessary by the CPM.

Verification of compliance with the conditions of certification can be accomplished by the following:

1. Monthly and/or annual compliance reports, filed by the project owner or authorized agent, reporting on work done and providing pertinent documentation, as required by the specific conditions of certification;

2. Appropriate letters from delegate agencies verifying compliance;

3. Energy Commission staff audits of project records; and/or
4. Energy Commission staff inspections of work, or other evidence that the requirements are satisfied.

Verification lead times associated with start of construction may require the project owner to file submittals during the certification process, particularly if construction is planned to commence shortly after certification.

A cover letter from the project owner or authorized agent is required for all compliance submittals and correspondence pertaining to compliance matters. **The cover letter subject line shall identify the project by AFC number, the appropriate condition(s) of certification by condition number(s), and a brief description of the subject of the submittal**. The project owner shall also identify those submittals **not** required by a condition of certification with a statement such as: “This submittal is for information only and is not required by a specific condition of certification.” When submitting supplementary or corrected information, the project owner shall reference the date of the previous submittal and CEC submittal number.

The project owner is responsible for the delivery and content of all verification submittals to the CPM, whether such condition was satisfied by work performed by the project owner or an agent of the project owner.

All hardcopy submittals shall be addressed as follows:

> **Chris Davis, Compliance Project Manager**
> **(08-AFC-9C)**
> **California Energy Commission**
> **1516 Ninth Street (MS-2000)**
> **Sacramento, CA 95814**

Those submittals shall be accompanied by a searchable electronic copy, on a CD or by e-mail, as agreed upon by the CPM.

If the project owner desires Energy Commission staff action by a specific date, that request shall be made in the submittal cover letter and shall include a detailed explanation of the effects on the project if that date is not met.

Pre-Construction Matrix and Tasks Prior to Start of Construction (COMPLIANCE-4)

Prior to commencing construction, a compliance matrix addressing only those conditions that must be fulfilled before the start of construction shall be submitted by the project owner to the CPM. This matrix will be included with the project owner’s first compliance submittal or prior to the first pre-construction meeting, whichever comes first. It will be submitted in the same format as the compliance matrix described below.

Construction shall not commence until the pre-construction matrix is submitted, all pre-construction conditions have been complied with, and the CPM has issued a letter to the project owner authorizing construction. Various lead times for submittal of compliance verification documents to the CPM for conditions of certification are established to allow sufficient staff time to review and comment and, if necessary, allow the project owner to revise the submittal in a timely manner. This will ensure that project construction may proceed according to schedule.

Failure to submit compliance documents within the specified lead-time may result in delays in authorization to commence various stages of project development.

If the project owner anticipates commencing project construction as soon as the project is certified, it may be necessary for the project owner to file compliance submittals prior to project certification. Compliance submittals should be completed in advance where the necessary lead time for a required compliance event extends beyond the date anticipated for start of construction. The project owner must understand that the submittal of compliance documents prior to project certification is at the owner's own risk. Any approval by Energy Commission staff is subject to change, based upon the Commission Decision.

COMPLIANCE REPORTING

There are two different compliance reports that the project owner must submit to assist the CPM in tracking activities and monitoring compliance with the terms and conditions of the Energy Commission Decision. During construction, the project owner or authorized agent will submit Monthly Compliance Reports. During operation, an Annual Compliance Report must be submitted. These reports, and the requirement for an accompanying compliance matrix, are described below. The majority of the conditions of certification require that compliance submittals be submitted to the CPM in the monthly or annual compliance reports.

Compliance Matrix (COMPLIANCE-5)

A compliance matrix shall be submitted by the project owner to the CPM along with each monthly and annual compliance report. The compliance matrix is intended to provide the CPM with the current status of all conditions of certification in a spreadsheet format. The compliance matrix must identify:

1. the technical area;
2. the condition number;
3. a brief description of the verification action or submittal required by the condition;
4. the date the submittal is required (e.g., 60 days prior to construction, after final inspection, etc.);
5. the expected or actual submittal date;
6. the date a submittal or action was approved by the Chief Building Official (CBO), CPM, or delegate agency, if applicable; and

7. the compliance status of each condition, e.g., “not started,” “in progress” or “completed” (include the date).
8. if the condition was amended, the date of the amendment.

Satisfied conditions shall be placed at the end of the matrix.

Monthly Compliance Report (COMPLIANCE-6)

The first Monthly Compliance Report is due one month following the Energy Commission business meeting date upon which the project was approved, unless otherwise agreed to by the CPM. The first Monthly Compliance Report shall include the AFC number and an initial list of dates for each of the events identified on the **Key Events List. The Key Events List Form is found at the end of this section.**

During pre-construction and construction of the project, the project owner or authorized agent shall submit an original and an electronic searchable version of the Monthly Compliance Report within 10 working days after the end of each reporting month. Monthly Compliance Reports shall be clearly identified for the month being reported. The reports shall contain, at a minimum:

1. A summary of the current project construction status, a revised/updated schedule if there are significant delays, and an explanation of any significant changes to the schedule;
2. Documents required by specific conditions to be submitted along with the Monthly Compliance Report. Each of these items must be identified in the transmittal letter, as well as the conditions they satisfy and submitted as attachments to the Monthly Compliance Report;
3. An initial, and thereafter updated, compliance matrix showing the status of all conditions of certification;
4. A list of conditions that have been satisfied during the reporting period, and a description or reference to the actions that satisfied the condition;
5. A list of any submittal deadlines that were missed, accompanied by an explanation and an estimate of when the information will be provided;
6. A cumulative listing of any approved changes to conditions of certification;
7. A listing of any filings submitted to, or permits issued by, other governmental agencies during the month;
8. A projection of project compliance activities scheduled during the next two months. The project owner shall notify the CPM as soon as any changes are made to the project construction schedule that would affect compliance with conditions of certification;
9. A listing of the month’s additions to the on-site compliance file; and

10. A listing of complaints, notices of violation, official warnings, and citations received during the month, a description of the resolution of the resolved actions, and the status of any unresolved actions.

All sections, exhibits, or addendums shall be separated by tabbed dividers or as acceptable by the CPM.

Annual Compliance Report (COMPLIANCE-7)

After construction is complete, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports. The reports are for each year of commercial operation and are due to the CPM each year at a date agreed to by the CPM. Annual Compliance Reports shall be submitted over the life of the project unless otherwise specified by the CPM. Each Annual Compliance Report shall include the AFC number, identify the reporting period and shall contain the following:

1. An updated compliance matrix showing the status of all conditions of certification (fully satisfied conditions do not need to be included in the matrix after they have been reported as completed);

2. A summary of the current project operating status and an explanation of any significant changes to facility operations during the year;

3. Documents required by specific conditions to be submitted along with the Annual Compliance Report. Each of these items must be identified in the transmittal letter, with the condition it satisfies, and submitted as attachments to the Annual Compliance Report;

4. A cumulative listing of all post-certification changes approved by the Energy Commission or cleared by the CPM;

5. An explanation for any submittal deadlines that were missed, accompanied by an estimate of when the information will be provided;

6. A listing of filings submitted to, or permits issued by, other governmental agencies during the year;

7. A projection of project compliance activities scheduled during the next year;

8. A listing of the year’s additions to the on-site compliance file;

9. An evaluation of the on-site contingency plan for unplanned facility closure, including any suggestions necessary for bringing the plan up to date [see Compliance Conditions for Facility Closure addressed later in this section]; and

10. A listing of complaints, notices of violation, official warnings, and citations received during the year, a description of the resolution of any resolved matters, and the status of any unresolved matters.

Confidential Information (COMPLIANCE-8)

Any information that the project owner deems confidential shall be submitted to the Energy Commission's Executive Director with an application for confidentiality pursuant to Title 20, California Code of Regulations, section 2505(a). Any information that is determined to be confidential shall be kept confidential as provided for in Title 20, California Code of Regulations, section 2501 et. seq.

Annual Energy Facility Compliance Fee (COMPLIANCE-9)

Pursuant to the provisions of Section 25806(b) of the Public Resources Code, the project owner is required to pay an annual compliance fee, which is adjusted annually. Current compliance fee information is available on the Energy Commission's website http://www.energy.ca.gov/siting/filing_fees.html. You may also contact the CPM for the current fee information. The initial payment is due on the date the Energy Commission adopts the final decision. All subsequent payments are due by July 1 of each year in which the facility retains its certification. The payment instrument shall be made payable to the California Energy Commission and mailed to: Accounting Office MS-02, California Energy Commission, 1516 9th St., Sacramento, CA 95814.

Reporting of Complaints, Notices, and Citations (COMPLIANCE-10)

Prior to the start of construction, the project owner must send a letter to property owners living within one mile of the project notifying them of a telephone number to contact project representatives with questions, complaints or concerns. If the telephone is not staffed 24 hours per day, it shall include automatic answering with date and time stamp recording. All recorded complaints shall be responded to within 24 hours. The telephone number shall be posted at the project site and made easily visible to passersby during construction and operation. The telephone number shall be provided to the CPM who will post it on the Energy Commission's web page at:
http://www.energy.ca.gov/sitingcases/power_plants_contacts.html

Any changes to the telephone number shall be submitted immediately to the CPM, who will update the web page.

In addition to the monthly and annual compliance reporting requirements described above, the project owner shall report and provide copies to the CPM of all complaint forms, including noise and lighting complaints, notices of violation, notices of fines, official warnings, and citations, within 10 days of receipt. Complaints shall be logged and numbered. Noise complaints shall be recorded on the form provided in the **NOISE** conditions of certification. All other complaints shall be recorded on the complaint form (Attachment A).

FACILITY CLOSURE

At some point in the future, the project will cease operation and close down. At that time, it will be necessary to ensure that the closure occurs in such a way that public health and safety and the environment are protected from adverse impacts. Although the project setting for this project does not appear, at this time, to present any special or unusual closure problems, it is impossible to foresee what the situation will be in 30 years or more when the project ceases operation. Therefore, provisions must be made that provide the flexibility to deal with the specific situation and project setting that exist at the time of closure. Laws, Ordinances, Regulations and Standards (LORS) pertaining to facility closure are identified in the sections dealing with each technical area. Facility closure will be consistent with LORS in effect at the time of closure.

There are at least three circumstances in which a facility closure can take place: planned closure, unplanned temporary closure and unplanned permanent closure**.**

CLOSURE DEFINITIONS

Planned Closure

A planned closure occurs when the facility is closed in an anticipated, orderly manner, at the end of its useful economic or mechanical life, or due to gradual obsolescence.

Unplanned Temporary Closure

An unplanned temporary closure occurs when the facility is closed suddenly and/or unexpectedly, on a short-term basis, due to unforeseen circumstances such as a natural disaster or an emergency.

Unplanned Permanent Closure

An unplanned permanent closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unplanned closure where the owner implements the on-site contingency plan. It can also include unplanned closure where the project owner fails to implement the contingency plan, and the project is essentially abandoned.

COMPLIANCE CONDITIONS FOR FACILITY CLOSURE

Planned Closure (COMPLIANCE-11)

In order to ensure that a planned facility closure does not create adverse impacts, a closure process that provides for careful consideration of available options and applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of closure, will be undertaken. To ensure adequate review of a planned project closure, the project owner shall submit a proposed facility closure plan to the Energy Commission for review and approval at least 12 months (or other period of time agreed to by the CPM) prior to commencement of closure activities. The project owner shall file 120 copies (or other number of copies agreed upon by the CPM) of a proposed facility closure plan with the Energy Commission.

The plan shall:

1. identify and discuss any impacts and mitigation to address significant adverse impacts associated with proposed closure activities and to address facilities, equipment, or other project related remnants that will remain at the site;

2. identify a schedule of activities for closure of the power plant site, transmission line corridor, and all other appurtenant facilities constructed as part of the project;

3. identify any facilities or equipment intended to remain on site after closure, the reason, and any future use; and

4. address conformance of the plan with all applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of facility closure, and applicable conditions of certification.

Prior to submittal of the proposed facility closure plan, a meeting shall be held between the project owner and the Energy Commission CPM for the purpose of discussing the specific contents of the plan.

In the event that there are significant issues associated with the proposed facility closure plan's approval, or the desires of local officials or interested parties are inconsistent with the plan, the CPM shall hold one or more workshops and/or the Energy Commission may hold public hearings as part of its approval procedure.

As necessary, prior to or during the closure plan process, the project owner shall take appropriate steps to eliminate any immediate threats to public health and safety and the environment, but shall not commence any other closure activities until the Energy Commission approves the facility closure plan.

Unplanned Temporary Closure/On-Site Contingency Plan (COMPLIANCE-12)

In order to ensure that public health and safety and the environment are protected in the event of an unplanned temporary facility closure, it is essential to have an on-site contingency plan in place. The on-site contingency plan will help to ensure that all necessary steps to mitigate public health and safety impacts and environmental impacts are taken in a timely manner.

The project owner shall submit an on-site contingency plan for CPM review and approval. The plan shall be submitted no less than 60 days (or other time agreed to by the CPM) prior to commencement of commercial operation. The approved plan must be in place prior to commercial operation of the facility and shall be kept at the site at all times.

The project owner, in consultation with the CPM, will update the on-site contingency plan as necessary. The CPM may require revisions to the on-site contingency plan over the life of the project. In the annual compliance reports submitted to the Energy Commission, the project owner will review the on-site contingency plan, and recommend changes to bring the plan up to date. Any changes to the plan must be approved by the CPM.

The on-site contingency plan shall provide for taking immediate steps to secure the facility from trespassing or encroachment. In addition, for closures of more than 90 days, unless other arrangements are agreed to by the CPM, the plan shall provide for removal of hazardous materials and hazardous wastes, draining of all chemicals from storage tanks and other equipment, and the safe shutdown of all equipment. (Also see specific conditions of certification for the technical areas of Hazardous Materials Management and Waste Management.)

In addition, consistent with requirements under unplanned permanent closure addressed below, the nature and extent of insurance coverage, and major equipment warranties must also be included in the on-site contingency plan. In addition, the status of the insurance coverage and major equipment warranties must be updated in the annual compliance reports.

In the event of an unplanned temporary closure, the project owner shall notify the CPM, as well as other responsible agencies, by telephone, fax, or e-mail, within 24 hours and shall take all necessary steps to implement the on-site contingency plan. The project owner shall keep the CPM informed of the circumstances and expected duration of the closure.

If the CPM determines that an unplanned temporary closure is likely to be permanent, or for a duration of more than 12 months, a closure plan consistent with the requirements for a planned closure shall be developed and submitted to the CPM within 90 days of the CPM's determination (or other period of time agreed to by the CPM).

Unplanned Permanent Closure/On-Site Contingency Plan (COMPLIANCE-13)

The on-site contingency plan required for unplanned temporary closure shall also cover unplanned permanent facility closure. All of the requirements specified for unplanned temporary closure shall also apply to unplanned permanent closure.

In addition, the on-site contingency plan shall address how the project owner will ensure that all required closure steps will be successfully undertaken in the event of abandonment.

In the event of an unplanned permanent closure, the project owner shall notify the CPM, as well as other responsible agencies, by telephone, fax, or e-mail, within 24 hours and shall take all necessary steps to implement the on-site contingency plan. The project owner shall keep the CPM informed of the status of all closure activities.

A closure plan, consistent with the requirements for a planned closure, shall be developed and submitted to the CPM within 90 days of the permanent closure or another period of time agreed to by the CPM.

Post Certification Changes to the Energy Commission Decision: Amendments, Ownership Changes, Staff Approved Project Modifications and Verification Changes (COMPLIANCE-14)

The project owner must petition the Energy Commission pursuant to Title 20, California Code of Regulations, section 1769, in order to modify the project (including linear facilities) design, operation or performance requirements, and to transfer ownership or operational control of the facility. **It is the responsibility of the project owner to contact the CPM to determine if a proposed project change should be considered a project modification pursuant to section 1769.** Implementation of a project modification without first securing Energy Commission, or Energy Commission staff approval, may result in enforcement action that could result in civil penalties in accordance with section 25534 of the Public Resources Code.

A petition is required for **amendments** and for **staff approved project modifications** as specified below. Both shall be filed as a "Petition to Amend." Staff will determine if the change is significant or insignificant. For verification changes, a letter from the project owner is sufficient. In all cases, the petition or letter requesting a change should be submitted to the CPM, who will file it with the Energy Commission's Dockets Unit in accordance with Title 20, California Code of Regulations, section 1209.

The criteria that determine which type of approval and the process that applies are explained below. They reflect the provisions of Section 1769 at the time this condition was drafted. If the Commission's rules regarding amendments are amended, the rules in effect at the time an amendment is requested shall apply.

Amendment

The project owner shall petition the Energy Commission, pursuant to Title 20, California Code of Regulations, Section 1769(a), when proposing modifications to the project (including linear facilities) design, operation, or performance requirements. If a proposed modification results in deletion or change of a condition of certification, or makes changes that would cause the project not to comply with any applicable laws, ordinances, regulations or standards, the petition will be processed as a formal amendment to the final decision, which requires public notice and review of the Energy Commission staff analysis, and approval by the full Commission. The petition shall be in the form of a legal brief and fulfill the requirements of Section 1769(a). Upon request, the CPM will provide you with a sample petition to use as a template.

Change of Ownership

Change of ownership or operational control also requires that the project owner file a petition pursuant to section 1769 (b). This process requires public notice and approval by the full Commission. The petition shall be in the form of a legal brief and fulfill the requirements of Section 1769(b). Upon request, the CPM will provide you with a sample petition to use as a template.

Staff Approved Project Modification

Modifications that do not result in deletions or changes to conditions of certification, that are compliant with laws, ordinances, regulations and standards and will not have significant environmental impacts may be authorized by the CPM as a staff approved project modification pursuant to section 1769(a) (2). This process usually requires minimal time to complete, and it requires a 14-day public review of the Notice of Petition to Amend that includes staff's intention to approve the proposed project modification unless substantive objections are filed. These requests must also be submitted in the form of a “petition to amend” as described above.

Verification Change

A verification may be modified by the CPM without requesting an amendment to the decision if the change does not conflict with the conditions of certification and provides an effective alternate means of verification.

CBO DELEGATION AND AGENCY COOPERATION

In performing construction and operation monitoring of the project, Energy Commission staff acts as, and has the authority of, the Chief Building Official (CBO). Energy Commission staff may delegate CBO responsibility to either an independent third party contractor or the local building official. Energy Commission staff retains CBO authority when selecting a delegate CBO, including enforcing and interpreting state and local codes, and use of discretion, as necessary, in implementing the various codes and standards.

Energy Commission staff may also seek the cooperation of state, regional and local agencies that have an interest in environmental protection when conducting project monitoring.

ENFORCEMENT

The Energy Commission’s legal authority to enforce the terms and conditions of its Decision is specified in Public Resources Code sections 25534 and 25900. The Energy Commission may amend or revoke the certification for any facility, and may impose a civil penalty for any significant failure to comply with the terms or conditions of the Energy Commission Decision. The specific action and amount of any fines the Energy Commission may impose would take into account the specific circumstances of the incident(s). This would include such factors as the previous compliance history, whether the cause of the incident involves willful disregard of LORS, oversight, unforeseeable events, and other factors the Energy Commission may consider.

NONCOMPLIANCE COMPLAINT PROCEDURES

Any person or agency may file a complaint alleging noncompliance with the conditions of certification. Such a complaint will be subject to review by the Energy Commission pursuant to Title 20, California Code of Regulations, section 1237, but in many instances the noncompliance can be resolved by using the informal dispute resolution process. Both the informal and formal complaint procedure, as described in current State law and regulations, are described below. They shall be followed unless superseded by future law or regulations.

Informal Dispute Resolution Process

The following procedure is designed to informally resolve disputes concerning the interpretation of compliance with the requirements of this compliance plan. The project owner, the Energy Commission, or any other party, including members of the public, may initiate an informal dispute resolution process. Disputes may pertain to actions or decisions made by any party, including the Energy Commission's delegate agents.

This process may precede the more formal complaint and investigation procedure specified in Title 20, California Code of Regulations, section 1237, but is not intended to be a substitute for, or prerequisite to it. This informal procedure may not be used to change the terms and conditions of certification as approved by the Energy Commission, although the agreed upon resolution may result in a project owner, or in some cases the Energy Commission staff, proposing an amendment.

The process encourages all parties involved in a dispute to discuss the matter and to reach an agreement resolving the dispute. If a dispute cannot be resolved, then the matter must be brought before the full Energy Commission for consideration via the complaint and investigation procedure.

Request for Informal Investigation

Any individual, group, or agency may request the Energy Commission to conduct an informal investigation of alleged noncompliance with the Energy Commission's terms and conditions of certification. All requests for informal investigations shall be made to the designated CPM.

Upon receipt of a request for informal investigation, the CPM shall promptly notify the project owner of the allegation by telephone and letter. All known and relevant information of the alleged noncompliance shall be provided to the project owner and to the Energy Commission staff. The CPM will evaluate the request and the information to determine if further investigation is necessary. If the CPM finds that further investigation is necessary, the project owner will be asked to promptly investigate the matter. Within seven working days of the CPM's request, provide a written report to the CPM of the results of the investigation, including corrective measures proposed or undertaken. Depending on the urgency of the noncompliance matter, the CPM may conduct a site visit and/or request the project owner to also provide an initial verbal report within 48 hours.

Request for Informal Meeting

In the event that either the party requesting an investigation or the Energy Commission staff is not satisfied with the project owner's report, investigation of the event, or corrective measures proposed or undertaken, either party may submit a written request to the CPM for a meeting with the project owner. Such request shall be made within 14 days of the project owner's filing of its written report. Upon receipt of such a request, the CPM shall:

1. immediately schedule a meeting with the requesting party and the project owner, to be held at a mutually convenient time and place;

2. secure the attendance of appropriate Energy Commission staff and staff of any other agencies with expertise in the subject area of concern, as necessary;

3. conduct such meeting in an informal and objective manner so as to encourage the voluntary settlement of the dispute in a fair and equitable manner;

4. After the conclusion of such a meeting, promptly prepare and distribute copies to all in attendance and to the project file, a summary memorandum that fairly and accurately identifies the positions of all parties and any understandings reached. If an agreement has not been reached, the CPM shall inform the complainant of the formal complaint process and requirements provided under Title 20, California Code of Regulations, section 1230 et seq.

Formal Dispute Resolution Procedure-Complaints and Investigations

Any person may file a complaint with the Energy Commission's Dockets Unit alleging noncompliance with a Commission decision adopted pursuant to Public Resources Code section 25500. Requirements for complaint filings and a description of how complaints are processed are in Title 20, California Code of Regulations, section 1237.

KEY EVENTS LIST

PROJECT: ______________________________

DOCKET #: ______________________________

COMPLIANCE PROJECT MANAGER: ______________________________

EVENT DESCRIPTION	DATE
Certification Date	
Obtain Site Control	
Online Date	
POWER PLANT SITE ACTIVITIES	
Start Site Mobilization	
Start Ground Disturbance	
Start Grading	
Start Construction	
Begin Pouring Major Foundation Concrete	
Begin Installation of Major Equipment	
Completion of Installation of Major Equipment	
First Combustion of Gas Turbine	
Obtain Building Occupation Permit	
Start Commercial Operation	
Complete All Construction	
TRANSMISSION LINE ACTIVITIES	
Start T/L Construction	
Synchronization with Grid and Interconnection	
Complete T/L Construction	
FUEL SUPPLY LINE ACTIVITIES	
Start Gas Pipeline Construction and Interconnection	
Complete Gas Pipeline Construction	
WATER SUPPLY LINE ACTIVITIES	
Start Water Supply Line Construction	
Complete Water Supply Line Construction	

COMPLIANCE TABLE 1
SUMMARY of COMPLIANCE CONDITIONS OF CERTIFICATION

CONDITION NUMBER	SUBJECT	DESCRIPTION
COMPLIANCE-1	**Unrestricted Access**	**The project owner shall grant Energy Commission staff and delegate agencies or consultants unrestricted access to the power plant site.**
COMPLIANCE-2	**Compliance Record**	**The project owner shall maintain project files on-site. Energy Commission staff and delegate agencies shall be given unrestricted access to the files.**
COMPLIANCE-3	**Compliance Verification Submittals**	**The project owner is responsible for the delivery and content of all verification submittals to the CPM, whether such condition was satisfied by work performed or the project owner or his agent.**
COMPLIANCE-4	**Pre-construction Matrix and Tasks Prior to Start of Construction**	**Construction shall not commence until the all of the following activities/submittals have been completed:** • **property owners living within one mile of the project have been notified of a telephone number to contact for questions, complaints or concerns,** • **a pre-construction matrix has been submitted identifying only those conditions that must be fulfilled before the start of construction,** • **all pre-construction conditions have been complied with,** • **the CPM has issued a letter to the project owner authorizing construction.**
COMPLIANCE-5	**Compliance Matrix**	**The project owner shall submit a compliance matrix (in a spreadsheet format) with each monthly and annual compliance report which includes the status of all compliance conditions of certification.**
COMPLIANCE-6	**Monthly Compliance Report including a Key Events List**	**During construction, the project owner shall submit Monthly Compliance Reports (MCRs) which include specific information. The first MCR is due the month following the Energy Commission business meeting date on which the project was approved and shall include an initial list of dates for each of the events identified on the Key Events List.**

CONDITION NUMBER	SUBJECT	DESCRIPTION
COMPLIANCE-7	**Annual Compliance Reports**	**After construction ends and throughout the life of the project, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports.**
COMPLIANCE-8	**Confidential Information**	**Any information the project owner deems confidential shall be submitted to the Energy Commission's Executive Director with a request for confidentiality.**
COMPLIANCE-9	**Annual fees**	**Payment of Annual Energy Facility Compliance Fee**
COMPLIANCE-10	**Reporting of Complaints, Notices and Citations**	**Within 10 days of receipt, the project owner shall report to the CPM, all notices, complaints, and citations.**
COMPLIANCE-11	**Planned Facility Closure**	**The project owner shall submit a closure plan to the CPM at least 12 months prior to commencement of a planned closure.**
COMPLIANCE-12	**Unplanned Temporary Facility Closure**	**To ensure that public health and safety and the environment are protected in the event of an unplanned temporary closure, the project owner shall submit an on-site contingency plan no less than 60 days prior to commencement of commercial operation.**
COMPLIANCE-13	**Unplanned Permanent Facility Closure**	**To ensure that public health and safety and the environment are protected in the event of an unplanned permanent closure, the project owner shall submit an on-site contingency plan no less than 60 days prior to commencement of commercial operation.**
COMPLIANCE-14	**Post-certification changes to the Decision**	**The project owner must petition the Energy Commission to delete or change a condition of certification, modify the project design or operational requirements and/or transfer ownership of operational control of the facility.**

ATTACHMENT A
COMPLAINT REPORT/RESOLUTION FORM

PROJECT NAME: AFC Number:
COMPLAINT LOG NUMBER ________________________ Complainant's name and address: Phone number:
Date and time complaint received: Indicate if by telephone or in writing (attach copy if written): Date of first occurrence:
Description of complaint (including dates, frequency, and duration):
Findings of investigation by plant personnel: Indicate if complaint relates to violation of a CEC requirement: Date complainant contacted to discuss findings:
Description of corrective measures taken or other complaint resolution: Indicate if complainant agrees with proposed resolution: If not, explain: Other relevant information:
If corrective action necessary, date completed: _________ Date first letter sent to complainant: _______ (copy attached) Date final letter sent to complainant: _______ (copy attached)
This information is certified to be correct. Plant Manager's Signature: ______________ Date:

(Attach additional pages and supporting documentation, as required.)

PREPARATION TEAM

PALMDALE HYBRID POWER PROJECT
VOLUME 1
PREPARATION TEAM

Introduction .... Felicia Miller

Hazardous Materials Management ....Alvin J. Greenberg, Ph.D. and Rick Tyler

Noise and Vibration..Steve Baker

Public Health ....Alvin J. Greenberg, Ph.D.

Socioeconomic Resources..Kristin Ford

Transmission Line Safety and Nuisance .... Obed Odoemelam, Ph.D.

Waste Management ....Suzanne Phinney, D.Env.

Worker Safety and Fire Protection ....Alvin J. Greenberg, Ph.D. and Rick Tyler

Facility Design...Erin Bright

Geology and Paleontology ....Dal Hunter, PH.D., C.G.E.

Power Plant Efficiency...Shahab Khoshmashrab

Power Plant Reliability...Shahab Khoshmashrab

Transmission System Engineering....................................Laiping Ng and Mark Hesters

Alternatives ....Hedy Born Koczwara

General Conditions...Chris Davis

Project Assistant ....Hilarie Anderson

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 *PALMDALE HYBRID POWER PROJECT*

Docket No. 08-AFC-9

PROOF OF SERVICE

(Revised 10/01/2009)

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DECLARATION OF SERVICE

I, Hilarie Anderson, declare that on, December 23, 2009, I served and filed copies of the attached Preliminary Staff Assessment , Volume 1. 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/palmdale/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:

(C*heck all that Apply*)

For service to all other parties:

_✔_sent electronically to all email addresses on the Proof of Service list;

_✔_by personal delivery or by depositing in the United States mail at Sacramento, California with first-class postage thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses **NOT** marked "email preferred."

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. 08-AFC-9
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct.

Original Signature in Dockets
Hilarie Anderson

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