Final Staff Assessment

AVENAL ENERGY

Application For Certification (08-AFC-1)
Kings County

CALIFORNIA
ENERGY
COMMISSION

STAFF REPORT

JUNE 2009
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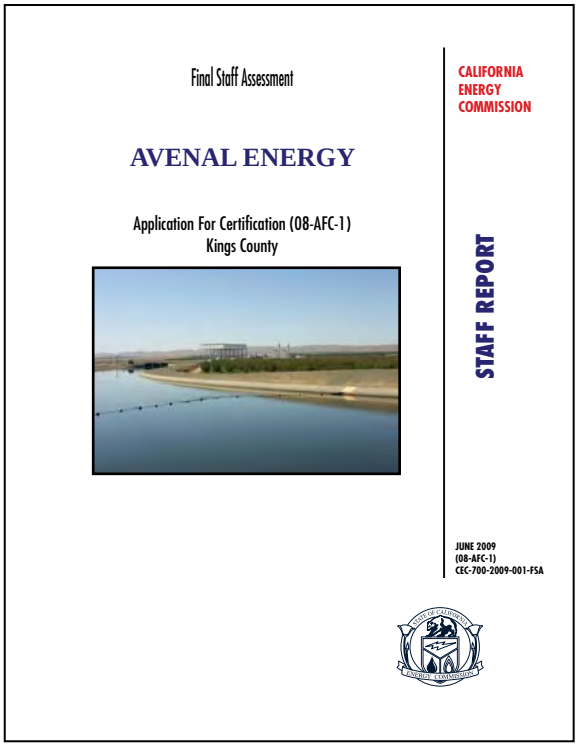

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(08-AFC-1)
FINAL STAFF ASSESSMENT

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INTRODUCTION

This Final Staff Assessment (FSA) contains the California Energy Commission (Energy Commission) staff's evaluation of Avenal Power Center LLC's (the Applicant) Application for Certification (AFC) (08-AFC-1) for the Avenal Energy project (AE).

The proposed AE electric generating plant and related facilities are under the Energy Commission's jurisdiction and cannot be constructed or operated without the Energy Commission's certification. This FSA examines engineering, environmental, public health and safety aspects of the AE project, based on the information provided by the applicant and other sources available at the time the FSA was prepared. The FSA contains analyses similar to those normally contained in an Environmental Impact Report required by the California Environmental Quality Act (CEQA). When issuing a license, the Energy Commission is the lead state agency under CEQA, and its process is functionally equivalent to the preparation of an EIR.

The Energy Commission staff has the responsibility to complete an independent assessment of the project's engineering design and its potential effects on the environment, the public's health and safety, and whether the project conforms to all applicable laws, ordinances, regulations and standards (LORS). The staff also recommends measures to mitigate potential significant adverse environmental effects and conditions of certification for construction, operation and eventual closure of the project, if approved by the Energy Commission.

This FSA is not the decision document for these proceedings nor does it contain findings of the Energy Commission related to environmental impacts or the project's compliance with local/state/federal legal requirements. The FSA serves as staff's testimony in evidentiary hearings to be held by the Committee of two Commissioners who are hearing this case. After evidentiary hearings, the Committee will consider the recommendations presented by staff, the applicant, all parties, government agencies, and the public prior to proposing its decision. The full Energy Commission will make the final decision, including findings, after publication of the Presiding Member's Proposed Decision.

PROJECT LOCATION AND DESCRIPTION

The proposed Avenal Energy project would be built on approximately 34 acres of a 148-acre industrial zoned parcel. The approximate 34-acre project would include the power plant footprint and ancillary infrastructure connections of 1.2 acres of permanent disturbance due to tower footing for an electrical transmission line, and approximately 1.3 acres for an access road. The construction phase would require a 24 acre temporary laydown area also within the 148 acre parcel. The geographical location of the site is (Section 19, Township 21 south, and Range 18 east of the Mt. Diablo Base and Meridian, Assessor's Parcel No. 36-170-035).

The proposed AE project would be a nominal 600 megawatt, natural gas-fired, combined-cycle electrical generating power plant arranged with two combustion turbine generators /heat recovery steam generators to one steam turbine generator (two-on-one configuration). Primary equipment for the generating facility would include 2 natural gas-fired General Electric model PG7241 combustion turbine generators, equipped with model 7FA dry, low nitrogen oxide (NOx) combustors, inlet-air mechanical chillers to enhance output at higher ambient temperatures and selective catalytic reduction in the heat recovery steam generator to control NOx stack emissions. Oxidation catalysts would also be located within each heat recovery steam generator to reduce carbon monoxide (CO) and volatile organic compounds (VOC) in the exhaust gases exiting the stack.

AE infrastructure connections would include the following; new underground raw, recycled, potable and waste water pipelines connecting to the City of Avenal water treatment plant. The treatment plant receives raw water from the U. S. Bureau of Reclamation's San Luis Canal, City of Avenal turnout (located adjacent to the site) and from additional underground pipes from existing agricultural wells that would be used as a backup water supply. A plant access road and turn around will connect the project site to the Avenal Cutoff Road (a county road). A 20-inch, 2.5–mile long, underground gas pipeline tie-in to the PG&E Kettleman natural gas compressor station; and a 6.4-mile, single-circuit, 230-kV transmission line to connect the onsite switchyard to the existing PG&E Gates Substation complete the major project-related interconnections.

PUBLIC AND AGENCY COORDINATION

AGENCIES AND LIBRARIES

Beginning with the AFC on February 28, 2008, the Energy Commission staff provided the AE published documents to a comprehensive list of libraries, agencies, organizations, and to property owners affected by the project. The Commission staff's notification letters request public and agency review, comment, and continued participation in the Energy Commission's certification process.

OUTREACH EFFORTS

The Energy Commission's public outreach program is facilitated by the Public Adviser's Office (PAO). This is an ongoing process that to date has involved the following efforts: Energy Commission regulations require staff to notice, at a minimum, property owners within 1,000 feet of a project and 500 feet of a linear facility (such as transmission lines, gas lines and water lines). The Commission staff's FSA notification letters provide project website information, staff contact information, and a means to access, review or acquire published documents; the letters request public and agency review, comment, and continued participation in the Energy Commission's certification process through oral and written comment and participation in events including workshops and hearings. In addition, a majority of residents and property owners within a six-mile radius of the proposed project site were also notified of publication and noticed events such as workshops and hearings.

The PAO's public outreach is an integral part of the Energy Commission's AFC review process. The PAO conducted its own expanded outreach efforts to identify and locate local elected and certain appointed officials, as well as "sensitive receptors" (including schools, community, cultural and health facilities, daycare and senior-care centers, local environmental and ethnic organizations) within a six-mile radius of the proposed project. The PAO notified--by letter and attached notice--all elected local (that is, county and city) officials, as well as the sensitive receptors identified within six miles of the proposed site.

The February 18, 2009 PSA Workshop notice was also sent to a comprehensive list of libraries, agencies, organizations, and property owners within 1,000 feet of the proposed project and 500 feet of the linear facilities. The Commission staff's notification letter requested public and agency review, comment, and continued participation in the Energy Commission's certification process.

In addition, notice was published in the Community News Section of the May 14, 2008 issue of the Avenal Chimes, a weekly newspaper with the highest circulation in the Avenal area. Furthermore, the Native American Heritage Commission, the Sierra Club and Audubon Society, as well as the Kings County Economic Development Corporation will be given notice of the Evidentiary Hearing event. The PAO will also arrange for the distribution (by the City of Avenal) of 1,200 copies of the bilingual notice to various local facilities frequented by the public, such as City Hall, the community/recreation center, grocery stores and gas stations within the Avenal area to further publicize the upcoming events. The Evidentiary Hearing notices will also be sent to a comprehensive list of libraries, agencies, organizations, and property owners within 1,000 feet of the proposed project and 500 feet of the linear facilities and to members of the public who have requested to be notified of such events.

ENVIRONMENTAL JUSTICE

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

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

California Statute, Section 65040.12 (c) of the Government Code, defines "environmental justice" to mean "fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement

of environmental laws, regulations, and policies." In light of the progress made by federal environmental agencies on environmental justice, the Energy Commission has examined federal guidelines pursuant to its desire to follow environmental justice principles for the environmental review of this project.

The steps recommended by these guidance documents to assure compliance with the Executive Order are: (1) outreach and involvement; (2) a screening-level analysis to determine the existence of a minority or low-income population; and (3) if warranted, a detailed examination of the distribution of impacts on segments of the population. Though the Federal Executive Order and guidance are not binding on the Energy Commission, staff finds these recommendations helpful for implementing this environmental justice analysis. Staff has followed each of the above steps for the following 11 sections in the PSA: Air Quality, Hazardous Materials Management, Land Use, Noise, Public Health, Socioeconomics, Soils and Water Resources, Traffic and Transportation, Transmission Line Safety and Nuisance, Visual Resources, and Waste Management.

The purpose of the environmental justice screening analysis is to determine whether a low-income and/or minority population exists within the potentially affected area of the proposed site. Staff conducted the screening analysis in accordance with the "Final Guidance for Incorporating Environmental Justice Concerns in U.S. EPA's NEPA Compliance Analysis" (Guidance Document) dated April 1998. People of color populations, as defined by this Guidance Document, are identified where either:

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

Staff reviewed Census 2000 information showing the minority population by census block (the smallest geographic unit for which the Census Bureau collects and tabulates data) as 92.44 percent within a 6-mile radius of the proposed Avenal Energy project site (see SOCIOECONOMICS Figure 1).

Census 2000 by census block group (a combination of census blocks and subdivision of a census tract) information shows that the below-poverty population is 30.89 percent within the 6-mile radius. Several census block groups extend beyond the 6-mile radius and therefore may affect this population statistic. Poverty status excludes institutionalized people, people in military quarters, people in college dormitories, and unrelated individuals under 15 years old.

Staff has determined that the project would not cause significant adverse direct, indirect, or cumulative socioeconomic impacts in the areas noted above and therefore staff concludes that there are no Environmental Justice Impacts for this project.

STAFF'S ASSESSMENT

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

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

Staff has prepared its final analyses and has made recommendations for all technical areas.

On May 21, 2009 the applicant submitted a document indicating that the PG&E Gates Substation would need to be expanded to accommodate interconnection of Avenal Energy. Pursuant to CEQA, this substation expansion would be considered part of the whole of the Avenal Energy project and its impacts analyzed accordingly. Instead of delaying release of the FSA to incorporate the necessary analysis, staff will be filing a supplemental analysis once the information needed to analyze the impacts of the substation expansion is obtained.

SUMMARY OF PROJECT RELATED IMPACTS

Staff believes that with implementation of the applicant's and the staff's proposed mitigation measures and the staff's proposed conditions of certification, the AE project would comply with all applicable laws, ordinances, regulations, and standards (LORS), and that significant adverse direct, indirect, and cumulative impacts would not occur. For a more detailed review of potential impacts, see staff's technical analyses in the FSA. The status of each technical area is summarized in the table below.

Technical Area	Complies with LORS	Impacts Mitigated
Air Quality	Yes	Yes
Biological Resources	Yes	Yes
Cultural Resources	Yes	Yes
Efficiency	Yes	Yes
Facility Design	Yes	Yes
Geology & Paleontology	Yes	Yes
Hazardous Materials	Yes	Yes
Land Use	Yes	Yes
Noise	Yes	Yes
Public Health	Yes	Yes
Reliability	Yes	Yes
Socioeconomic Resources	Yes	Yes
Soil & Water Resources	Yes	Yes
Traffic & Transportation	Yes	Yes
Transmission Line Safety/Nuisance	Yes	Yes
Transmission System Engineering	Yes	Yes
Visual Resources	Yes	Yes
Waste Management	Yes	Yes
Worker Safety and Fire Protection	Yes	Yes

ALTERNATIVES SUMMARY

The “Guidelines for Implementation of the California Environmental Quality Act,” Title 14, California Code of Regulation, Section 15126.6(a), provides direction by requiring an evaluation of the comparative merits of “a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project.” In addition, the analysis must address the “no project” alternative (Cal. Code Regs., tit. 14, §15126.6(e)).

Staff’s analysis included examining alternative energy producing technologies, as well as alternative project sites. Lacking a significant environmental impact associated with the proposed project, these alternatives would not result in an environmentally superior project. Staff also believes that the “No Project Alternative” is not superior to the proposed project. The No Project scenario would not address the potential need for natural gas fired combined-cycle facilities to replace aging and once through cooled facilities, and help integrate renewable energy.

CONCLUSIONS AND RECOMMENDATIONS

The FSA is a document of the Energy Commission staff, therefore, by its very nature, the conclusions and recommendations presented are considered staff's analysis of the project.

Each technical area assessment in the FSA includes a discussion of the project and the existing environmental setting; the project's conformance with laws, ordinances, regulations and standards (LORS); whether the facility can be constructed and operated safely and reliably; project specific direct and cumulative impacts; the environmental consequences of the project using the proposed mitigation measures; conclusions and recommendations; and any proposed conditions of certification under which the project should be constructed and operated, should it be approved.

In summary this FSA finds that:

- As shown in the above table, the project is in conformance with all LORS.
- Although the proposed project area is in a predominately agricultural region, and the project site is currently being farmed in irrigated row crops, the project site has nevertheless been rezoned for industrial uses. All biological, soil, water, and agricultural impacts have been fully mitigated to a less than significant level, not only for the project site but also for the construction laydown areas, and infrastructural connections. Implementation of the Energy Commission staff's proposed conditions of certification is necessary to avoid or minimize potential indirect impacts to biological resources, soil and water impacts and agricultural impacts. The project would not result in take of listed species and no wetlands or other waters of the United States will be directly impacted by the project. The applicant has also agreed to fund, separate from this CEQA process, an additional project mitigation program that will be paid to and administered by the Kern Water Bank.
- The construction and operation of the project would comply with all federal, state, and local laws, ordinances, regulations, and standards relating to biological resources if staff's conditions of certification are adopted and implemented.
- The proposed AE project, with the effective implementation of the recommended condition's of certification, would be consistent with the applicable laws, ordinances, regulations, and standards pertaining to local land use planning and would not generate a significant impact under the California Environmental Quality Act guidelines.
- The San Joaquin County Air Pollution Control District has determined that the project complies with the appropriate rules and requirements of the District and would not contribute to the degradation of the air quality. The applicant has agreed to fund and supply emission reduction credits in sufficient quantity to fully offset all nonattainment pollutants and their precursors at a minimum ratio of 1:1. Staff evaluated the global climate change and greenhouse gas (GHG) emissions from the project. AE would be an efficient, new, dispatchable natural gas-fired combined cycle power plant that would provide a net reduction in GHG emissions across the

electricity system while generating electricity for California consumers. Its addition to the system would displace less efficient plants and facilitate the integration of renewable resources.

- Staff recommends reporting of the GHG emissions as the California Air Resources Board develops greenhouse gas regulations and/or trading markets. The project may be subject to additional reporting requirements and GHG reductions as these regulations become more fully developed and implemented.
- The funding and implementation of the city of Avenal waste water treatment plant recycled water project would eliminate need for potable water generally used in the past for power plant operations. Implementation of this water conservation project is consistent with the intent of Article X of the California State Constitution and the Warren-Alquist Act. The use of a municipal water supply for this project would comply with state water policy found in the State Water Resources Control Board (SWRCB) Resolution 75-58, and the Energy Commission's 2003 Integrated Energy Policy Report (IEPR).
- Transmission system impacts and appropriate mitigation have been identified at this point and are acceptable and would comply with all applicable laws, ordinances, regulations, and standards. The project interconnection to the grid would not result in downstream transmission impacts as a result of the Special Protection Schemes proposed by the applicant. However, staff is awaiting the final System Impact Study from the California ISO and PG&E regarding the final approval and schedule for expansion of the Gates Substation to accommodate this and other area projects.
- With the proposed conditions of certification included in the various technical areas, the project's construction and operation impacts can be mitigated to a level less than significant.

INTRODUCTION

Joseph Douglas

PURPOSE OF THIS REPORT

The Final Staff Assessment (FSA) presents the California Energy Commission staff's independent analysis of the Avenal Energy project (AE) Application for Certification (AFC). This FSA is a staff document that presents an initial comprehensive, concise, objective analysis of the project proposed in the AE project AFC. It is neither a Committee document, nor a draft decision. The FSA 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).
- Environmental consequences of the project, including potential public health and safety impacts.
- An analysis of the project's incremental impacts, as viewed cumulatively in connection with the effects of other existing and known planned developments.
- Mitigation measures that may avoid, lessen, or eliminate potential impacts, as proposed by the applicant, Energy Commission staff, interested agencies, and intervenors.
- Proposed conditions under which the project should be constructed and operated, if it is certified.
- Project alternatives.
- Project closure requirements.

The analyses contained in this FSA 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 identify potential impacts and conflicts with applicable laws, ordinances, regulations, and standards, and include discussions of proposed conditions of certification to address these issues. 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 method by which the Energy Commission Compliance Unit can ensure post-certification compliance with the adopted requirements.

The Energy Commission staff's analyses were prepared in accordance with Public Resources Code, Section 25500 et seq.; Title 20, California Code of Regulations, Section 1701 et seq.; and Public Resources Code, Section 21000 et seq. (California Environmental Quality Act [CEQA]).

ORGANIZATION OF THE STAFF ASSESSMENT

The FSA is a comprehensive document that contains the final staff assessment of the proposed AE project. Sections incorporated into this document include an Executive Summary, Introduction, Project Description, Project Alternatives, and analyses of the 19 environmental, engineering, and public health and safety elements of the proposed project. Each technical area is addressed in a separate chapter and these include air quality, biological resources, cultural resources, hazardous material management, land use, noise and vibration, public health, socioeconomics, soil and water resources, traffic and transportation, transmission line safety and nuisance, visual resources, waste management, worker safety and fire protection, facility design, geological and paleontological resources, power plant efficiency, power plant reliability, and transmission system engineering. The document also includes a discussion of facility closure and project construction and operation compliance monitoring plans, along with a list of staff that assisted in the preparation of this document.

Each of the 20 technical area assessments includes a discussion of:

- Laws, ordinances, regulations, and standards (LORS);
- Regional and site-specific setting;
- Project-specific and cumulative impacts;
- Proposed mitigation measures;
- Closure requirements;
- 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. Energy Commission certification is in lieu of any permit required by state, regional, or local agencies, and those required by federal agencies, to the extent permitted by federal law (Pub. Resources Code, §25500).

The Energy Commission must review a power plant AFC to assess potential project-related environmental and public health and safety impacts, measures proposed to avoid or 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 identifies is accurate and complete and that proposed mitigation measures are adequate, or if additional or more effective mitigation measures are necessary and feasible (Cal. Code Regs., tit. 20, §§ 1742 and 1742.5(a-e)).

Because the Energy Commission's site certified regulatory program has been certified by the California Resources Agency (Pub. Resources Code, §21080.5 and Cal. Code

Regs., tit. 14, §15251 (k)), the Energy Commission is considered the lead agency under the California Environmental Quality Act (CEQA) and staff conducts its environmental analysis consistent with the requirements of CEQA. The FSA serves as the functional equivalent to an EIR and project review is subject to all other applicable portions of CEQA. The Energy Commission is the Lead Agency under CEQA, but through its certified regulatory program produces several environmental and decision documents rather than an Environmental Impact Report.

In addition to the environmental project review, staff must assess the completeness and adequacy of the health and safety standards and the reliability of the proposed power plant operations (Cal. Code Regs., tit. 20, § 1743(b)). Staff is also required to coordinate with other agencies to ensure compliance with applicable LORS (Cal. Code Regs., tit. 20, § 1744(b)). Staff's independent review of the AE AFC is presented in this report (Cal. Code Regs., tit. 20 , §1742.5).

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

Staff uses the PSA to resolve issues among the parties and to narrow the scope of adjudicated issues in the evidentiary hearings. During the period between publishing the PSA and preparation of the Final Staff Assessment (FSA), staff will conduct one or more public workshops to discuss their findings, proposed mitigation, and proposed compliance monitoring requirements. Based on input received at these workshops and written comments, staff will refine their analysis, make necessary changes, and finalize conditions of certification to address areas where staff has reached agreement with the parties. This refined analysis, along with responses to written comments on the PSA, is published in the FSA. The FSA serves as staff's testimony for the evidentiary record.

The staff assessment is only one piece of evidence that will be considered by the Committee (two Commissioners who have been assigned to this proceeding) in reaching a decision on whether to recommend that the Energy Commission approve or deny 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 provides a forum for the Committee to receive comments from the public, governmental agencies, and other interested parties.

Following the hearings, the Committee presents its recommendation for project approval or denial to the full Energy Commission in the Presiding Members' Proposed Decision (PMPD). Once the PMPD is prepared, it is published and circulated for public review and comment. At the conclusion of the comment period, the Committee will review the comments received and may prepare a revised PMPD. A revised PMPD will also be circulated for a comment period to be determined by the Committee. At the close of the comment period for the PMPD or revised PMPD, the final document is submitted to the full Energy Commission for a decision. Parties have 30 days from the date of the Energy Commission decision to request reconsideration.

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 FSA.

OUTREACH

The Energy Commission's public outreach program is primarily facilitated by the Public Adviser's Office (PAO). This is an ongoing process that to date has involved the following efforts:

LIBRARIES

Beginning with the AFC on February 28, 2008, the Energy Commission staff provided the AE published documents to a comprehensive list of libraries, agencies, organizations, and property owners within 1,000 feet of the proposed project and 500 feet of the linear facilities. The Commission staff's notification letter requested public and agency review, comment, and continued participation in the Energy Commission's certification process.

OUTREACH EFFORTS

Energy Commission regulations require staff to notice, at a minimum, property owners within 1,000 feet of a project and 500 feet of a linear facility (such as transmission lines, gas lines and water lines). The Commission staff's notification letter will again request public and agency review, comment, and continued participation in the Energy Commission's certification process. In addition, residents and property owners within a six-mile radius of the proposed project site were also notified of publication and noticed events such as workshops and hearings.

The PAO's public outreach is an integral part of the Energy Commission's AFC review process. The PAO reviewed information provided by the applicant and also conducted their own outreach efforts to identify and locate local elected and certain appointed officials, as well as "sensitive receptors" (including schools, community, cultural and health facilities, daycare and senior-care centers, as well as environmental and ethnic organizations) within a six-mile radius of the proposed site for the project. The PAO notified--by letter and attached notice--all elected local (that is, county and city) officials, as well as the sensitive receptors identified within six miles of the proposed site.

The February 18, 2009 PSA Workshop notice was also sent to a comprehensive list of libraries, agencies, organizations, and property owners within 1,000 feet of the proposed project and 500 feet of the linear facilities. The Commission staff's notification letter requested public and agency review, comment, and continued participation in the Energy Commission's certification process.

In addition, notice was published in the Community News Section of the May 14, 2008 issue of the Avenal Chimes, a weekly newspaper with the highest circulation in the Avenal area. Furthermore, the Native American Heritage Commission, the Sierra Club and Audubon Society, as well as the Kings County Economic Development Corporation will be given notice of the Evidentiary Hearing event which is expected to be held on July 7, 2009. The PAO will also arrange for the distribution (by the City of Avenal) of 1,200 copies of the bilingual notice to various local facilities frequented by the public, such as City Hall, the community/recreation center, grocery stores and gas stations within the Avenal area to further publicize the upcoming events. The Evidentiary Hearing notices will be sent to a comprehensive list of libraries, agencies, organizations, and property owners within 1,000 feet of the proposed project and 500 feet of the linear facilities.

ENVIRONMENTAL JUSTICE

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

For all siting cases, Energy Commission staff conducts an environmental justice screening analysis in accordance with the “Final Guidance for Incorporating Environmental Justice Concerns in U.S. EPA’s National Environmental Policy Act (NEPA) Compliance Analysis” dated April 1998. The purpose of the screening analysis is to determine whether a minority or low-income population exists within the potentially affected area of the proposed site.

California Statute, Section 65040.12 (c) of the Government Code, defines “environmental justice” to mean “fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.” In light of the progress made by federal environmental agencies on environmental justice, the Energy Commission has examined federal guidelines pursuant to its desire to follow environmental justice principles for the environmental review of this project. Staff’s specific activities, with respect to environmental justice for the AE project, are discussed in the **EXECUTIVE SUMMARY** section of this report.

PROJECT DESCRIPTION

Joseph Douglas

INTRODUCTION

Avenal Power Center, LLC, wholly-owned subsidiary of Macquarie Energy North America Trading Inc, filed an Application for Certification with the California Energy Commission on February 21, 2008, to construct and operate a combined-cycle dry cooling power plant. The proposed Avenal Energy project would be a dry cooled, nominally rated, 600 megawatt electrical generating facility that would be constructed on approximately 34 acres of land including project linear elements. It would be located within the city of Avenal in Kings County, California. The project would consist of two natural gas-fired General Electric 7FA gas turbines with heat recovery steam generators and one General Electric steam turbine.

PROJECT PURPOSE AND OBJECTIVES

As described in its Application for Certification (AFC), Avenal Power Center, LLC's (Avenal Power) objectives are to design, build, own, and operate the Avenal Energy (AE) project in order to meet the need for additional electric generation capacity, energy, and ancillary services in both Northern and Southern California.

The AFC identifies several basic objectives for the development of the proposed AE project including:

- Construct and operate a nominal 600 megawatt (MW), natural gas-fired, combined-cycle generating facility to serve electricity demand in California;
- Use a location that has existing nearby infrastructure (transmission lines and water and gas supplies) with available capacity to support the project; and
- Develop a site consistent with community planning and existing zoning, at a location that is supported by the local community.

If permitted, construction of the power plant would start in April of 2010 with commercial operation planned by June of 2012. Construction is expected to cost approximately $530 million.

PROJECT LOCATION AND DESCRIPTION

REGIONAL SETTING

The proposed site is located in a predominantly agricultural region of the southwestern San Joaquin Valley in western Kings County, just south of the Fresno County line, and two miles east of Interstate 5. While the site is within the city limits of Avenal, it is separated from the business, commercial development, and residential districts of the city by the Kettleman Hills and approximately six miles of rolling, open agricultural lands as shown in **Figure 1**

SITE DESCRIPTION

The proposed AE project would be built on approximately 34-acres of a 148-acre industrial-zoned parcel. The approximate 34-acre project would include the power plant footprint and ancillary infrastructure including 1.2 acres of permanent disturbance resulting from tower footing for an electrical transmission line and approximately 1.3 acres to be used for an access road. The construction phase would require a 24-acre temporary laydown area also within the 148-acre parcel. The geographical location of the site is (Section 19, Township 21 south, and Range 18 east of the Mt. Diablo Base and Meridian, Assessor's Parcel No. 36-170-035).

PROJECT ELEMENTS

The primary features of the proposed AE project include the following a 34 acre security fenced area that includes the plant footprint, switchyard and storm water detention basin, with the exception of linear element easements for natural gas, electric transmission and water.

Features Within the 34 Acre Fenced Area Are Discussed in Greater Detail Below

- Two combustion turbine generators /heat recovery steam generators to one steam turbine generator (two-on-one configuration);
- Natural gas-fired General Electric 7FA model PG7241 combustion turbine generators, equipped with dry low-nitrogen oxide (NOx) combustors and inlet-air mechanical chillers;
- Selective catalytic reduction and oxidation catalysts in the heat recovery steam generator; and
- Oxidation catalysts located within each heat recovery steam generator (see **Figure 2**).

Elements That Will Be Located Outside the Fenced Area Include

- Backup water supply from new underground raw, recycled, potable and waste water pipelines connecting to the city of Avenal water treatment plant and additional underground pipes from existing agricultural wells;
- A plant access road and turn around to connect to the Avenal Cutoff Road (a county road);
- A 20-inch, 2.5-mile long underground gas pipeline tie-in to the PG&E Kettleman Compressor Station (see **Figure 3**); and
- A 6.4-mile, single-circuit, 230-kV transmission line connecting the onsite switchyard to the existing PG&E Gates Substation (see **Figure 4**).

Zoning/General Plan: The proposed AE project site is zoned M-2 Industrial. City of Avenal zoning ordinance section 9.31 specifies that an electric power generating plant is an allowable use in the M-2 zone. The northernmost backup water supply well and a

portion of the transmission line are located in Fresno County on land designated for agricultural use. However, the county does permit transmission lines on agricultural land (see **Figure 4**).

Transmission Lines: Electricity generated by the proposed project would be delivered by 6.4 miles of new, single circuit, 230 kV transmission line extending from the onsite switchyard to the existing PG&E Gates Substation. The new line would be located within a 120-foot-wide right-of-way and follow the route shown in **Figure 4**.

Roads: Access to the proposed AE project would be provided by a road and turn-around on the project site that would connect to the Avenal Cutoff Road.

Gas Line: Natural gas would be conveyed by a new 20-inch diameter, 2.5-mile long underground pipeline interconnection from existing lines at the PG&E Kettleman compressor station, located approximately 7,000 feet southwest of the proposed AE site. For the proposed route of the new interconnecting line, refer to **Figure 1.5-3A of the AFC.**

Water Supply and Turbine Cooling: The proposed nominally rated 600 MW AE project turbines will require an estimated 20 acre-feet of water annually, 104 acre feet of water in a maximum use year. To minimize water consumption, the project will incorporate dry cooling, zero liquid discharge (ZLD) resulting in no wastewater disposal needs, dry low-NOx reduction and closed loop inlet air chillers to minimize water use.

The primary water source identified in the AFC is the city of Avenal turnout on the California Department of Water Resources' San Luis Canal (located adjacent to the site). The city of Avenal has provided a will-serve letter for the use of the San Luis Canal water. An onsite Service Water/Firewater Storage Tank, providing up to 750,000 gallons of water storage, would be provided on site in the event that water sources are temporarily interrupted or water quality is temporarily degraded. Domestic water, supplied by the city of Avenal, would be treated onsite and used for toilets, showers, emergency eyewash and shower stations. Bottled water would be used for drinking. Additional backup water supplies would come from nearby agricultural wells, requiring several new pipelines.

EMISSION CONTROLS

Nitrous Oxides (NOx) Controls

Each combustion turbine will use dry low-NOx (DLN) combustors to maintain low levels of NOx formation while ensuring complete combustion of the fuel. Exhaust from each turbine will enter the HRSG equipped with duct burners and then enter a Selective Catalytic Reduction (SCR) system before being released into the atmosphere. SCR refers to a process that chemically reduces NOx to nitrogen (N_2) and water vapor (H_2O) by injecting ammonia (NH_3) into the flue gas stream in the presence of a catalyst and excess oxygen. The process is termed selective because the ammonia preferentially reacts with NOx rather than oxygen. The catalyst material most commonly used is titanium dioxide, but materials such as vanadium pentoxide, zeolite, or noble metals are also used. Regardless of the type of catalyst used, efficient conversion of NOx to

nitrogen and water vapor requires the uniform mixing of ammonia into the exhaust gas stream and a catalyst surface large enough to ensure sufficient time for the reaction to take place.

Volatile Organic Compounds and Carbon Monoxide (VOC and CO) Controls

Emissions of CO and unburned hydrocarbons, including VOC, will be controlled with an oxidation catalyst installed in conjunction with the SCR catalyst. An oxidation catalyst system chemically reacts with organic compounds and CO with excess oxygen to form carbon dioxide (CO_2) and water. Unlike the SCR system for reducing NOx, an oxidation catalyst does not require any additional chemicals.

Particulate Matter and Sulfur Oxide (PM10 and 2.5, and SOx) Controls

The exclusive use of pipeline-quality natural gas, a clean-burning fuel that contains very little sulfur or noncombustible solid residue, will limit the formation of SOx and particulate matter. Natural gas does contain small amounts of a sulfur-based scenting compound known as mercaptan, which results in some SOx emissions when burned. However, in comparison with other fossil fuels used in thermal power plants, SOx emissions from natural gas are very low. Particulate matter emissions from natural gas combustion are also very low compared with other fossil fuels. The sulfur content of pipeline-quality natural gas is normally less than 1 grain of sulfur per 100 cubic feet at standard temperature and pressure (gr/100 scf).

Wastewater Discharge: A drainage system will route water from contained or curbed power block areas to a zero liquid discharge facility. At the zero liquid discharge facility, brine slurry would be separated and reduced to dry solids (salt cake) for disposal at a local Class III (non-hazardous) landfill. Treated water would be recycled back to the power production cycle. A sanitary system would collect wastewater from sinks, toilets, and other sanitary facilities and discharge it to a permitted on-site septic system.

PROJECT CONSTRUCTION AND OPERATION

If approved by the Energy Commission, Avenal Power proposes to initiate the construction of the AE project in April of 2010. Construction is expected to take approximately 27 months, with initial start-up scheduled for October 2011. Assuming there are no unanticipated delays, commercial operation would begin in June of 2012.

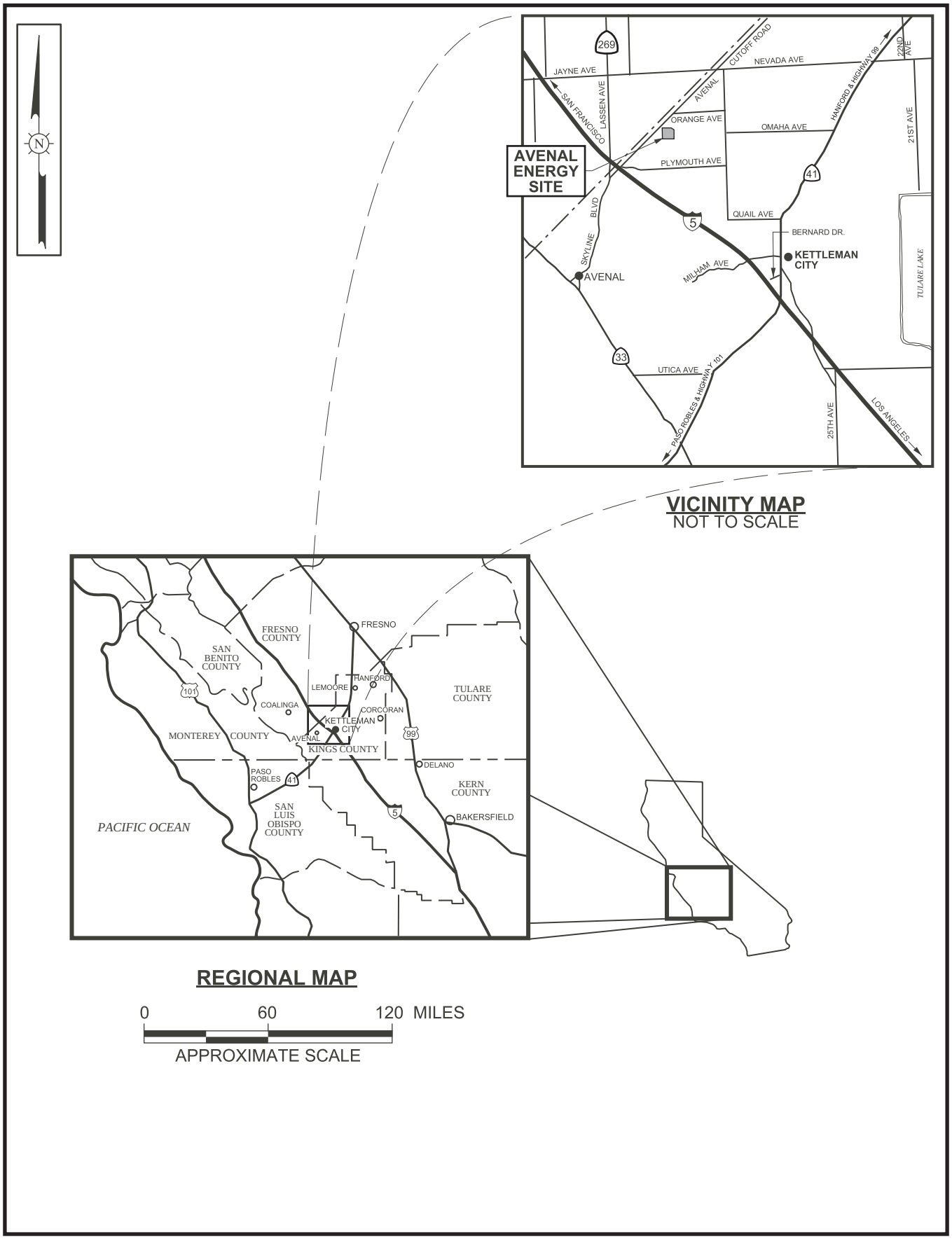
The construction schedule would consist of an 8-hour workday (Monday through Friday), with two shifts starting at 6:30 a.m. through 3:00 p.m. and 7:30 a.m. through 4:00 p.m. Additional hours may be necessary to make up schedule deficiencies or complete critical construction activities. During some construction periods and during the start-up phase, some activities would continue 24 hours a day, 7 days a week.

Avenal Power anticipates that AE will be operated up to 7 days per week, 24 hours a day, employing up to 25 full-time employees. Overall annual availability of the project is expected to be approximately 90% or greater. The project capacity factor would depend upon the demand for electricity and ancillary services.

FACILITY CLOSURE

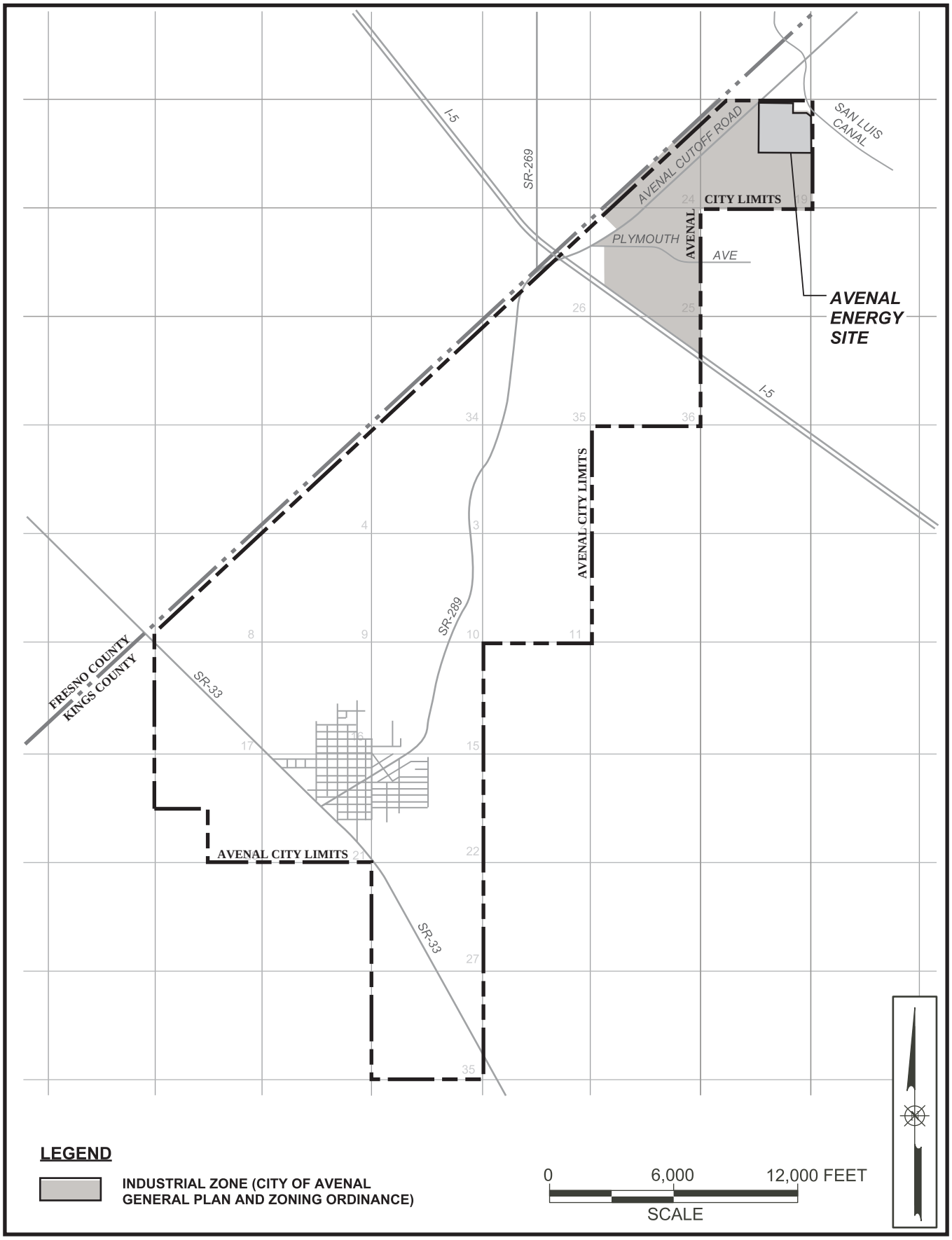
AE would be designed for a 30-year operating life. At some point in the future, the project would cease operation and shut down. At that time, it would be necessary to ensure that the closure occurs in a manner that protects public health and safety and the environment from adverse effects. Decommissioning activities would be designed to optimize the recycling of facility components. Unused chemicals would be returned to suppliers or sold to other uses. Equipment containing chemicals would be drained and shut down in a manner to assure public health and safety and protect the environment. Nonhazardous wastes would be collected and disposed of in licensed landfills or recycled at licensed waste collection facilities. Hazardous wastes would be disposed of according to applicable laws, ordinances, regulations, and standards. The site would be secured 24 hours per day during the decommissioning activities.

PROJECT DESCRIPTION - FIGURE 1
Avenal Energy - Regional Location



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2009
SOURCE: AFC Figure 1.5-1

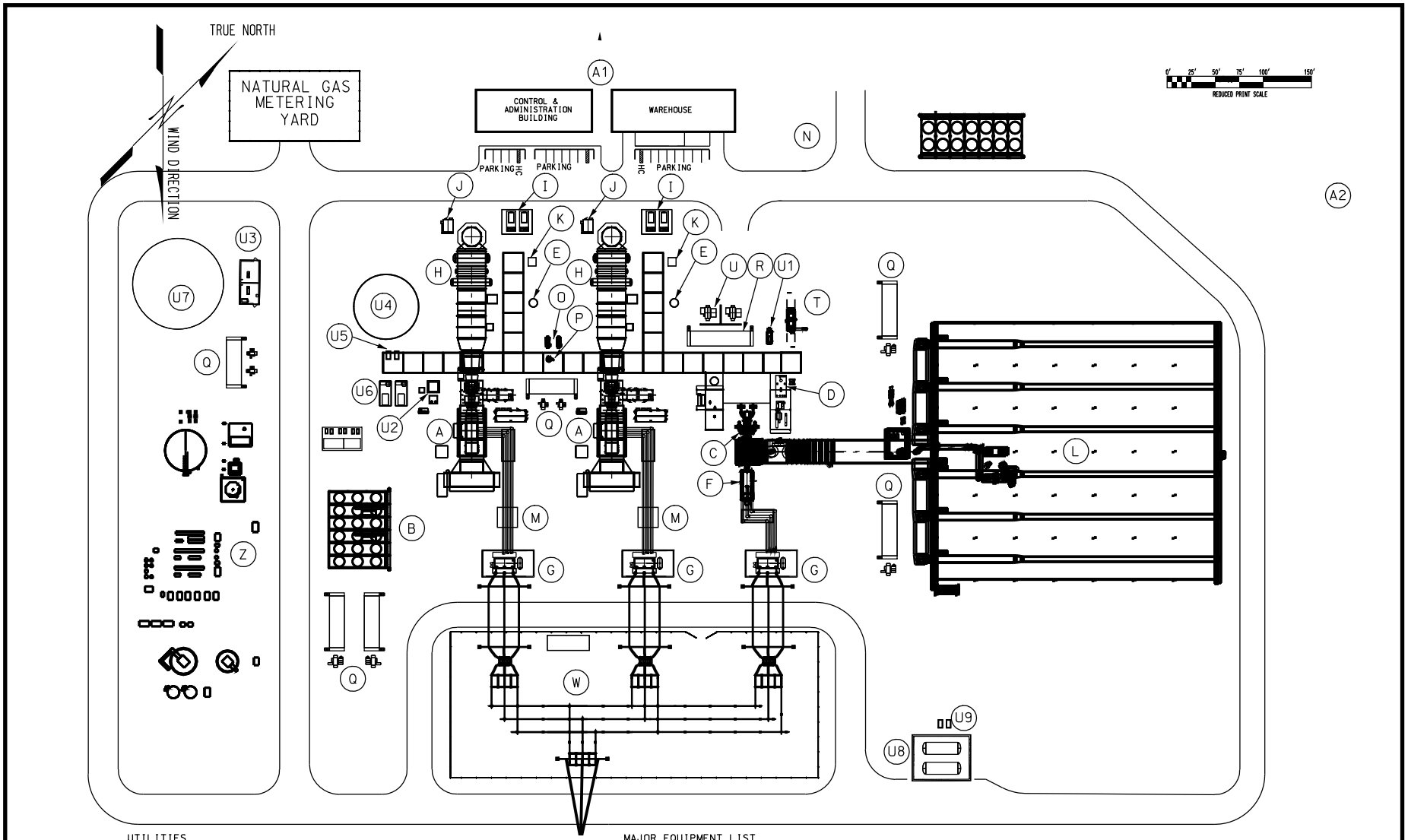
PROJECT DESCRIPTION - FIGURE 2
Avenal Energy - Site Location



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2009
SOURCE: AFC Figure 1.5-2

PROJECT DESCRIPTION - FIGURE 2A

Avenal Energy - Site Facilities



UTILITIES

U1 STANDBY DIESEL GENERATOR
U2 OIL/WATER SEPARATOR
U3 FIREWATER PUMP HOUSE
U4 DEMINERALIZED WATER STORAGE TANK
U5 DEMINERALIZED WATER PUMPS
U6 PLANT/INSTRUMENT AIR COMPRESSORS
U7 RAW WATER/FIREWATER STORAGE TANKS
U8 AMMONIA STORAGE TANKS
U9 AMMONIA TRANSFER PUMPS

A1 SEPTIC TANK & LEACH FIELD (IMMEDIATELY NW)
A2 STORM WATER EVAPORATION/PERCOLATION BA

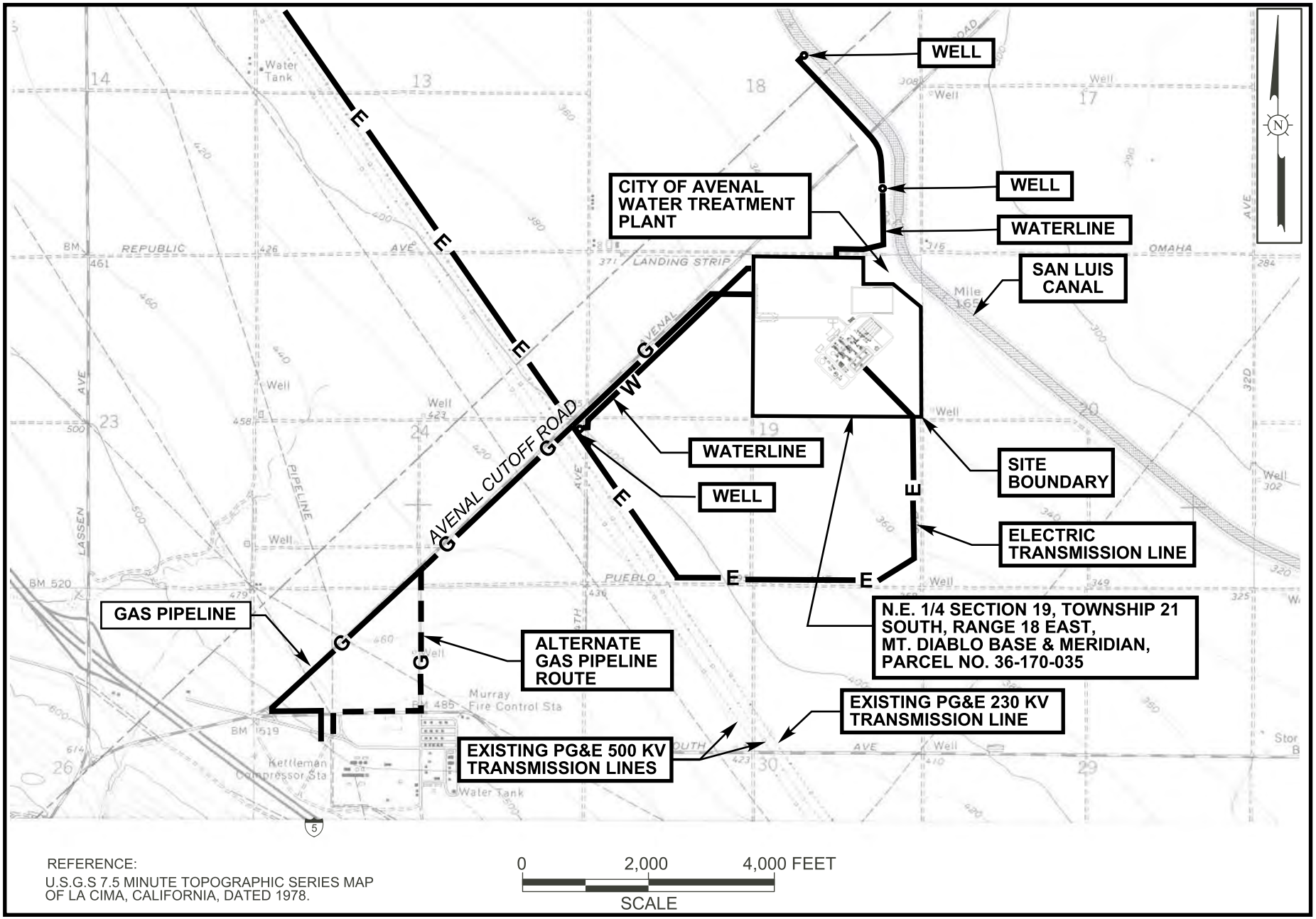
MAJOR EQUIPMENT LIST

A GAS TURBINE GENERATOR
B INLET AIR CHILLERS
C STEAM TURBINE
D STG LUBE OIL SKID
E HRSG BLOW DOWN DRUM
F STG GENERATOR
G MAIN TRANSFORMERS
H HEAT RECOVERY STEAM GENERATOR
I HP/IP BOILER FEED WATER PUMPS
J CONTINUOUS EMISSIONS MONITORING SYSTEM
K HRSG BLOWDOWN SUMP
L AIR COOLED CONDENSER
M GENERATOR BREAKERS
N CLOSED COOLING WATER AIR COOLER
O CIRCULATING COOLING WATER PUMPS
P CLOSED COOLING WATER EXPANSION TANK
Q POWER DISTRIBUTION CENTER (480 V)
R POWER DISTRIBUTION CENTER (4160 V)
S
T AUXILIARY BOILER
U UNIT AUXILIARY TRANSFORMER
V
W SWITCHYARD
X RAW WATER SOFTENER CLARIFIERS (RWSC)
Y RWSC FILTER PRESS
Z ZERO LIQUID DISCHARGE FACILITY (ZLDF)

SOURCE: AFC Figure 2.2-3

PROJECT DESCRIPTION - FIGURE 3

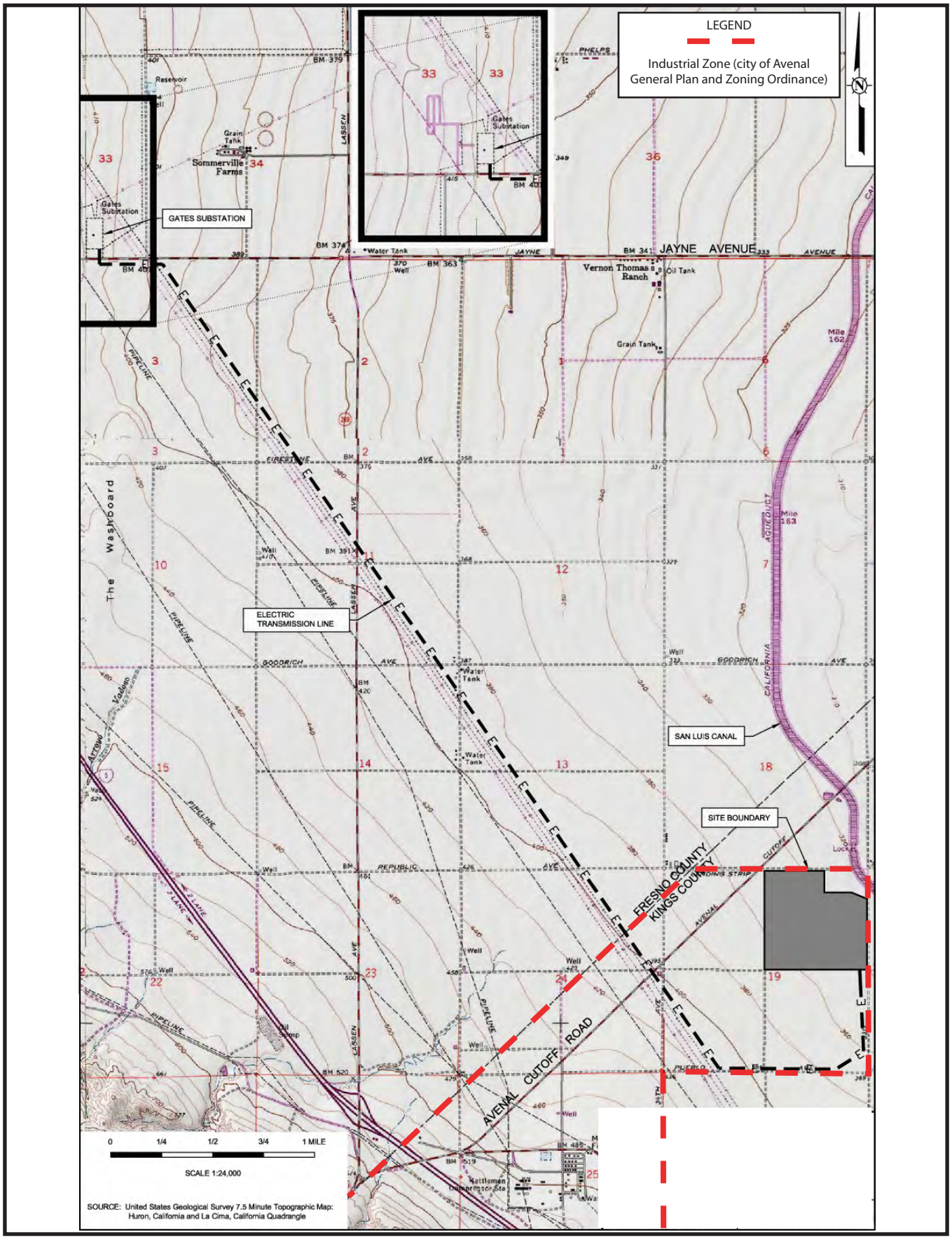
Avenal Energy - Linear Facilities



SOURCE: AFC Figure 1.5-3A

PROJECT DESCRIPTION - FIGURE 4

Avenal Energy - Electrical Transmission Line



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIROMENTAL PROTECTION DIVISION, JUNE 2009

SOURCE: AFC Figure 2.1-1B

ENVIRONMENTAL ASSESSMENT

AIR QUALITY

Testimony of Brewster Birdsall, P.E., QEP

SUMMARY OF CONCLUSIONS

Staff finds that with the adoption of the attached conditions of certification, the proposed Avenal Energy project (Avenal Energy) would likely conform with applicable federal, state and San Joaquin Valley Air Pollution Control District air quality laws, ordinances, regulations and standards, and that the proposed Avenal Energy project would not result in significant air quality related impacts.

Staff finds that the project has secured emission reduction credits in sufficient quantity to meet local air district requirements and to fully offset all nonattainment pollutants and their precursors at a minimum ratio of one-to-one. Staff has assessed both the potential for localized impacts and regional impacts for the project's construction and operation, and as a product of this analysis staff has recommended mitigation and monitoring requirements that should provide adequate mitigation and monitoring sufficient to reduce the adverse construction and operating emission impacts to less than significant.

The San Joaquin Valley Air Pollution Control District developed an interpollutant trading ratio for sulfur oxides to particulate matter of one-to-one and concluded that this would be protective of managing regional particulate matter impacts and progress towards attainment. However, staff notes that the one-to-one interpollutant trading ratio is lower than what has been historically required by the District on similar past power plant cases, and the methods used by the District in developing the ratio are subject to oversight by the U.S. Environmental Protection Agency, which may affect future power plant cases.

Global climate change and greenhouse gas emissions from the project are discussed and analyzed in **AIR QUALITY APPENDIX AIR-1**. Avenal Energy would emit 0.383 metric tons of carbon dioxide per megawatt hour ($MTCO_2$/MWh). The project would comply with the limits of SB 1368 (Perata, Chapter 598, Statutes of 2006) and the Greenhouse Gas Emission Performance Standard. Staff notes that mandatory reporting of greenhouse gas emissions provides the necessary information for the California Air Resources Board to develop greenhouse gas regulations and/or trading markets required by the California Global Warming Solutions Act of 2006 (AB 32 Núñez, Chapter 488, Statutes of 2006). The project may be subject to additional reporting requirements and GHG reduction or trading requirements as these regulations become more fully developed and implemented.

INTRODUCTION

This analysis evaluates the expected air quality impacts from the emissions of criteria air pollutants from both the construction and operation of Avenal Energy. Criteria air pollutants are defined as air contaminants for which the state and/or federal government has established an ambient air quality standard to protect public health.

The criteria pollutants analyzed are nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), and particulate matter (PM). Two subsets of particulate matter are inhalable particulate matter (less than 10 microns in diameter) (PM10) and fine particulate matter (less than 2.5 microns in diameter) (PM2.5). Nitrogen oxides (NOx, consisting primarily of nitric oxide (NO) and NO_2) and volatile organic compounds (VOC) emissions readily react in the atmosphere as precursors to ozone and, to a lesser extent, particulate matter. Sulfur oxides (SOx) readily react in the atmosphere to form particulate matter and are major contributors to acid rain.

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

- Whether Avenal Energy is likely to conform with applicable federal, state, and San Joaquin Valley Air Pollution Control District (SJVAPCD or District) air quality laws, ordinances, regulations and standards (Title 20, California Code of Regulations, section 1744 (b));
- Whether Avenal Energy is likely to cause new violations of ambient air quality standards or contribute substantially to existing violations of those standards (Title 20, California Code of Regulations, section 1743); and
- Whether mitigation measures proposed for the project are adequate to lessen potential impacts to a level of insignificance (Title 20, California Code of Regulations, section 1742 (b)).

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local laws, ordinances, regulations, and standards (LORS) and policies pertain to the control of criteria pollutant emissions and the mitigation of air quality impacts. Staff's analysis examines the project's compliance with these requirements, shown in **Air Quality Table 1**.

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

Applicable Law	Description
Federal	**U.S. Environmental Protection Agency**
CAAA of 1990, 40 CFR 50	National Ambient Air Quality Standards (NAAQS).
CAA Sec. 171-193, 42 USC 7501	New Source Review (NSR) – Requires NSR permit for new stationary sources. This requirement is addressed through SJVAPCD Rule 2201.
40 CFR 52.21	Prevention of Significant Deterioration (PSD) – Requires dispersion modeling to demonstrate no violation of NAAQS or PSD increments, for pollutants that attain the NAAQS. A PSD permit is required for Avenal Energy because the emissions would exceed the applicable PSD thresholds for NO_2 and CO from sources in the fossil fuel-fired steam-electric plant category. The PSD program is within the jurisdiction of the U.S. EPA.
40 CFR 60, Subpart KKKK	Standards of Performance for Stationary Combustion Turbines, New Source Performance Standard (NSPS). Replaces NSPS Subpart Da and Subpart GG for the proposed combustion turbines and duct burners with heat recovery steam generators. Requires the proposed combined cycle units to achieve 15 ppm NOx and achieve fuel sulfur standards.
40 CFR 60, Subpart Dc	Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units. Requires monitoring of the natural gas fuel source for the proposed auxiliary boiler.
40 CFR 60, Subpart IIII	Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Requires the emergency fire water pump engine to achieve: 3.0 grams per horsepower-hour (g/bhp-hr) of non-methane hydrocarbons and NOx (NMHC+NOx) and 0.15 g/bhp-hr PM, which are levels equivalent to U.S. EPA Tier 3 standards.
40 CFR 60 (Proposed Subpart JJJJ)	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. Proposed standard would require the natural gas-fired emergency generator engine to achieve: 1.0 g/bhp-hr NMHC.
40 CFR 70, CAA Sec 401, 42 USC 7651	Federal Title V Operating Permit Program. Consolidates the federally-enforceable operating limits. Application required within one year following start of operation. This program is within the jurisdiction of the SJVAPCD with U.S. EPA oversight [SJVAPCD Rule 2520].

Applicable Law	Description
40 CFR 72, CAA Sec 401 42 USC 7651	Title IV Acid Rain – Applicable to electrical generating units greater than 25 MW. Requires Title IV permit and compliance with acid rain provisions, implemented through the Title V program. This program is within the jurisdiction of the SJVAPCD with U.S. EPA oversight [SJVAPCD Rule 2540].
State	**California Air Resources Board and Energy Commission**
Health and Safety Code (HSC) Section 40910-40930	Permitting of source needs to be consistent with approved clean air plan. The SJVAPCD New Source Review (NSR) program is consistent with regional air quality management plans.
California Health & Safety Code Section 41700	Public Nuisance Provisions – Outlaws the discharge of air contaminants that cause nuisance, injury, detriment, or annoyance.
California Code of Regulations for Off-Road Diesel-Fueled Fleets (13 CCR §2449, et seq.)	General Requirements for In-Use Off-Road Diesel-Fueled Fleets – Requires owners and operators of in-use (existing) off-road diesel equipment and vehicles to begin reporting fleet characteristics to CARB in 2009 and meet fleet emissions targets for diesel particulate matter and NOx in 2010.
Airborne Toxic Control Measure for Idling (ATCM, 13 CCR §2485)	ATCM to Limit Diesel-Fueled Commercial Motor Vehicle Idling – Generally prohibits idling longer than five minutes for diesel-fueled commercial motor vehicles.
Local	**San Joaquin Valley Air Pollution Control District**
Regulation I, General Provisions	Establishes the requirements and standards for stack monitoring, source sampling, and breakdown events and identifies penalties.
Regulation II, Permits	Establishes the regulatory framework for permitting new and modified sources. Included in these requirements are the federally-delegated requirements for NSR, the Title V Operating Permit Program, and the Title IV Acid Rain Program.
Rule 2201, New and Modified Stationary Sources	Establishes the pre-construction review requirements for new, modified or relocated emission sources, in conformance with NSR to ensure that these facilities do not interfere with progress in attainment of the ambient air quality standards and that future economic growth in the San Joaquin Valley is not unnecessarily restricted. Establishes the requirement to prepare a Preliminary Determination of Compliance (PDOC) and Final Determination of Compliance (FDOC) during District review of an application for a power plant. This regulation establishes Best Available Control Technology (BACT) and emission offset requirements.

Applicable Law	Description
Rule 2520, Federally Mandated Operating Permits	Establishes the permit application and compliance requirements for the federal Title V federal permit program. Avenal Energy qualifies as a Title V facility and must submit the Title V application within twelve months after starting operation.
Rule 2540, Acid Rain Program	Implements the federal Title IV Acid Rain Program, which requires subject facilities to obtain emission allowances for SOx emissions and requires fuel sampling and/or continuous monitoring to determine SOx and NOx emissions.
Regulation IV, Prohibitions	Sets forth the restrictions for visible emissions, odor nuisance, various air emissions, and fuel contaminants. Regulation IV incorporates the NSPS provisions of 40 CFR 60, including standards for stationary combustion turbines (Subpart KKKK). These rules limit emissions of NOx, VOC, CO, particulate matter, and sulfur compounds.
Rule 4306, Boilers, Steam Generators, and Process Heaters	Limits NOx and CO from boilers and steam generators. The proposed auxiliary boiler is subject to NOx limit of 9 parts per million by volume (ppmv) and CO limit of 400 ppmv.
Rule 4702, Internal Combustion Engines	Limits emissions of NOx, CO, and VOC from internal combustion engines. However, as emergency units, the proposed emergency engine-generator set and emergency fire water pump engine are exempt from emission limits, subject to monitoring and recordkeeping.
Rule 4703, Stationary Gas Turbines	Limits the proposed stationary gas turbine emissions of NOx to 3 ppmv and CO to 25 ppmv over a 3-hour averaging period. Provided certain demonstrations are made, the emission limits do not apply during startup, shutdown, or reduced load periods (defined as “transitional operation periods”).
Regulation V, Procedure before the Hearing Board	Establishes the procedures for reporting emergencies and emergency variances.
Regulation VIII, Fugitive PM10 Prohibition	Sets forth the requirements and performance standards for the control of emissions from fugitive dust causing activities.

SETTING

CLIMATE AND METEOROLOGY

The climate in California is typically dominated by the eastern Pacific high-pressure system centered off the coast of California. In the summer, this system results in low inversion layers and clear skies inland and typically early morning fog by the coast. In winter, this system promotes wind and rainstorms originating in the Gulf of Alaska and striking Northern California.

The climate of the southern San Joaquin Valley is characterized by hot dry summers and mild winters with precipitation almost exclusively in the winter. Very little precipitation occurs during the summer months because the Pacific high-pressure blocks migrating storm systems. Beginning in the fall and continuing through the winter, the storm belt and zone of strong westerly winds begins to greatly influence California. Temperature, winds, and rainfall are variable during fall and winter months, and stagnant conditions occur more frequently than during summer.

Wind speeds are generally higher in summer than in winter and are typically north-northwesterly winds. During the spring, summer, and fall, the stronger winds are caused by a combination of offshore and thermal low pressure resulting from high temperatures in the Central Valley. During the winter months, winds are more variable and are predominantly northerly. Calm conditions occur more during winter, but are relatively infrequent throughout the year. Valley fog often occurs during these calm, stagnant atmospheric conditions, when temperature inversions trap a layer of cool, moist air near the surface. The annual rainfall at Kettleman City is less than seven inches and most precipitation (90%) occurs during October through April. Summers have average daily maximum temperatures between 97 and 100°F for the two hottest months (July and August). During December and January, average daily minimum temperatures are between 38 and 40°F (WRCC 2008).

Along with the wind flow, atmospheric stability and mixing heights are important factors in the determination of pollutant dispersion. Atmospheric stability is an indicator of the air turbulence and mixing. During the daylight hours of the summer when the earth is heated and air rises, there is more turbulence, more mixing, and thus less stability. During these conditions there is more air pollutant dispersion and therefore usually reduced air quality impacts near any single air pollution source. During the winter months between storms, however, very stable atmospheric conditions occur, resulting in very little mixing. Under these conditions, minimal air pollutant dispersion occurs, and consequently higher air quality impacts may result near sources. Because lower mixing heights generally occur during the winter, along with lower mean wind speeds and less vertical mixing, dispersion occurs less rapidly.

AMBIENT AIR QUALITY STANDARDS

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

National Ambient Air Quality Standards (NAAQS). The federal Clean Air Act requires the periodic review of the science upon which the standards are based and the standards themselves.

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

Current state and federal air quality standards are listed in **Air Quality Table 2**. The averaging times for the various air quality standards (the duration over which all measurements taken are averaged) range from one hour to one year. The standards are read as a concentration, in parts per million (ppm), or as a weighted mass of material per unit volume of air, in milligrams (mg or 10^{-3} g) or micrograms (µg or 10^{-6} g) of pollutant in a cubic meter (m^3) of ambient air, drawn over the applicable averaging period.

Air Quality Table 2
State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standard	Federal Standard
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m^3)	None
	8 Hour	0.070 ppm (137 µg/m^3)	0.075 ppm (147 µg/m^3)
Respirable Particulate Matter (PM10)	24 Hour	50 µg/m^3	150 µg/m^3
	Annual	20 µg/m^3	None
Fine Particulate Matter (PM2.5)	24 Hour	None	35 µg/m^3
	Annual	12 µg/m^3	15 µg/m^3
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)
	8 Hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)
Nitrogen Dioxide (NO_2)	1 Hour	0.18 ppm (339 µg/m^3)	None
	Annual	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)
Sulfur Dioxide (SO_2)	1 Hour	0.25 ppm (655 µg/m^3)	None
	3 Hour	None	0.5 ppm (1300 µg/m^3)
	24 Hour	0.04 ppm (105 µg/m^3)	0.14 ppm (365 µg/m^3)
	Annual	None	0.03 ppm (80 µg/m^3)

Source: ARB (http://www.arb.ca.gov/research/aaqs/aaqs2.pdf), April 2008.

The California Air Resources Board and the U.S. EPA designate regions where ambient air quality standards are not met as “nonattainment areas.” Where a pollutant exceeds standards, the federal and state Clean Air Acts both require air quality management plans that demonstrate how the standards will be achieved. These laws also provide the basis for implementing agencies to develop mobile and stationary source performance standards.

EXISTING AMBIENT AIR QUALITY

Air Quality Table 3 summarizes the attainment status of the air quality in the San Joaquin Valley. Violations of federal and state ambient air quality standards for ozone, particulate matter, and carbon monoxide have occurred historically throughout the region. Since the early 1970s, substantial progress has been made toward controlling these pollutants. Although air quality improvements have occurred, violations of standards for particulate matter and ozone persist.

Air Quality Table 3
Attainment Status of San Joaquin Valley Air Pollution Control District

Pollutants	Federal Classification	State Classification
Ozone (1-hr)	No Federal Standard	**Nonattainment (Severe)**
Ozone (8-hr)	**Nonattainment (Serious)** [a]	**Nonattainment**
PM10	Attainment [b]	**Nonattainment**
PM2.5	**Nonattainment**	**Nonattainment**
CO	Attainment	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment

Source: SJVAPCD 2008 (http://www.valleyair.org/aqinfo/attainment.htm).
Notes:
[a] In April 2007, the SJVAPCD Governing Board proposed to re-classify the region as “extreme” nonattainment, and the U.S. EPA is reviewing the request.
[b] In November 2008, EPA redesignated the San Joaquin Valley to attainment for the PM10 National Ambient Air Quality Standard (NAAQS) and approved the PM10 Maintenance Plan.

Nonattainment Criteria Pollutants

Air Quality Table 4 summarizes the existing ambient monitoring data for nonattainment criteria pollutants (ozone and particulate matter) collected by ARB and SJVAPCD from monitoring stations closest to the project site. Data marked in **bold** indicates that the most-stringent current standard was exceeded. Note that an exceedance is not necessarily a violation of the standard, and that only persistent exceedances lead to designation of an area as nonattainment.

Air Quality Table 4
Avenal Energy, Highest Measured Concentrations (ppm or µg/m^3)

Pollutant, Location	Averaging Time	2002	2003	2004	2005	2006	2007	2008
Ozone (ppm) Hanford	1 hour	**0.125**	**0.120**	**0.121**	**0.120**	**0.127**	**0.102**	**---**
Ozone (ppm) Hanford	8 hour	**0.105**	**0.100**	**0.094**	**0.098**	**0.101**	**0.091**	**---**
PM10 (µg/m^3) Hanford	24 hour	**161**	**140**	**123**	**117**	**142**	**100**	**230**
PM10 (µg/m^3) Hanford	Annual	**53.5**	**46.7**	**43.1**	**40.3**	**46.3**	**43.9**	**50.9**
PM2.5 (µg/m^3) Corcoran	24 hour	**90.7**	**55.1**	**61.0**	**92.5**	**74.2**	**75.0**	**51.0**
PM2.5 (µg/m^3) Corcoran	Annual (3-yr avg.)	**19**	**16.2**	**17.4**	**17.5**	**16.9**	**18.4**	**15.8**

Source: ARB, Air Quality Data Statistics (http://www.arb.ca.gov/adam/welcome.html). Accessed May 2009.

Ozone

Ozone is not directly emitted from stationary or mobile sources, but is formed as the result of chemical reactions in the atmosphere between precursor air pollutants. The primary ozone precursors are NOx and VOC, which interact in the presence of sunlight and warm air temperatures to form ozone. Ozone formation is highest in the summer and fall when abundant sunshine and high temperatures trigger the necessary photochemical reactions, and lowest in the winter. The days with the highest ozone concentrations commonly occur between June and August, but the region's ozone management season officially runs from April through November (the second and third calendar quarters, Q2 and Q3).

Respirable Particulate Matter (PM10)

PM10 is a mixture of particles and droplets that vary in size and chemical composition, depending upon the origin of the pollution. An extremely wide range of sources, including natural causes, most mobile sources, and many stationary sources, causes emissions that directly and indirectly lead to increased ambient particulate matter. This makes it an extremely difficult pollutant to manage. Particulate matter caused by any combustion process can be generated directly by burning the fuel, but it can also be formed downwind when various precursor pollutants chemically interact in the atmosphere to form solid precipitates. These solids are called secondary particulate matter since the contaminants are not directly emitted, but are rather indirectly formed as a result of precursor emissions.

Gaseous contaminants such as NOx, SO_2, organic compounds, and ammonia (NH_3) from natural or man-made sources can form secondary particulate nitrates, sulfates,

and organic solids. Secondary particulate matter is mostly finer PM10, whereas particles from dust sources tend to be the coarser fraction of PM10.

Air Quality Table 5 summarizes the ambient PM10 data collected from monitoring stations near the project site and the highest PM10 concentrations in the District.

Air Quality Table 5
Avenal Energy, Highest Measured PM10 Concentrations (μg/m^3)

Location	Averaging Time	2003	2004	2005	2006	2007	2008
Hanford	24 hour	**140**	**123**	**117**	**142**	**100**	**230**
	Days Over CAAQS	149	101	110	125	145	---
	Days Over NAAQS	0	0	0	0	0	11
	Annual	**46.7**	**43.1**	**40.3**	**46.3**	**43.9**	**50.9**
Corcoran	24 hour	**150**	**217**	**131**	**254**	**123**	**351**
	Days Over CAAQS	133	88	126	122	134	182
	Days Over NAAQS	0	7	0	13	0	7
	Annual	**46.3**	**47.9**	**38.7**	**51.4**	**46.6**	**59.5**
District-wide	24 hour	**150**	**217**	**131**	**304**	**172**	**390**
	Days Over CAAQS	167	113	146	167	145	182
	Days Over NAAQS	0	1	0	4	1	5
	Annual	**52.4**	**47.9**	**44.3**	**55.4**	**54.8**	**59.7**

Source: ARB, Air Quality Data Statistics (http://www.arb.ca.gov/adam/welcome.html). Accessed May 2009.

Note: Concentrations shown are based upon California reference methods. The number of days above the CAAQS (50 μg/m^3) is calculated by ARB. Because PM10 is monitored approximately once every six days, the potential number of violation days is calculated by multiplying the actual number of days of violations by six.

PM10 is primarily a winter problem, but high regional PM10 levels occur at other times of the year as well. Days with high PM10 concentrations commonly occur in November and December, but the region's PM10 management season officially runs from October through March (the first and fourth calendar quarters, Q1 and Q4).

Fine Particulate Matter (PM2.5)

Particles and droplets with an aerodynamic diameter less than or equal to 2.5 microns (PM2.5) penetrate more deeply into the lungs than PM10, so can therefore be much more damaging to public health than larger particles. PM2.5 is mainly a product of combustion and includes nitrates, sulfates, organic carbon (ultra-fine dust), and elemental carbon (ultra-fine soot). Almost all combustion-related particles, including those from wood smoke and cooking, are smaller than 2.5 microns. Nitrate and sulfate particles are formed through complex chemical reactions in the atmosphere. Particulate nitrate (mainly ammonium nitrate) is formed in the atmosphere from the reaction of nitric acid and ammonia. Nitric acid in turn originates from NOx emissions from combustion sources. The nitrate ion concentrations during the winter make up a large portion of the

total PM2.5. Ammonium sulfate is also a concern because of the ready availability of ammonia in the atmosphere.

Air Quality Table 6 summarizes the ambient PM2.5 data collected from the nearest monitoring station.

Air Quality Table 6
Avenal Energy, Highest Measured PM2.5 Concentrations (μg/m^3)

Location	Averaging Time	2003	2004	2005	2006	2007	2008
Corcoran	24 hour	**55.1**	**61.0**	**92.5**	**74.2**	**75.0**	**51.0**
	Annual (3-yr average)	**16.2**	**17.4**	**17.5**	**16.9**	**18.4**	**15.8**

Source: ARB, Air Quality Data Statistics (http://www.arb.ca.gov/adam/welcome.html). Accessed May 2009.

Attainment Criteria Pollutants

Carbon Monoxide

Carbon monoxide (CO) is a by-product of incomplete combustion common to any fuel-burning source. Ambient concentrations of CO vary substantially depending upon the proximity of the source since the pollutant disperses quickly and oxidizes in the air. Mobile sources are the principal sources of CO emissions, and they have historically been the focus of regional and statewide strategies to attain and maintain CO ambient air quality standards. Ambient CO concentrations attain the standards due to two state-wide programs for all mobile sources: the 1992 wintertime oxygenated gasoline program, and Phases I and II of the reformulated gasoline program. New vehicles with oxygen sensors and fuel injection systems have also helped reduce CO emissions.

Nitrogen Dioxide

Approximately 90% of the NOx emitted from combustion sources is in the form of nitric oxide, while the balance is NO_2. Nitric oxide (NO) is oxidized in the presence of ozone to form NO_2, but some level of photochemical activity is needed for this conversion. High concentrations of NO_2 occur during the fall (not in the winter) when atmospheric conditions tend to trap ground-level releases but lack significant photochemical activity (less sunlight). In the summer, the conversion rates of NO to NO_2 are high, but the relatively high temperatures and windy conditions (atmospheric unstable conditions) tend to engage the NO in reactions with VOCs to create ozone and also disperse the NO_2. The formation of NO_2 in the summer, with the help of the ozone, is according to the following reaction:

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

Urban areas typically have high daytime ozone concentrations that drop substantially at night as the above reaction takes place, and ozone scavenges the available NO. If ozone is unavailable to oxidize the NO, less NO_2 will form because the reaction is "ozone-limited." This reaction explains why, in urban areas, ground-level ozone

concentrations drop at night, while aloft and in downwind rural areas (without sources of fresh NO emissions), ozone concentrations can remain relatively high.

New CAAQS for NO_2 became effective in early 2008. Although the attainment designations have not yet been established for the new, more stringent standards, the San Joaquin Valley air basin appears likely to attain. Data from 2006 to 2008 shows the highest observed hourly concentration for the entire San Joaquin Valley (0.101 ppm) is well below the new 0.18 ppm NO_2 standard (ARB 2009).

Sulfur Dioxide

Sulfur dioxide is typically emitted as a result of the combustion of fuels containing sulfur. When high levels are present in ambient air, SO_2 leads to sulfite particulate formation and acid rain. Natural gas contains very little sulfur and so therefore results in very little SO_2 emissions when burned. By contrast, high sulfur fuels like coal emit large amounts of SO_2 when burned. Sources of SO_2 emissions come from every economic sector and include a wide variety of gaseous, liquid, and solid fuels. The entire state is designated attainment for all SO_2 ambient air quality standards.

Summary of Existing Ambient Air Quality

The local and recent ambient air quality data show existing violations of ambient air quality standards for ozone, PM10, and PM2.5. Staff uses the highest locally-measured (Hanford or Corcoran) background ambient air concentrations as the baseline in staff's analysis of potential ambient air quality impacts for the proposed Avenal Energy project. Data from the nearest sites in Hanford, Visalia, and Sacramento are used for CO, NO_2, and SO_2, respectively. The highest concentrations are shown in **Air Quality Table 7**.

Air Quality Table 7
Highest Local Background Concentrations Used in Staff Assessment (µg/m^3)

Pollutant	Averaging Time	Background	Limiting Standard	Percent of Standard
PM10	24 hour	**351**	50	**702**
	Annual	**59.5**	20	**298**
PM2.5	24 hour	**75.0**	35	**214**
	Annual	**18.4**	12	**153**
CO	1 hour	4,222	23,000	18
	8 hour	2,900	10,000	29
NO_2	1 hour	137.2	339	40
	Annual	22.6	57	40
SO_2	1 hour	47.2	655	7
	24 hour	7.9	105	8
	Annual	2.6	80	3

Source: AFC Table 6.2-30, updated with ARB 2009.

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

PROJECT DESCRIPTION AND PROPOSED EMISSIONS

Avenal Energy would include the following stationary sources of emissions:

- two stationary natural gas-fired combustion turbine generators (CTGs) in a combined-cycle configuration. Each rated at 180 MW each, consisting of General Electric Model PG7241FA (Frame 7FA) combustion turbine with a heat recovery steam generator (HRSG) and a duct burner of 562 million British thermal units (Btu) per hour (MMBtu/hr) heat input, with duct firing up to 800 hours per year per CTG;
- one condensing steam turbine generator (STG) rated at 300 MW shared between the two CTGs;
- one natural gas-fired auxiliary boiler to provide steam that facilitates startup of the combined-cycle turbine system, with a maximum firing rate of 37.4 MMBtu/hr heat input, operating up to 1,248 hours per year;
- one 288 bhp diesel fuel oil-fired emergency fire water pump engine, Cummins model CFP83-F40 or Clarke model JW6H-UF40, that would be either U.S. EPA Tier 2 certified or Tier 3, depending on purchase date (AFC p. 6.2-31 and Appendix 6.2-1.4). This emergency-use engine would use ARB ultra-low-sulfur (0.0015% or 15 ppm sulfur by weight) diesel fuel; and
- one nominal 550 kilowatt (kW) Caterpillar model G3512LE, natural gas-fired emergency engine-generator set, rated at 860 bhp.

Separate emissions caused during the construction phase, initial commissioning, and operation are described here.

Proposed Construction Emissions

Construction of Avenal Energy is expected to take about 27 months. Onsite construction activities include clearing of agricultural vegetation, grading, hauling and layout of equipment, materials and supplies, facility construction and testing (AFC Section 2.3.18). During the construction period, air emissions would be generated from the exhaust of off-road/non-road construction equipment and on-road vehicles and fugitive dust from activity on unpaved surfaces and material handling. Construction activities would occur during an 8-hour day staggered over multiple shifts (AFC Section 2.3.18). Construction of the gas pipeline and transmission system interconnections and water pipelines would also occur for three to five months, during which the emissions would occur along the length of the linear facilities.

Fugitive dust emissions would result from:

- dust entrained during preparation and grading/excavation at the construction site and along linear facilities;
- dust entrained during on-site travel on paved and unpaved surfaces;
- dust entrained during aggregate and soil loading and unloading operations; and
- wind erosion of soil at areas disturbed during construction activities.

Combustion emissions during construction would result from:

- exhaust from the diesel construction equipment used for site preparation, grading, excavation, and construction of on-site structures;
- exhaust from water trucks used on-site and along linear facilities to control construction dust emissions;
- exhaust from use of diesel-powered welding machines, electric generators, air compressors, water pumps, etc.;
- off-site exhaust from on-road diesel trucks used to deliver concrete, fuel, and construction supplies to the construction site; and
- off-site exhaust from on-road automobiles and trucks used by workers to commute to the construction site.

Estimates for the highest daily emissions and total annual emissions over the 27-month construction period are shown in **Air Quality Table 8**.

Air Quality Table 8
Avenal Energy, Estimated Maximum Construction Emissions

Activity	NOx	VOC	PM10/ PM2.5	CO	SOx
On-site Construction Equipment (lb/day)	181.5	25.5	7.7	230.1	0.4
On-site Fugitive Dust (lb/day)	---	---	5.9	---	---
Off-site (On-road) Worker Travel (lb/day)	357.5	99.0	25.2	2,740	2.6
Off-site (On-road) Truck Deliveries (lb/day)	157.8	8.7	7.1	34.8	0.2
Off-site Linear Construction Equipment (lb/day)	43.1	4.8	1.9	32.6	0.1
Off-site Linear Fugitive Dust (lb/day)	---	---	5.4	---	---
Off-site Linear (On-road) Deliveries (lb/day)	53.9	3.0	2.4	11.9	0.1
Maximum Daily Emissions (lb/day, excluding off-site linear)	**697**	**133**	**46.0**	**3,005**	**3.2**
On-site Construction Equipment (tpy)	14.1	2.2	0.7	22.3	0.03
On-site Fugitive Dust (tpy)	---	---	0.4	---	---
Off-site (On-road) Worker Travel (tpy)	24.6	6.8	1.7	188.7	0.18
Off-site (On-road) Truck Deliveries (tpy)	9.2	0.5	0.4	2.0	0.01
Total Annual Emissions (tpy)	**47.9**	**9.5**	**3.2**	**213.0**	**0.2**

Source: AFC Appendix Table 6.2-3.11 and Table 6.2-3.8 for maximum daily emissions from pipeline or transmission line linear.

The applicant proposes to reduce construction emissions with the following measures to control exhaust emissions from the diesel heavy equipment used for construction (AFC Appendix 6.2-3.3):

- Operational measures, such as limiting engine idling time and shutting down equipment when not in use;
- Regular preventive maintenance to prevent emission increases due to engine problems;
- Use of low sulfur and low aromatic fuel meeting California standards for motor vehicle Diesel fuel; and
- Use of low-emitting Diesel engines meeting federal emissions standards for construction equipment if available.

The applicant proposes to implement the following measures to control construction-related fugitive dust emissions (AFC Appendix 6.2-3.3):

- Use either water application or chemical dust suppressant application to control dust emissions from unpaved surface travel and unpaved parking areas;
- Use vacuum sweeping and/or water flushing of paved road surface to remove buildup of loose material to control dust emissions from travel on the paved access road (including adjacent public streets impacted by construction activities) and paved parking areas;
- Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least two feet of freeboard;
- Limit traffic speeds on unpaved surfaces to 25 mph;
- Install sandbags or other erosion control measures to prevent silt runoff to roadways;
- Re-plant vegetation in disturbed areas as quickly as possible;
- As needed, use gravel pads along with wheel washers or wash tires of all trucks exiting construction site that carry track-out dirt from unpaved surfaces; and
- Mitigate fugitive dust emissions from wind erosion of areas disturbed from construction activities (including storage piles) by application of either water or chemical dust suppressant and/or use of wind breaks.

Proposed Initial Commissioning Emissions

New electrical generation facilities must go through initial commissioning phases before becoming commercially available to generate electricity. During this period, initial firing causes greater emissions than those that occur during normal operations because of the need to tune the combustor, conduct numerous startups and shutdowns, operate under low loads, and conduct testing before emission control systems are functioning or fine-tuned for optimum performance.

The applicant identifies the series of commissioning tests and expects that up to 408 hours of operation would be needed for each CTG to complete initial commissioning, and the applicant proposes to conduct initial commissioning on each CTG sequentially so that both CTGs would not undergo commissioning simultaneously (AFC Appendix Table 6.2-1.9). Staff recommends a Condition of Certification to ensure that initial commissioning would occur on each CTG sequentially (**AQ-SC9**).

Air Quality Table 9 presents the predicted maximum short-term emissions of NOx, CO, and VOC. PM10, PM2.5, and SO_2 emissions are not included here since they are proportional to fuel use, and fuel use during commissioning is equal to that during full load operations.

Air Quality Table 9
Avenal Energy, Maximum Initial Commissioning Emissions

Source	NOx	VOC	CO
Each Combustion Turbine (lb/hr)	160	16	1,000
One Combustion Turbine Commissioning, plus One Combustion Turbine in Normal Operations (lb/day)	1,941	335	12,501

Source: AFC Appendix Table 6.2-1.10.

Operation Emission Controls

NOx Controls

Each combustion turbine will use dry low-NOx (DLN) combustors to maintain low levels of NOx formation while ensuring complete combustion of the fuel. Exhaust from each turbine will enter the HRSG equipped with duct burners and then enter a Selective Catalytic Reduction (SCR) system before being released into the atmosphere. SCR refers to a process that chemically reduces NOx to nitrogen (N_2) and water vapor (H_2O) by injecting ammonia (NH_3) into the flue gas stream in the presence of a catalyst and excess oxygen. The process is termed selective because the ammonia preferentially reacts with NOx rather than oxygen. The catalyst material most commonly used is titanium dioxide, but materials such as vanadium pentoxide, zeolite, or noble metals are also used. Regardless of the type of catalyst used, efficient conversion of NOx to nitrogen and water vapor requires the uniform mixing of ammonia into the exhaust gas stream and a catalyst surface large enough to ensure sufficient time for the reaction to take place.

VOC and CO Controls

Emissions of CO and unburned hydrocarbons, including VOC, will be controlled with an oxidation catalyst installed in conjunction with the SCR catalyst. An oxidation catalyst system chemically reacts with organic compounds and CO with excess oxygen to form carbon dioxide (CO_2) and water. Unlike the SCR system for reducing NOx, an oxidation catalyst does not require any additional chemicals.

PM10/PM2.5 and SOx Controls

The exclusive use of pipeline-quality natural gas, a clean-burning fuel that contains very little sulfur or noncombustible solid residue, will limit the formation of SOx and particulate matter. Natural gas does contain small amounts of a sulfur-based scenting compound known as mercaptan, which results in some SOx emissions when burned. However, in comparison with other fossil fuels used in thermal power plants, SOx emissions from natural gas are very low. Particulate matter emissions from natural gas combustion are also very low compared with other fossil fuels. The sulfur content of pipeline-quality natural gas is normally less than one grain of sulfur per 100 cubic feet at standard temperature and pressure (gr/100 scf).

Proposed Operation Emissions

Air Quality Table 10 through **Air Quality Table 12** summarize the maximum (worst-case) criteria pollutant emissions associated with Avenal Energy's normal operation. Emissions for each of the two combustion turbines are based upon:

- NOx emissions controlled to 2.0 parts per million by volume, dry basis (ppmvd) corrected to 15% oxygen, averaged over any 1-hour period;
- VOC emissions controlled to 2.0 ppmvd at 15% O_2 for any 3-hour period;
- CO emissions controlled to 4.0 ppmvd at 15% O_2 for any 3-hour period;
- PM10 emissions at 11.8 lb/hr during duct burner firing and 9.0 lb/hr without duct firing based on exclusive use of pipeline-quality natural gas fuel with no provisions for an alternative or backup fuel;
- SOx emissions based on hourly or daily levels of fuel sulfur content of up to 1 gr/100 scf with annual average sulfur content of 0.36 gr/100 scf; and
- CTGs with duct burner firing for 800 hours per year per CTG, up to 1,248 hours per year of operation in startup or shutdown mode for both CTGs combined, and 1,248 hours per year of operation of the auxiliary boiler.

Air Quality Table 10 lists the maximum 1-hour emissions from each piece of proposed equipment as specified by calculations in the Final Determination of Compliance (FDOC, SJVAPCD 2008b). The applicant proposes to stagger startups in such a way to limit the combined NOx emission rates of the CTGs to 240 lb/hr (as in AFC Appendix Table 6.2-2.5), and staff recommends a Condition of Certification (**AQ-SC11**) to enforce this.

Air Quality Table 10
Avenal Energy, Maximum Short-Term Emissions Rates (pounds per hour [lb/hr])

Source	NOx	VOC	PM10/ PM2.5	CO	SOx
Each Combustion Turbine (maximum lb/hr during startup/shutdown)	160	16	---	1,000	---
Each Combustion Turbine (maximum lb/hr with duct firing)	17.20	5.89	11.78	10.60	6.65
Each Combustion Turbine (maximum lb/hr without duct firing)	13.55	3.34	8.91	8.35	5.23
Both Combustion Turbines (maximum lb/hr combined startup)	240	32.00	23.56	1,902	13.30
Auxiliary Boiler	0.41	0.16	0.19	1.38	0.11
Fire Pump Engine	2.16	0.24	0.04	0.28	<0.01
Emergency Standby Generator	1.90	0.63	0.06	1.14	0.02

Source: SJVAPCD 2008b, pp.12, 13, 16.

Air Quality Table 11 lists the worst-case emissions during any given day of operation of the proposed Avenal Energy project. The emissions of NOx, VOC, and CO are based upon each CTG operating in six hours of startup or shutdown mode and 18 hours of full load operation with duct burner firing daily. The emissions of PM10 and SOx are based upon each CTG operating in full load with duct firing for 24 hours. The auxiliary boiler emissions are based on twelve hours per day of this unit. The fire pump engine and emergency standby generator are shown assuming 24 hours of emissions, though these units are not expected to operate for more than one hour at a time for maintenance and testing.

Air Quality Table 11
Avenal Energy, Maximum Daily Emissions (pounds per day [lb/day])

Source	NOx	VOC	PM10/PM2.5	CO	SOx
Each Combustion Turbine (lb/day, with six startup/shutdown hours)	789.6	202.0	---	5,590.8	---
Each Combustion Turbine (lb/day with duct firing)	---	---	282.7	---	159.6
Both Combustion Turbines (maximum lb/day with startups)	1,579.2	404.0	565.4	11,182	319.2
Auxiliary Boiler	4.9	1.9	2.2	16.6	1.3
Fire Pump Engine	51.8	5.8	0.9	6.8	0.1
Emergency Standby Generator	45.5	15.0	1.5	27.3	0.4

Source: AFC Table 6.2-1.8 and SJVAPCD 2008b, p. 17, with fire pump engine and emergency generator engine each operating 24 hr/day.

Air Quality Table 12 lists maximum potential annual emissions from each source with the federally enforceable total annual emission limits for the proposed project, as defined by the SJVAPCD "Post-Project Stationary Source Potential to Emit" (SJVAPCD 2008b).

Air Quality Table 12
Avenal Energy, Maximum Annual Emissions (tons per year [tpy])

Source	NOx	VOC	PM10/ PM2.5	CO	SOx
Each Combustion Turbine	71.98	17.24	40.33	300.9	8.35
Both Combustion Turbines	144.0	34.5	80.7	601.8	16.69
Auxiliary Boiler	0.26	0.10	0.12	0.86	0.07
Fire Pump Engine	0.05	0.01	0.00	0.01	0.00
Emergency Standby Generator	0.05	0.02	0.00	0.03	0.00
Total Maximum Annual Emissions	**144.3**	**34.61**	**80.78**	**602.7**	**16.76**

Source: SJVAPCD 2008b, pp. 18, 19, 26.

Ammonia Emissions

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

The Avenal Energy project applicant initially proposed to limit ammonia slip emissions from the combined-cycle turbine system to 10 ppmvd or up to 32 lb/hr NH_3 per turbine. The Air Resources Board recommendation for ammonia slip in their Guidance for Power Plant Siting (ARB 1999) is 5 ppmvd, and the Avenal Energy AFC Appendix Table 6.2-4.5 recognizes this guideline level. Staff agrees with the Air Resources Board that a level of 5 ppmvd is achievable, and after conducting discovery of this issue (Data Request 1 and CEC 2008), staff recommends a condition of certification establishing an ammonia slip limit at 5 ppmvd (**AQ-SC10**).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Staff characterizes air quality impacts as follows: All project emissions of nonattainment criteria pollutants and their precursors (NOx, VOC, CO, PM10, PM2.5, and SOx) are considered significant and must be mitigated. For short-term construction activities that essentially cease before operation of the power plant, our assessment is qualitative and mitigation consists of controlling construction equipment tailpipe emissions and fugitive dust emissions to the maximum extent feasible. For operating emissions, mitigation

includes both the Best Available Control Technology (BACT) and emission reduction credits (ERCs) or other valid emission reductions to offset emissions of both nonattainment criteria pollutants and their precursors.

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

DIRECT/INDIRECT IMPACTS AND MITIGATION

Ambient air quality impacts occur when project emissions cause the ambient concentration of a pollutant to increase. Project-related emissions are the actual mass of emitted pollutants, which are diluted in the atmosphere before reaching the ground. Analysis begins with quantifying the emissions, then uses an atmospheric dispersion model to determine the probable change in ground-level concentrations.

Dispersion models complete the complex, repeated calculations that consider emissions in the context of various ambient meteorological conditions, local terrain, and nearby structures that affect air flow. For Avenal Energy, the meteorological data used as an input to the dispersion model included five years (2000-2004) of hourly wind speeds and directions measured at the Hanford meteorological station, combined with upper-air meteorological data from Oakland.

The applicant uses the American Meteorological Society/Environmental Protection Agency Regulatory Model known as AERMOD (version 07026) for an analysis of the operating-phase emissions. The U.S. EPA designates AERMOD as a “preferred” model for refined modeling in all types of terrain. The applicant uses AERMOD as both a screening and refined model to estimate the direct impacts of the project’s PM10/2.5, CO, NOx, and SOx emissions. For determining NO_2 impacts of short-term emissions (1-hour averaging period), NOx emissions are further modeled using the more-rigorous Plume Volume Molar Ratio Method (PVMRM) adaptation of the Ozone Limiting Method (OLM). Because project NOx emissions would be approximately 90% NO that could oxidize into NO_2 with sufficient time, sunlight, and availability of organic compounds or ozone, use of the PVMRM and OLM is appropriate. Concurrent hourly ozone data is used in modeling the reactive NOx impacts.

Project-related modeled concentrations are then added to highest background concentrations to arrive at the total impact of the project. The total impact is then compared with the ambient air quality standards for each pollutant to determine whether the project’s emissions would either cause a new violation of the ambient air quality standards or contribute to an existing violation.

Construction Impacts and Mitigation

This section discusses the project’s short-term direct construction ambient air quality impacts assessed by the applicant and, as necessary, independently assessed by Energy Commission staff. Construction-related emissions are modeled using the U.S.

EPA's Industrial Source Complex Short Term Model (ISCST3, version 02035) for all pollutants except NO_2, which was modeled with the Ozone Limited Method (ISC3-OLM) and Ambient Ratio Method (ARM).

Construction modeling for Avenal Energy used 1995 met data from Kettleman City for ISC-OLM during construction, with concurrent 1995 hourly ozone data from Hanford. The dispersion modeling included with the AFC used source factors (that allow variation of emissions by hour-of-day or day-of-week) to erroneously set emissions to zero for some hours of the year for sources that have annual averaging periods. This caused the AFC to underestimate the construction impacts during annual averaging periods. To correct this, staff removed the source factors and re-evaluated the annual construction impacts.

Air Quality Table 13 summarizes the results of the modeling analysis for construction activities. The total impact is the sum of the existing background condition plus the maximum impact predicted by the modeling analysis for project activity. The values in **bold** in the Impact and Background columns represent the values that either equal or exceed the relevant ambient air quality standard.

Air Quality Table 13
Avenal Energy, Construction-Phase Maximum Impacts (µg/m^3)

Pollutant	Averaging Time	Modeled Impact	Background	Total Impact	Limiting Standard	Percent of Standard
PM10	24 hour	4.7	**351**	**355.7**	50	**711**
	Annual	0.62	**59.5**	**60.1**	20	**301**
PM2.5	24 hour	4.7	**75.0**	**79.7**	35	**228**
	Annual	0.34	**18.4**	**18.74**	12	**156**
CO	1 hour	1,245	4,222	5,467	23,000	24
	8 hour	178	2,900	3,078	10,000	31
NO_2	1 hour	163	137.2	300.2	339	89
	Annual	5.4	22.6	28.0225	57	49
SO_2	1 hour	2	47.2	49.2	655	8
	24 hour	0.2	7.9	8.1	105	8
	Annual	0.018	2.6	2.62	80	3

Sources: AFC Appendix 6.2-3 and AFC Table 6.2-35 with independent Energy Commission staff analysis for annual averaging times.

The maximum modeled project construction impacts are predicted to occur near the southern and eastern fence line and decrease rapidly with distance. No residential receptors exist near the fence line.

Staff believes that particulate matter emissions from construction would cause a significant impact because they will contribute to existing violations of PM10 and PM2.5 ambient air quality standards, and additionally that those emissions can and should be mitigated to a level of insignificance. Significant secondary impacts would also occur for PM10, PM2.5, and ozone because construction-phase emissions of particulate matter precursors (including SOx) and ozone precursors (NOx and VOC) would also contribute to existing violations of these standards. The direct impacts of NO_2, in conjunction with worst-case background conditions, would not create a new violation of the 1-hour or annual NO_2 ambient air quality standard. The direct impacts of CO and SO_2 would not be significant because construction of the project would neither cause nor contribute to a violation of these standards. Mitigation for construction emissions of PM10, PM2.5, SOx, NOx, and VOC would be appropriate for reducing impacts to PM10, PM2.5, and ozone.

Construction Mitigation

The applicant proposes to reduce emissions of particulate matter, particulate matter precursors, and ozone precursors by implementing measures consistent with local air district recommendations, soil erosion control requirements, and nuisance prohibitions. Staff agrees that the applicant's proposed mitigation measures would be effective, although staff believes that additional construction mitigation measures are necessary to reduce potential impacts to less than significant.

Additional measures recommended by staff would reduce construction-phase impacts to a less than significant level by further reducing construction emissions of particulate matter and combustion contaminants. Staff believes that the short-term and variable nature of construction activities warrants a qualitative approach to mitigation. Construction emissions and the effectiveness of mitigation varies widely depending on variable levels of activity, the specific work taking place, the specific equipment, soil conditions, weather conditions, and other factors, making precise quantification difficult. Despite this variability, there are a number of feasible control measures that can be implemented to significantly reduce construction emissions. Staff has determined that the use of oxidizing soot filters is a viable emissions control technology for all heavy diesel-powered construction equipment that does not use an ARB-certified low emission diesel engine. In addition, staff proposes that, prior to beginning construction, the applicant should provide an Air Quality Construction Mitigation Plan (AQCMP) that specifically identifies mitigation measures to be employed by the applicant to limit air quality impacts during construction. Staff includes proposed staff Conditions of Certification **AQ-SC1** through **AQ-SC5** to implement these requirements. These conditions are consistent with both the applicant's proposed mitigation and the conditions of certification adopted in similar prior licensing cases. Compliance with these conditions would substantially reduce the potential for significant air quality impacts during construction of the Avenal Energy project.

Operation Impacts and Mitigation

The following section discusses ambient air quality impacts that were estimated by the applicant and subsequently evaluated by Energy Commission staff. The applicant performed a number of direct impact modeling analyses, including both fumigation modeling and modeling for impacts during commissioning.

Routine Operation Impacts

A refined dispersion modeling analysis was performed to identify off-site criteria pollutant impacts that would occur from routine operational emissions throughout the life of the project. This impact analysis includes both maximum operating and start-up/shutdown scenarios to determine worst-case air quality impacts on both a short-term and an annual basis. The operating profiles are shown in **Air Quality Table 10** to **Air Quality Table 12**. The predicted maximum concentrations of non-reactive pollutants are summarized in **Air Quality Table 14**.

Air Quality Table 14
Avenal Energy, Routine Operation Maximum Impacts (µg/m^3)

Pollutant	Averaging Time	Modeled Impact	Background	Total Impact	Limiting Standard	Percent of Standard
PM10	24 hour	2.9	**351**	**353.9**	50	**708**
	Annual	0.8	**59.5**	**60.3**	20	**302**
PM2.5	24 hour	2.9	**75.0**	**77.9**	35	**223**
	Annual	0.8	**18.4**	**19.2**	12	**160**
CO	1 hour	2,175	4,222	6,397	23,000	28
	8 hour	337	2,900	3,237	10,000	32
NO_2	1 hour	190.0	137.2	327.2	339	97
	Annual	0.5	22.6	23.1	57	41
SO_2	1 hour	9.7	47.2	56.9	655	9
	24 hour	1.5	7.9	9.4	105	9
	Annual	0.1	2.6	2.7	80	3

Source: AFC Table 6.2-31.
Note: One-hour NO2 impact assumes the combined emission rates of the two combustion turbine exhausts during staggered startups would not exceed 240 lb/hr of NOx (as in Condition of Certification **AQ-SC11**).

Staff believes that particulate matter emissions from routine operation would cause a significant impact because they will contribute to existing violations of PM10 and PM2.5 ambient air quality standards. Significant secondary impacts would also occur for PM10, PM2.5, and ozone because operational emissions of particulate matter precursors (including SOx) and ozone precursors (NOx and VOC) would also contribute to existing violations of these standards. The direct impacts of NO_2, in conjunction with worst-case background conditions, would not create a new violation of the 1-hour or annual NO_2 ambient air quality standard. The direct impacts of CO and SO_2 would not be significant because routine operation of the project would neither cause nor contribute to a violation of these standards. Mitigation for emissions of PM10, PM2.5, SOx, NOx, and VOC would be appropriate for reducing impacts to PM10, PM2.5, and ozone.

Secondary Pollutant Impacts

The project's gaseous emissions of NOx, SOx, VOC, and ammonia are precursor pollutants that can contribute to the formation of secondary pollutants, ozone, PM10, and PM2.5. Gas-to-particulate conversion in ambient air involves complex chemical and physical processes that depend on many factors, including local humidity, pollutant travel time, and the presence of other compounds. Currently, there are no agency-recommended models or procedures for estimating ozone or particulate nitrate or sulfate formation from a single project or source. However, because of the known relationships of NOx and VOC to ozone and of NOx, SOx, and ammonia emissions to secondary PM10 and PM2.5 formation, it can be said that unmitigated emissions of these pollutants would contribute to higher ozone and PM10/PM2.5 levels in the region. Significant impacts of ozone and PM10/PM2.5 precursors would be mitigated with SJVAPCD offsets (**AQ-SC7**).

Ammonia is a particulate precursor but not a criteria pollutant. Reactive with sulfur and nitrogen compounds, ammonia is especially abundant in the San Joaquin Valley from natural sources, agricultural sources, and as a byproduct of tailpipe controls on motor vehicles. Ammonia particulate forms more readily with sulfates than with nitrates, and particulate formation in the San Joaquin Valley has been found to be limited by the availability of SOx and NOx in ambient air, rather than the availability of ammonia (SJVAPCD 2008 PM2.5 Plan). Offsetting SOx and NOx emissions would both avoid significant secondary PM10/PM2.5 impacts and reduce secondary pollutant impacts to a less than significant level.

Energy Commission staff recommends limiting ammonia slip emissions to the extent feasible. After conducting discovery of this issue (Data Request 1 and CEC 2008), and consistent with the previously mentioned ARB guidance on ammonia slip, staff recommends a condition of certification establishing an ammonia slip limit for each combustion turbine at 5 ppmvd (**AQ-SC10**).

Fumigation Impacts

There is the potential that higher short-term concentrations of pollutants may occur during fumigation conditions. Fumigation conditions are generally short-term in nature and only compared to 1-hour standards. The applicant analyzed the air quality impacts for normal emissions under fumigation conditions (without startups) using the SCREEN3 Model (version 96043) (AFC Table 6.2-27 and Appendix 6.2-2.6). Even if startup emissions are considered, the short-term project impacts during fumigation would not exceed the impacts for routine operation shown in **Air Quality Table 14**, above. Therefore, no additional mitigation is required for fumigation impacts.

Commissioning-Phase Impacts

Commissioning impacts would occur during any of the 408 hours of operation per CTG needed to complete commissioning. The applicant modeled initial commissioning impacts based on one combustion gas turbine undergoing testing with the second in full operation with duct firing (AFC Appendix Table 6.2-1.11), and so the analysis is based on implementing Staff-recommended Condition of Certification **AQ-SC9** to ensure sequential commissioning of each CTG. Impacts due to PM10, PM2.5, and SO_2 during commissioning would occur under similar exhaust conditions as those for startup while

in routine operation. **Air Quality Table 15** shows that the commissioning-phase impacts of CO and NO_2 would also be similar to those during routine operations.

Air Quality Table 15
Avenal Energy, Commissioning-Phase Maximum Impacts (µg/m^3)

Pollutant	Averaging Time	Modeled Impact	Background	Total Impact	Limiting Standard	Percent of Standard
CO	1 hour	1,164	4,222	5,386	23,000	23
	8 hour	251	2,900	3,151	10,000	32
NO_2	1 hour	187.0	137.2	324.2	339	96

Source: AFC Table 6.2-29.

Visibility Impacts

A visibility analysis of the project's gaseous emissions is required under the federal Prevention of Significant Deterioration (PSD) permitting program. Avenal Energy is subject to PSD permitting through the U.S. EPA, because it would exceed the PSD major source emission thresholds for NO_2 and CO. For new PSD sources, a visibility analysis is required for the nearest Class I area. The nearest Class I areas are Pinnacles National Monument in western San Benito County and Sequoia National Park; both more than 100 kilometers (62 miles) from the project site. Due to the distance to Class I areas, Energy Commission staff anticipates that the project's visibility impacts on Class I areas would be considered insignificant by the U.S. EPA and Federal Land Managers. The PSD permit issued by the U.S. EPA would address these impacts.

Mitigation for Routine Operation

Applicant's Proposed Mitigation

The Avenal Energy project would include a combination of clean-fuel-firing equipment, emission control devices, and emission reduction credits to mitigate air quality impacts. The equipment description, equipment operation, and emission control devices are provided in **AIR QUALITY PROJECT DESCRIPTION**.

Emission Controls

The proposed combustion turbines would limit NOx formed during combustion using dry low-NOx (DLN) combustors. Compared to steam or water-injection designs, combustors designed for low-NOx firing maintain low temperatures, thus minimizing NOx formation, while thermal efficiencies remain high. To further reduce the emissions from the combustion turbines before they are exhausted into the atmosphere, flue gas controls, primarily catalyst systems, will be installed in the HRSG. The applicant proposes two catalyst systems for each combustion turbine: the SCR system to reduce NOx; and the oxidation catalyst system to reduce CO and VOC. Operating exclusively on pipeline quality natural gas limits SOx and particulate matter emissions.

The other stationary sources would also be limited. By using an air cooled condenser (dry cooling design), the project would not include a large cooling tower, which would otherwise be a source of particulate matter drift or mist. The auxiliary boiler would include ultra low-NOx burners to achieve the District's limits. The fire pump engine would achieve the equivalent of U.S. EPA Tier 2 or Tier 3 standards, depending on purchase date (AFC p. 6.2-31 and Appendix 6.2-1.4), and the emergency standby generator would include a non-selective catalytic reduction (NSCR) system for exhaust control.

Emission Offsets

In addition to emission control strategies included in the project design, SJVAPCD Rule 2201 requires the applicant to provide emission reduction credits to offset the new emissions of NOx, VOC, and PM10.

Air Quality Table 16 summarizes the emissions in terms of the annual and quarterly liabilities as viewed by the District, with the likely requirements assuming a distance-based (greater than 15 miles) offset ratio of 1.5-to-1. The standard offset ratios of either 1.0-to 1 or 1.3-to-1 would not apply to Avenal Energy because all of the offsets are likely to originate more than 15 miles away from the new sources at Avenal. The District conducts a case-by-case analysis of offset requirements and distance ratios depending on the specific ERCs held by the applicant (SJVAPCD 2008b).

Air Quality Table 16
Avenal Energy, SJVAPCD Offset Determination and Requirements (lb)

Source	**NOx**	**VOC**	**PM10/ PM2.5**	**CO**	**SOx**
Combustion Turbine #1	143,951	34,489	80,656	601,810	16,694
Combustion Turbine #2	143,951	34,489	80,656	601,810	16,694
Auxiliary Boiler	513	201	233	1,727	132
Fire Pump Engine	108	12	2	14	0
Emergency Standby Generator	95	31	3	57	1
Potential to Emit	**288,618**	**69,222**	**161,550**	**1.2×10^6**	**33,521**
Offset Requirements					
Offset Threshold	20,000	20,000	29,200	200,000	54,750
Offsets Triggered?	Yes	Yes	Yes	No [a]	No
Emissions Over Threshold	268,618	49,222	132,350	---	---
Offsets Required [b]	268,415	49,179	132,345	---	---
Offsets Required (lb/quarter)	67,104	12,295	33,085	---	---
Offsets Required (lb/quarter) at Avenal Energy [c]	**100,656**	**18,442**	**49,629**	---	---

Source: SJVAPCD 2008b, p. 26.
[a] Emission offsets are not required for CO since the applicant has demonstrated to the satisfaction of the Air Pollution Control Officer (APCO) that the ambient air quality standards are not violated in the areas to be affected, and such emissions will be consistent with Reasonable Further Progress, and will not cause or contribute to a violation of the standards.
[b] Does not include emergency equipment which is exempt from District offset requirements.
[c] Includes a distance ratio factor of 1.5 based on assumption that all ERCs are obtained from sources more than 15 miles away.

Emission Offsets for Ozone Impact

Air Quality Table 17 summarizes NOx offset requirements and identifies the sources of offsets proposed by the applicant. The applicant holds numerous NOx ERCs that it intends to use to satisfy the District offset requirements.

Air Quality Table 18 summarizes VOC offset requirements and identifies the sources of offsets proposed by the applicant. The applicant holds numerous VOC ERCs that it intends to use to satisfy the District offset requirements.

Air Quality Table 17
Avenal Energy, NOx Offset Holdings and Quarterly Offset Requirements (lb/qtr)

Name of Offset/Site Of Reduction	ERC Number	Q1 (lb/qtr)	Q2 (lb/qtr)	Q3 (lb/qtr)	Q4 (lb/qtr)
Road 26, Madera	C-899-2	2,243	2,243	2,243	2,243
Oil Production, Fresno Co.	C-902-2	13,879	6,131	1,086	8,539
Ingomar Grade, Los Banos	N-720-2	0	9	1,255	437
Ingomar Grade, Los Banos	N-722-2	0	1,166	88,317	1,422
Eight Mile Rd., Stockton	N-726-2	0	0	4,728	0
Mariposa Rd., Modesto	N-728-2	10,542	3,731	2,487	5,171
Taft Oilfield, Southern	S-2814-2	6,121	13,869	18,914	11,461
Unknown (Previously Pastoria Energy Facility)	S-2321-2	51,000	51,000	51,000	51,000
Apply Q3 to Q1 [a]	---	16,871	---	-16,871	---
Apply Q3 to Q2 [a]	---	---	22,509	-22,509	---
Apply Q3 to Q4 [a]	---	---	---	-20,387	20,387
ERC Holdings of NOx	---	100,656	100,658	110,263	100,660
Offsets Required	---	**100,656**	**100,656**	**100,656**	**100,656**
Surplus (Deficit)	---	0	0	9,604	0
NOx Fully Offset?	---	Yes	Yes	Yes	Yes

Source: SJVAPCD 2008b.
Note: The Name of Offset / Location shows the ERC owner or the location of the reduction in terms of the three SJVAPCD regions.
[a] Per District Rule 2201 Section 4.13.8 NOx and VOC reductions that occurred in the 2nd and 3rd quarters can be used to offset increases in NOx and VOC during any period of the year.

Air Quality Table 18
Avenal Energy, VOC Offset Holdings and Quarterly Offset Requirements (lb/qtr)

Name of Offset/Site Of Reduction	ERC Number	Q1 (lb/qtr)	Q2 (lb/qtr)	Q3 (lb/qtr)	Q4 (lb/qtr)
Road 26, Madera	C-897-1	45	45	45	45
Barstow Ave., Fresno	C-898-1	5,480	6,496	4,696	6,616
Ingomar Grade, Los Banos	N-724-1	0	0	241	0
Eight Mile Rd., Stockton	N-725-1	0	0	709	0
Unknown, Southern	S-2812-1	31,432	31,424	31,417	31,417
Unknown, Southern	S-2813-1	12,500	12,500	12,500	12,500
Unknown, Southern	S-2817-1	11,431	11,424	11,417	11,417
ERC Holdings of VOC	---	**60,888**	**61,889**	**61,025**	**61,995**
Offsets Required	---	**18,442**	**18,442**	**18,442**	**18,442**
Surplus (Deficit)	---	42,446	43,447	42,583	43,553
VOC Fully Offset?	---	Yes	Yes	Yes	Yes

Source: SJVAPCD 2008b.
Note: The Name of Offset / Location shows the ERC owner or the location of the reduction in terms of the three SJVAPCD regions.

The applicant appears to be in compliance with the District's NOx and VOC offset requirements and would provide overall total ERCs at an offset ratio of greater than one-to-one, which satisfies the CEQA mitigation requirements for ozone impacts as established by Energy Commission staff.

Emission Offsets for Particulate Matter Impact

Air Quality Table 19 summarizes PM10 offset requirements and identifies the sources of PM10 offsets proposed by the applicant, and **Air Quality Table 20** identifies the SOx ERCs that are held by the applicant that are being offered as mitigation for the PM10/PM2.5 impacts. The applicant holds some PM10 ERCs and an abundance of SOx ERCs that it intends to use to satisfy the District offset requirements for PM10.

Air Quality Table 19
Avenal Energy, PM10 Offset Holdings and Quarterly Offset Requirements (lb/qtr)

Name of Offset / Site of Reduction	ERC Number	Q1 (lb/qtr)	Q2 (lb/qtr)	Q3 (lb/qtr)	Q4 (lb/qtr)
Road 26, Madera	C-896-4	80	80	80	80
Ingomar Grade, Los Banos	N-721-4	0	0	3,215	0
Eight Mile Rd., Stockton	N-723-4	0	0	985	0
SOx ERCs for PM10 [a]	---	121,681	49,549	90,172	125,801
ERC Holdings PM10/SOx	---	**121,761**	**49,629**	**94,452**	**125,881**
Offsets Required	---	**49,629**	**49,629**	**49,629**	**49,629**
Surplus (Deficit)	---	72,131	0	44,823	76,251
PM10 Fully Offset?	---	Yes	Yes	Yes	Yes

Source: SJVAPCD 2008b.
Note: The Name of Offset / Location shows the ERC owner or the location of the reduction in terms of the three SJVAPCD regions.
[a] Per District Rule 2201 Section 4.13.3 interpollutant offsets between PM10 and PM10 precursors may be approved by the SJVAPCD Air Pollution Control Officer on a case-by-case basis.

Air Quality Table 20
Avenal Energy, SOx Offset Holdings for Interpollutant Offset of PM10 (lb/qtr)

Name of Offset/Site Of Reduction	ERC Number	Q1 (lb/qtr)	Q2 (lb/qtr)	Q3 (lb/qtr)	Q4 (lb/qtr)
Hillside Lease (southwest Kern Co.), Southern	S-2791-5	92,179	23,666	69,157	96,288
Hillside Lease, Southern	S-2790-5	12,862	491	0	8,499
Fairfield Lease, Southern	S-2789-5	6	14	12	8
Fairfield Lease, Southern	S-2788-5	5	7	3	6
W. Church St., Stockton	N-762-5	21,000	21,000	21,000	21,000
Apply Q1 to Q2 [a]	---	-4,371	4,371	---	---
ERC Holdings of SOx [b]	---	**121,681**	**49,549**	**90,172**	**125,801**

Source: SJVAPCD 2008b.
Note: The Name of Offset / Location shows the ERC owner or the location of the reduction in terms of the three SJVAPCD regions.
[a] Per District Rule 2201 Section 4.13.7 PM10 reductions that occurred in the 1st and 4th quarters can be used to offset increases in PM10 during any period of the year.
[b] Per District Rule 2201 Section 4.13.3 interpollutant offsets between PM10 and PM10 precursors may be approved by the SJVAPCD Air Pollution Control Officer on a case-by-case basis

The applicant proposes to use banked reductions of SOx to offset PM10/PM2.5 increases associated with the project. The District allows this by establishing a case-by-case interpollutant offset ratio (District Rule 2201, Section 4.13.3). SOx is accepted as one of the major precursors of PM10 and PM2.5 through reaction with ammonia to form

ammonium sulfates. Reductions in SOx, particularly in areas that are ammonia rich such as the San Joaquin Valley, can reduce secondary particulate formation. However, the key issue is determining the appropriate interpollutant offset ratio, which depends on the existing levels of particulate matter precursors and the general atmospheric chemistry of the area in question. The District's case-by-case analysis of the interpollutant ratio for Avenal Energy resulted in a ratio of one-to-one based on a consideration of the shared emission inventory and local concentrations within Kings and Tulare Counties (SJVAPCD 2008b); the District notes that this is the "minimum technical value" due to a small inventory of local SOx sources in Kings and Tulare Counties. In early 2009, the SJVAPCD recalculated the ratio and confirmed the one-to-one ratio as being appropriate throughout the entire air basin (SJVAPCD 2009).

The District's use of a 1-to-1 interpollutant ratio for Rule 2201 compliance leads to fewer SOx reductions for particulate matter than ratios used by the District on some other recent power plant projects. For example, the interpollutant ratio for the Panoche Energy Center in western Fresno County was 1.867-to-1 (06-AFC-5), and the Avenal Energy applicant showed that 1.4 tons of SOx reductions would be needed to offset each new ton of PM10 emissions (AFC Table 6.2-39). Despite the District historically requiring more than one ton of SOx reductions for each new ton of PM10, the 1-to-1 interpollutant ratio would provide the minimum level of offsets required by Energy Commission staff for PM10/PM2.5 precursors. This issue is discussed further in **AIR QUALITY CUMULATIVE IMPACTS**.

The applicant appears to be in compliance with the District's PM10 offset requirements. Taking into account the distance ratio, Avenal Energy would provide overall total PM10/PM2.5 precursor ERCs at an offset ratio of greater than one-to-one, which satisfies the CEQA mitigation requirements for particulate matter impacts as established by Energy Commission staff.

Adequacy of Proposed Mitigation

Energy Commission staff have long held that emission reductions need to be provided for all nonattainment pollutants and their precursors at a minimum overall one-to-one ratio of annual operating emissions. For this project, the District's offset requirements would meet or exceed that minimum offsetting goal for all ozone and particulate matter impacts.

The offsets shown in **Air Quality Table 17** through **Air Quality Table 20** demonstrate that the applicant owns ERCs in quantities sufficient to offset the project's NOx, VOC, PM10, and SO_2 emissions, per District requirements and Energy Commission staff policy. PM2.5 emissions are not required to be offset separately from PM10 emissions. How the offsets provide PM2.5 mitigation is discussed separately in **AIR QUALITY SECONDARY POLLUTANT IMPACTS**.

While the one-to-one interpollutant offset ratio for SOx and PM10 is lower than what has been historically required by the District, Energy Commission staff's long-standing position is that all nonattainment pollutant and precursor emissions must be offset by at least one-to-one. Therefore, the proposed emission offset package would mitigate all project air quality impacts to a less than significant level.

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

Staff Proposed Mitigation

Staff proposes Conditions of Certification **AQ-SC6** and **AQ-SC8** to ensure that the license is amended as necessary to incorporate changes to the air quality permits and to ensure ongoing compliance through quarterly reports.

Cumulative Impacts and Mitigation

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

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

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

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

Summary of Projections

The federal and California Clean Air Acts direct local air quality management agencies to implement plans and programs that lead to attainment and maintenance of the ambient air quality standards. The New Source Review program administered by SJVAPCD and other programs for reducing emissions from mobile sources or area-wide sources, are part of air quality management plans.

Ozone

- The **2004 Extreme Ozone Attainment Demonstration Plan** illustrates how the SJVAPCD would attain the federal 1-hour ozone standard that was revoked in 2005.

The U.S. EPA proposed approval of the SJVAPCD 2004 Ozone Plan on October 16, 2008 (73 FR 61381). This plan shows how the area would achieve the revoked 1-hour ozone standard in 2010, and it includes elements that are the foundation for later ozone plans.

- The **2007 Ozone Plan** to attain the federal 8-hour ozone standard was approved by ARB on June 14, 2007. This plan would reduce ozone and particulate matter levels in the region, primarily by achieving a 75% reduction in NOx emissions by 2023. Achieving such dramatic reductions would affect all sectors of the region's economy (SJVAPCD 2007). The plan relies on four main approaches: tighter district regulations for stationary sources, wider use of incentive-based measures (like the Carl Moyer Program) to accelerate deployment of cleaner sources, new "innovative" programs for trip-reduction and energy conservation, and expanded controls on mobile source tailpipe emissions.

The Avenal Energy project is subject to the current SJVAPCD rules and regulations that specify performance standards, offset requirements, and emission control requirements for stationary sources. The regulations also include requirements for obtaining Authority to Construct (ATC) permits and subsequent operating permits. These regulations apply to Avenal Energy and all other projects with emission sources. In general, triennial updates of the attainment plans ensure that population, employment, and transportation trends in the region are taken into account, and compliance with SJVAPCD rules and regulations ensures consistency with the regional air quality management plans. However, the recently adopted plans and a changing regulatory environment raise the following concerns.

The project must offset its emissions to ensure "no net increase" from stationary sources in the region. According to the 2007 Ozone Plan, the SJVAPCD would need to revise its NSR rule to increase the standard offset ratio to 1.5-to-1 from the current one-to-one ratio that would be required for Avenal Energy (SJVAPCD 2007 and SJVAPCD 2008b). Avenal Energy would not be subject to the more stringent offset requirements because the revisions to Rule 2201 were not adopted at the time of Avenal Energy filing its application.

Energy Commission staff is concerned that the Avenal Energy project could interfere with the attainment effort of the 2007 Ozone Plan if it relies on offsets created by emission reductions prior to the plan baseline. The SJVAPCD is expecting new stationary sources like Avenal Energy to use pre-baseline credits (pre-2002 for the 2007 Ozone Plan) to allow growth from permitted stationary sources during the period of this plan, but as a safeguard, a cap would be established on the quantity of pre-baseline credits used by new sources (SJVAPCD 2007, Appendix D). Additionally, the integrity of the proposed mitigation may be adversely affected by the annual equivalency demonstration required by SJVAPCD Rule 2201, Section 7, which ensures that the District's offsetting requirements are at least as stringent as the federal requirements. Energy Commission staff requested (CEC 2008) that the District describe how the ERCs used by the project as offsets would be surplus at the time of use. The District replied that because the FDOC was issued before a failure in the equivalency demonstration, the ERCs used for Avenal Energy need not be "surplus at time of use" (SJVAPCD 2008b). The implication is that the ERCs surrendered for Avenal Energy are

presently surplus and they would not be subject to discounting to demonstrate equivalency with federal offsetting requirements. Because the project would use BACT to control ozone precursor emissions and ERCs to fully offset ozone precursors as required by existing rules and regulations, the project would not be likely to conflict with the District's 2007 Ozone Plan or regional ozone attainment goals.

Particulate Matter

- The **2007 PM10 Maintenance Plan** illustrates how the SJVAPCD intends to continue the efforts of the **2003 PM10 Plan** and **2006 PM10 Plan** that implemented aggressive PM10 controls in the region, including Reasonably Available Control Measures (RACM) for large existing sources of PM10 and fugitive dust. The 2007 PM10 Maintenance Plan includes a request for reclassification to "attainment" for the federal PM10 standard, and it provides for continued attainment for 10 years from the designation. In November 2008, the U.S. EPA redesignated the SJVAPCD to attainment for the federal PM10 standard (73 FR 66759, November 12, 2008).
- The **2008 PM2.5 Plan** was adopted by the SJVAPCD Governing Board on April 30, 2008 and adopted by the California Air Resources Board on May 22, 2008, and the plan was subsequently submitted to U.S. EPA. However, there has been no U.S. EPA action on the PM2.5 plan. The 2008 PM2.5 Plan includes measures for attaining the 1997 and 2006 federal PM2.5 standards. The 2008 PM2.5 Plan shows that emission reductions of NOx, directly emitted PM2.5, and SO_2 are needed to demonstrate attainment of the PM2.5 NAAQS in the San Joaquin Valley (p. 6-1 of plan).

Energy Commission staff is concerned that the Avenal Energy project could interfere with the attainment effort of the 2008 PM2.5 Plan if it relies on SOx emission reduction credits without an adequate interpollutant trading ratio for allowing PM2.5 increases. The "reasonable further progress" calculations in the 2008 PM2.5 Plan shows that about ten times more tons of direct PM2.5 need to be reduced than SO_2 (Table 8-2 of 2008 PM2.5 Plan). The 2014 Receptor Modeling Documentation supporting the 2008 PM2.5 Plan indicates that reducing SOx would not be as effective as reducing direct PM2.5 or NOx. The District inventory of SOx is too small to have enough of an impact when compared to direct PM2.5 or NOx (SJVAPCD 2009). Interpollutant trading is allowed with "the appropriate scientific demonstration of an adequate trading ratio" (Rule 2201, Section 4.13), and the SJVAPCD 2007 PM10 Maintenance Plan (see Appendix E of the Maintenance Plan) indicates that the minimum ratio would be one-to-one with higher interpollutant ratios if appropriate under Rule 2201. The applicant relied on data from 1997 and 1998 to show that 1.4 tons of SOx reductions would be needed to offset each new ton of PM10 emissions (AFC Table 6.2-39), but the FDOC in Attachment H shows that the minimum ratio of one-to-one would apply to Avenal Energy.

Energy Commission staff requested more information from the SJVAPCD in comments on the PDOC (CEC 2008), and the SJVAPCD responded in its analysis with the FDOC (SJVAPCD 2008b). Staff continued to illustrate concerns in the Preliminary Staff Assessment workshop in February 2009. The Center on Race, Poverty and the Environment (CRPE) in its comments on the Preliminary Staff Assessment also raised the concern that the one-to-one ratio would be insufficient (see **RESPONSE TO AGENCY AND PUBLIC COMMENTS**). In early 2009, the SJVAPCD recalculated the

ratio for newer projects and confirmed the one-to-one ratio as being appropriate throughout the entire air basin (SJVAPCD 2009). Staff raised concerns because the one-to-one interpollutant trading ratio is lower than what has been historically required by the District on similar past power plant cases. Additionally, staff notes that although implementation of trading under District Rule 2201 is subject to federal oversight, there is no evidence in the record indicating whether the methods used by the District in developing the ratio have been specifically reviewed and/or approved by U.S. Environmental Protection Agency.

The U.S. EPA review of the District's 2008 PM2.5 Plan is ongoing, and the review may lead to a different conclusion on an appropriate interpollutant trading ratio for the SJVAPCD. In rules issued by the U.S. EPA in 2008 related to PM2.5 NSR, the U.S. EPA's "nationwide preferred ratio" would be 40-to-1 for SO2-to-PM2.5 (73 FR 28339; May 16, 2008). Those rules are currently subject to a reconsideration established by U.S. EPA on April 24, 2009, so the ultimate outcome is uncertain. Although there is no formal federal endorsement of the District's interpollutant trading approach, Energy Commission staff is able to conclude that Avenal Energy would not be likely to conflict with regional particulate matter attainment goals. Staff recognizes that the attainment plan has been previously adopted by ARB, and the SJVAPCD has determined (SJVAPCD 2008b, SJVAPCD 2009) that the interpollutant trading ratio for Avenal Energy is appropriate. The FDOC shows that Avenal Energy is likely to comply with the particulate matter plans by meeting its permit requirements and complying with the existing applicable rules and regulations.

Localized Cumulative Impacts

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

Projects with stationary sources located up to six miles from the proposed project site need to be considered by the analysis. The applicant requested that the SJVAPCD identify potential new stationary sources within six miles (AFC Appendix 6.2-6). The SJVAPCD reported four facilities with pending changes, but none would emit more than 10 pounds per day of any contaminant other than VOC (AFC Appendix Table 6.2-6.2). These sources would contribute to the project-related impacts to secondary ozone formation, although there are no agency-recommended models or procedures for quantifying the cumulative ozone impacts.

COMPLIANCE WITH LORS

The Preliminary Determination of Compliance (PDOC) for Avenal Energy was issued dated July 11, 2008 (SJVAPCD 2008a), and the Final Determination of Compliance

(FDOC) was issued dated October 30, 2008. Compliance with all District Rules and Regulations was demonstrated to the District's satisfaction in the PDOC and FDOC, and the FDOC conditions are presented in the Conditions of Certification. Staff provided comments on the PDOC to the District for their consideration in a letter dated August 12, 2008 (CEC 2008), and this Staff Assessment reflects the responses from the District.

FEDERAL

The FDOC represents the preliminary federal New Source Review (NSR) permit.

40 CFR 52.21, Prevention of Significant Deterioration. The U.S. EPA has not yet issued a preliminary Prevention of Significant Deterioration (PSD) permit for the project. The project is not allowed to commence construction until the PSD permit is issued. The District FDOC (SJVAPCD 2008b) would likely serve as the basis for the PSD permit for this project, and to ensure that the applicant amends the Energy Commission license as necessary to incorporate changes triggered by the PSD permit, if any, Staff proposes Condition of Certification **AQ-SC6**.

40 CFR 60, NSPS Subpart KKKK. The CTGs proposed for Avenal Energy are likely to comply with the applicable emission limits by achieving a NOx emission rate of 2.0 ppmvd over any one-hour period except during startup and shutdown periods.

40 CFR 60, NSPS Subpart IIII. It is not clear if the emergency fire water pump engine would be required to achieve 3.0 g/hp-hr NOx+NMHC per U.S. EPA Tier 3 standards (which would be applicable if the engine is purchased in 2012, as noted on AFC p. 6.2-31), because the applicant specifies that the engine would meet the less-stringent Tier 2 standards (AFC Appendix 6.2-1.4). The applicant appears prepared for the fire pump engine to achieve the applicable standards, U.S. EPA Tier 2 or Tier 3, depending on the actual purchase date.

STATE

The applicant has demonstrated that the project would comply with Section 41700 of the California State Health and Safety Code, which restricts emissions that would cause nuisance or injury. Compliance with the FDOC (SJVAPCD 2008b) and the Energy Commission staff's Conditions of Certification enable staff's affirmative finding.

LOCAL

The District issued the PDOC (SJVAPCD 2008a) and the FDOC (SJVAPCD 2008b) stating that the proposed project is expected to comply with all applicable District rules and regulations. The District rules and regulations specify the emissions control and offset requirements for new sources such as Avenal. The project would use the Best Available Control Technology (BACT) as defined by the District, and emission reduction credits (ERCs), proposed by the Applicant and approved and certified by the District, would fully mitigate project nonattainment pollutant (including precursors) emissions so that they would be consistent with District rules and regulations.

Staff raised concerns in the Preliminary Staff Assessment on whether the SJVAPCD had established an appropriate interpollutant trading ratio (CEC 2008). Although the

SJVAPCD has determined (SJVAPCD 2008b, SJVAPCD 2009) that the ERCs would be fully consistent with the strategies and future emissions reductions anticipated under the applicable air quality management plans for attainment and maintenance of the ambient air quality standards, the U.S. EPA review of the regional particulate matter plan is ongoing. This issue is discussed under **AIR QUALITY CUMULATIVE IMPACTS**. One other issue was identified by staff upon review of the PDOC as discussed below.

SJVAPCD Rule 4703, Stationary Gas Turbines. Energy Commission staff concurs with the District that the NOx emission limits for the combustion turbines and duct burners should apply on one-hour rolling averages during all operating conditions except startup and shutdown periods (as in **AQ-26**). Staff notes that the applicant originally requested allowing "short-term excursions" of the NOx concentration limits due to rapid load changes, but rapid load changes and excursions appear to be limited by the NOx standards in 40 CFR 60 Section 60.4320, District Rule 4703, and FDOC one-hour NOx limit of 17.20 lb/hr. This issue is resolved with **AQ-26** as shown in the FDOC.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Public comments were made on the following issues during the workshop for the Preliminary Staff Assessment in February 2009 and in writing, namely by the Center on Race, Poverty, and the Environment (CRPE).

- **Air quality in the San Joaquin Valley is unhealthy.** As pointed out in the **Setting**, the existing ambient air quality in the entire San Joaquin Valley fails to meet various state and/or federal standards that are protective of public health. This staff assessment describes how Avenal Energy could cause increased concentrations, especially in the nearby communities of Avenal, Kettleman City, and Huron. The maximum and highest cumulative changes in the air quality in the vicinity of Avenal Energy appear in **Air Quality Tables 13 to 15**. The applicant filed additional information showing the modeled concentrations predicted for the populated areas (TRC2009). Staff and applicant results agree and show that the highest particulate matter concentrations would occur during construction (**Air Quality Table 13**). The highest PM10 and PM2.5 concentrations would be less than 5 $\mu g/m^3$ (24-hour basis). As noted by CRPE, construction-related emissions would be emitted near ground level, which explains the more severe impacts during that phase. Although the worst-case project-related PM10 contribution is less than 10% of the 50 $\mu g/m^3$ standard, because existing air quality already fails to meet the standard, staff considers the impact to be significant. Staff's approach to mitigation is through the emissions offsets that would be surrendered.
- **Emission offsets are "illusory" and would not mitigate local impacts.** The region-wide air quality management strategy is one of "no net increases." As development and growth occurs throughout the region, some communities may experience local emission increases while other communities experience the reductions. Regional improvements are relevant to the communities of Avenal, Kettleman City, and Huron because of the shared nature of the air basin. Emission reductions from any location in the basin provide some benefit. Background particulate matter concentrations in Avenal, Kettleman City, and Huron are forecasted to decrease with additional control of large stationary sources across the

region and implementation of New Source Review with offset requirements (see discussion of attainment plans in **SUMMARY OF PROJECTIONS**). The emission inventories that make up the ozone and particulate matter attainment plans assume new emissions occur in the future as allowed by the banked ERCs. This means that surrendering offsets and ERCs is a useful mitigation strategy because removing ERCs from the regional bank makes it more difficult for new stationary sources to be proposed and emit in the San Joaquin Valley. This improves the likelihood that actual emissions in the region will remain less than forecasted by the attainment plans.

- **Interpollutant Ratio.** Comments from CRPE assert that the SJVAPCD's use of a one-to-one interpollutant trading ratio would be insufficient for mitigating project-related impacts. This ratio was established by the SJVAPCD for compliance with New Source Review (NSR) rules based on modeling that was conducted for the 2008 PM2.5 Plan. Energy Commission staff recognizes that the 2008 PM2.5 Plan for attainment has been adopted by ARB, and the SJVAPCD has determined (SJVAPCD 2008b, SJVAPCD 2009) that the interpollutant trading ratio for Avenal Energy would not interfere with regional particulate matter attainment goals. Future projects may be subject to different ratios because the U.S. EPA review of the 2008 PM2.5 Plan is ongoing. For mitigating project-related impacts, the CEQA mitigation requirements are established by Energy Commission staff, and it is staff's long-standing position that mitigation of all nonattainment pollutant and precursor emissions be of sufficient quantity to achieve a one-to-one offset.
- **Greenhouse gas emissions must be analyzed and mitigated.** The Preliminary Staff Assessment included an analysis of GHG impacts that has been substantially revised and updated by this Final Staff Assessment, as in **AIR QUALITY APPENDIX AIR-1**.

AGENCY COMMENTS ON THE PSA

The Kings County Department of Public Health expressed concern that greenhouse gas and criteria pollutant emissions could be cumulatively significant. Responses above and the revised and updated GHG analysis in **AIR QUALITY APPENDIX AIR-1** summarize how project-related impacts and cumulative impacts would be less than significant.

CONCLUSIONS

- Construction impacts would contribute to violations of the ozone, PM10, and PM2.5 ambient air quality standards. Staff recommends Conditions of Certification **AQ-SC1** to **AQ-SC5** to mitigate the project construction-phase impacts to a less than significant level.
- Operation of the project would comply with applicable SJVAPCD rules and regulations, including New Source Review, Best Available Control Technology (BACT) requirements, and requirements to offset emission increases.
- The project would neither cause new violations of any NO_2, CO, or SO_2 ambient air quality standards nor contribute to existing violations for these pollutants. Therefore, the project's direct NO_2, CO, and SO_2 impacts are less than significant.

- The project NOx and VOC emissions would contribute to existing violations of state and federal ozone ambient air quality standards. The ozone precursor offsets required by SJVAPCD and shown in Condition of Certification **AQ-SC7** would mitigate the ozone impact to a less than significant level.
- Without proper mitigation, the project PM10 and PM2.5 emissions and the PM10/PM2.5 precursor emissions of SOx would contribute to the existing violations of state and federal PM10 and PM2.5 ambient air quality standards. ERCs would be accepted for PM10 and SOx reductions (**AQ-SC7**), and these ERCs would mitigate the PM10/PM2.5 impacts to a less than significant level. The particulate matter precursor offsets would satisfy Energy Commission staff's long-standing position that all nonattainment pollutant and precursor emissions be offset at least one-to-one. Future projects may be subject to different offset ratios because the U.S. EPA review of the SJVAPCD's 2008 PM2.5 Plan is ongoing, and there is no evidence that the District's interpollutant trading ratios have been specifically reviewed and/or approved by U.S. EPA (see **AIR QUALITY CUMULATIVE IMPACTS**).
- Staff recommends Condition of Certification **AQ-SC9** to ensure that the applicant would conduct initial commissioning on each CTG sequentially so that both CTGs would not undergo commissioning simultaneously.
- Staff recommends Condition of Certification **AQ-SC10** to limit ammonia slip from the combined-cycle system to the extent feasible.
- Staff recommends Condition of Certification **AQ-SC11** to see that startups from the two CTGs are staggered so that the combined one-hour NOx emission rate would be under 240 lb/hr (as in AFC Appendix Table 6.2-2.5).
- Global climate change and greenhouse gas (GHG) emissions from the project are discussed and analyzed in **AIR QUALITY APPENDIX AIR-1**. Avenal Energy would not be directly subject to the requirements of SB 1368 and the Emission Performance Standard, but this project would meet the CO_2 emission limits of this standard. Mandatory reporting of the GHG emissions is required as part of the Air Resources Board's greenhouse gas regulations, and this may enable the ARB to implement future GHG trading markets (see **AIR QUALITY APPENDIX AIR-1**). The project may be subject to additional reporting requirements and GHG reduction or trading requirements as GHG regulations become more fully developed and implemented.

PROPOSED CONDITIONS OF CERTIFICATION

STAFF-RECOMMENDED CONDITIONS OF CERTIFICATION

Staff proposes the following conditions of certification (**AQ-SC1** to **AQ-SC5**) to provide mitigation during the construction phase of the project. Other staff-proposed conditions of certification are identified as the **AQ-SCx** series.

AQ-SC1 Air Quality Construction Mitigation Manager (AQCMM): The project owner shall designate and retain an on-site AQCMM who shall be responsible for directing and documenting compliance with conditions **AQ-SC3, AQ-SC4** and **AQ-SC5** for the entire project site and linear facility construction. The on-site

AQCMM may delegate responsibilities to one or more AQCMM delegates. The AQCMM and AQCMM delegates shall have full access to all areas of construction on the project site and linear facilities, and shall have the authority to stop any or all construction activities as warranted by applicable construction mitigation conditions. The AQCMM and AQCMM delegates may have other responsibilities in addition to those described in this condition. The AQCMM shall not be terminated without written consent of the construction project manager (CPM).

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

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

Verification: At least 60 days prior to the start of any ground disturbance, the project owner shall submit the AQCMP to the CPM for approval. The CPM will notify the project owner of any necessary modifications to the plan within 30 days from the date of receipt. The AQCMP must be approved by the CPM before the start of ground disturbance.

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

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

B. No vehicle shall exceed 15 miles per hour within the construction site.

C. The construction site entrances shall be posted with visible speed limit signs.

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

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

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

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

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

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

J. At least the first 500 feet of any public roadway exiting from the construction site shall be swept at least twice daily (or less during periods of precipitation) on days when construction activity occurs or on any other day when dirt or run-off from the construction site is visible on the public roadways.

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

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

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

Verification: The project owner shall include in the MCR: (1) a summary of all actions taken to maintain compliance with this condition; (2) copies of any complaints filed with the air district in relation to project construction; and (3) any other documentation deemed necessary by the CPM and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC4 Dust Plume Response Requirement: The AQCMM or an AQCMM delegate shall monitor all construction activities for visible dust plumes. Observations of visible dust plumes with the potential to be transported off the project site, 200 feet beyond the centerline of the construction of linear facilities, or within 100 feet upwind of any regularly occupied structures not owned by the project owner indicate that existing mitigation measures are not providing effective

mitigation. The AQCMM or delegate shall then implement the following procedures for additional mitigation measures in the event that such visible dust plumes are observed.

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

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

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

Verification: The AQCMP shall include a section detailing how additional mitigation measures will be accomplished within specified time limits.

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

A. All diesel-fueled engines used in the construction of the facility shall have clearly visible tags issued by the on-site AQCMM showing that the engine meets the conditions set forth herein.

B. All construction diesel engines with a rating of 100 hp or higher shall meet, at a minimum, the Tier 2 California Emission Standards for Off-Road Compression-Ignition Engines, as specified in California Code of Regulations, Title 13, section 2423(b)(1), unless certified by the on-site AQCMM that such engine is not available for a particular item of equipment. In the event that a Tier 2 engine is not available for any off-road engine larger than 100 hp, that engine shall be equipped with a Tier 1 engine. In the event a Tier 1 engine is not available for any off-road engine larger than 100 hp, that engine shall be equipped with a diesel particulate filter (DPF) unless certified by engine manufacturers or the on-site AQCMM that the use of such devices is not practical for specific engine types. For purposes of this condition, the use of such devices is “not practical” for the following, as well as other, reasons.

1. There is no available DPF that has been verified by either the

California Air Resources Board or U.S. Environmental Protection Agency for the engine in question; or

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

3. The CPM may grant relief from this requirement if the AQCMM can demonstrate a good faith effort to comply with this requirement and that compliance is not possible.

C. The use of a soot filter may be terminated immediately if one of the following conditions exists, provided that the CPM is informed within 10 working days of the termination:

1. The use of the soot filter is excessively reducing the normal availability of the construction equipment due to increased down time for maintenance, and/or reduced power output due to an excessive increase in back pressure.

2. The soot filter is causing or is reasonably expected to cause significant engine damage.

3. The soot filter is causing or is reasonably expected to cause a significant risk to workers or the public.

4. Any other seriously detrimental cause which has the approval of the CPM prior to implementation of the termination.

D. All heavy earth-moving equipment and heavy duty construction-related trucks with engines meeting the requirements of (b) above shall be properly maintained and the engines tuned to the engine manufacturer's specifications.

E. All diesel heavy construction equipment shall not idle for more than five minutes, to the extent practical.

Verification: The project owner shall include in the MCR: (1) a summary of all actions taken to maintain compliance with this condition; (2) a list of all heavy equipment used on site during that month, including the owner of that equipment and a letter from each owner indicating that the equipment has been properly maintained; and (3) any other documentation deemed necessary by the CPM and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC6 The project owner shall submit to the CPM for review and approval any modification proposed by the project owner to any project air permit. The project owner shall submit to the CPM any modification to any permit proposed by the District or U.S. EPA, and any revised permit issued by the District or U.S. EPA, for the project.

Verification: The project owner shall submit any proposed air permit modification to the CPM within five working days of its submittal either by: 1) the project owner to an agency, or 2) receipt of proposed modifications from an agency. The project owner shall submit all modified air permits to the CPM within 15 days of receipt.

AQ-SC7 The project owner shall provide emission reductions in the form of offsets or emission reduction credits (ERCs) as calculated per SJVAPCD Rule 2201 to offset NOx, VOC, PM10, and SOx emissions. The project owner shall demonstrate that the reductions are provided in the form and amount required by the District.

The project owner shall surrender the ERCs from among those that are listed in the Final Preliminary Determination of Compliance Conditions (SJVAPCD 2008b) or a modified list, as allowed by this condition. If additional ERCs are submitted, the project owner shall submit an updated table including the additional ERCs to the CPM. The project owner shall request CPM approval for any substitutions, modifications, or additions to the listed credits.

The CPM, in consultation with the District, may approve any such change to the ERC list provided that the project remains in compliance with all applicable laws, ordinances, regulations, and standards, and that the requested change(s) will not cause the project to result in a significant environmental impact. The District must also confirm that each requested change is consistent with applicable federal and state laws and regulations.

Verification: The project owner shall submit to the CPM records showing that the project's offset requirements have been met prior to initiating construction. If the CPM approves a substitution or modification to the list of ERCs, the CPM shall file a statement of the approval with the project owner and Commission docket. The CPM shall maintain an updated list of approved ERCs for the project.

AQ-SC8 The project owner shall submit to the CPM quarterly operation reports that include operational and emissions information as necessary to demonstrate compliance with the conditions of certification. The quarterly operation report shall specifically note or highlight incidences of noncompliance.

Verification: The project owner shall submit quarterly operation reports to the CPM and APCO no later than 30 days following the end of each calendar quarter. This information shall be maintained on site for a minimum of five years and shall be provided to the CPM and District personnel upon request.

AQ-SC9 The facility shall be operated such that simultaneous commissioning of the two combustion turbines without abatement of nitrogen oxide and CO emissions by its SCR system and oxidation catalyst system will not occur. Operation of a combustion turbine during commissioning without abatement shall be limited to discrete commissioning activities that can only be properly executed without the SCR or Oxidation Catalyst Systems fully operational.

Verification: The project owner shall submit a monthly compliance report to the CPM during the commissioning period demonstrating compliance with this condition.

AQ-SC10 The ammonia (NH_3) emissions from each combustion turbine shall not exceed 10 ppmvd @ 15% O_2 averaged over one hour. The selective catalytic reduction (SCR) system catalyst shall be replaced, repaired, or otherwise reconditioned within 12 months if the ammonia slip exceeds 5 ppmvd @ 15% O_2 over a 24 hour rolling average. The SCR ammonia injection grid replacement, repair, or reconditioning scheduled event may be cancelled if the owner or operator can demonstrate that, subsequent to the initial exceedance, the ammonia slip consistently remains below 5 ppmvd @ 15% O_2 averaged over 24 hours, and that the initial exceedance does not accurately indicate expected future operating conditions.

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-SC11 While either combustion turbine is in start-up or shutdown, the combined emission rates of the two combustion turbine exhausts shall not exceed 240 lb/hr of NOx (as NO_2).

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

DISTRICT FINAL DETERMINATION OF COMPLIANCE CONDITIONS (SJVAPCD 2008B)

The SJVACPD permits each device separately, which causes duplication of conditions. Staff has compiled the SJVAPCD conditions to eliminate this duplication, with the conditions first for each of the two units in the combined-cycle system (**AQ-1** to **AQ-56**) and facility-wide conditions (**AQ-57** to **AQ-66**), followed by the conditions for the auxiliary boiler (**AQ-67** to **AQ-102**), the fire pump engine (**AQ-103** to **AQ-115**), and the emergency standby generator engine (**AQ-116** to **AQ-131**).

EQUIPMENT DESCRIPTION, UNIT C-3953-10-0

180 MW NOMINALLY RATED COMBINED-CYCLE POWER GENERATING SYSTEM #1 CONSISTING OF A GENERAL ELECTRIC FRAME 7 MODEL PG7241FA NATURAL GAS-FIRED COMBUSTION TURBINE GENERATOR WITH DRY LOW NOX COMBUSTOR, A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, AN OXIDATION CATALYST, HEAT RECOVERY STEAM GENERATOR #1 (HRSG) WITH A 562 MMBTU/HR DUCT BURNER AND A 300 MW NOMINALLY RATED STEAM TURBINE SHARED WITH C-3953-11

EQUIPMENT DESCRIPTION, UNIT C-3953-11-0

180 MW NOMINALLY RATED COMBINED-CYCLE POWER GENERATING SYSTEM #2 CONSISTING OF A GENERAL ELECTRIC FRAME 7 MODEL PG7241FA NATURAL GAS-FIRED COMBUSTION TURBINE GENERATOR WITH DRY LOW NOX COMBUSTOR, A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, AN OXIDATION CATALYST, HEAT RECOVERY STEAM GENERATOR #2 (HRSG) WITH A 562 MMBTU/HR DUCT BURNER AND A 300 MW NOMINALLY RATED STEAM TURBINE SHARED WITH C-3953-10

AQ-1 Permittee shall submit an application to comply with SJVUAPCD District Rule 2520 – Federally Mandated Operating Permits within twelve months of commencing operation. [District Rule 2520]

Verification: The project owner shall submit to both the District and CPM the Operating Permit application after completing commissioning.

AQ-2 Permittee shall submit an application to comply with SJVUAPCD District Rule 2540 – Acid Rain Program. [District Rule 2540]

Verification: The project owner shall submit to both the District and CPM the Acid Rain Program application after completing commissioning.

AQ-3 Prior to initial operation of C-3953-10-0, C-3953-11-0, and C-3953-12-0, permittee shall provide NOx (as NO2) emission reduction credits for the following quantities of emissions: 1st quarter – 67,103 lb; 2nd quarter – 67,104 lb; 3rd quarter – 67,104 lb; and 4th quarter – 67,104 lb. Offsets shall be provided at the appropriate distance ratio specified in Rule 2201. [District Rule 2201]

Verification: The project owner shall submit to both the District and CPM records showing that the project's offset requirements have been met prior to initiating operation.

AQ-4 Prior to initial operation of C-3953-10-0, C-3953-11-0, and C-3953-12-0, permittee shall provide VOC emission reduction credits for the following quantities of emissions: 1st quarter – 12,294 lb; 2nd quarter – 12,295 lb; 3rd quarter – 12,295 lb; and 4th quarter – 12,295 lb. Offsets shall be provided at the appropriate distance ratio specified in Rule 2201. [District Rule 2201]

Verification: The project owner shall submit to both the District and CPM records showing that the project's offset requirements have been met prior to initiating operation.

AQ-5 Prior to initial operation of C-3953-10-0, C-3953-11-0, and C-3953-12-0, permittee shall provide PM_{10} emission reduction credits for the following quantities of emissions: 1st quarter – 33,085 lb; 2nd quarter – 33,085 lb; 3rd quarter – 33,085 lb; and 4th quarter – 33,085 lb. Offsets shall be provided at the appropriate distance ratio specified in Rule 2201. SOx ERC's may be used to offset PM10 increases at an interpollutant ratio of 1.0 lb-SOx : 1.0 lb-PM10. [District Rule 2201]

Verification: The project owner shall submit to both the District and CPM records showing that the project's offset requirements have been met prior to initiating operation.

AQ-6 ERC certificate numbers (or any splits from these certificates) C-897-1, C-898-1, N-724-1, N-725-1, S-2812-1, S-2813-1, S-2817-1, C-899-2, C-902-2, N-720-2, N-722-2, N-726-2, N-728-2, S-2814-2, S-2321-2, C-896-4, N-721-4, N-723-4, S-2791-5, S-2790-5, S-2789-5, S-2788-5, or N-762-5 shall be used to supply the required offsets, unless a revised offsetting proposal is received and approved by the District, upon which this determination of compliance

(DOC) shall be reissued, administratively specifying the new offsetting proposal. Original public noticing requirements, if any, shall be duplicated prior to reissuance of the DOC. [District Rule 2201]

Verification: The project owner shall submit to both the District and CPM records showing that the project's offset requirements have been met prior to initiating operation.

AQ-7 No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]

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

AQ-8 No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]

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

AQ-9 Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]

Verification: The project owner shall submit the results of source tests to both the District and CPM in accordance with **AQ-42**.

AQ-10 The CTG shall be fired exclusively on PUC-regulated natural gas with a sulfur content of no greater than 1.0 grains of sulfur compounds (as S) per 100 dry scf of natural gas. [District Rule 2201 and 40 CFR 60.4330(a)(2)]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-11 Annual average of the sulfur content of the CTG shall not exceed 0.36 grain of sulfur compounds (as S) per 100 dry scf of natural gas. [District Rule 2201]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (AQ-**SC8**).

AQ-12 The owner or operator shall install, certify, maintain, operate and quality-assure a Continuous Emission Monitoring System (CEMS) which continuously measures and records the exhaust gas NO_X, CO and O_2 concentrations. Continuous emissions monitor(s) shall be capable of monitoring emissions during normal operating conditions, and during startups and shutdowns provided the CEMS passes the relative accuracy requirement for startups and shutdowns specified herein. If relative accuracy of CEMS cannot be demonstrated during startup conditions, CEMS results during startup and shutdown events shall be replaced with startup emission rates obtained from source testing to determine compliance with emission limits contained in this document. [District Rules 1080 and 4703 and 40 CFR 60.4340(b)(1)]

Verification: The project owner shall make the site available for inspection by representatives of the District, ARB and the Commission to verify the continuous monitoring system is properly installed and operational.

AQ-13 The CEMS shall complete a minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive 15-minute period or shall meet equivalent specifications established by mutual agreement of the District, the ARB and the EPA. [District Rule 1080 and 40 CFR 60.4345(b)]

Verification: The project owner shall submit to the CPM and APCO CEMS audits demonstrating compliance with this condition as part of the quarterly operation report (**AQ-SC8**).

AQ-14 The NO_X, CO and O_2 CEMS shall meet the requirements in 40 CFR 60, Appendix F Procedure 1 and Part 60, Appendix B Performance Specification 2 (PS 2), or shall meet equivalent specifications established by mutual agreement of the District, the ARB, and the EPA. [District Rule 1080 and 40 CFR 60.4345(a)]

Verification: The project owner shall submit to the CPM and APCO CEMS audits demonstrating compliance with this condition as part of the quarterly operation report (**AQ-SC8**).

AQ-15 Audits of continuous emission monitors shall be conducted quarterly, except during quarters in which relative accuracy and compliance source testing are both performed, in accordance with EPA guidelines. The District shall be notified prior to completion of the audits. Audit reports shall be submitted along with quarterly compliance reports to the District. [District Rule 1080]

Verification: The project owner shall submit to the CPM and APCO CEMS audits demonstrating compliance with this condition as part of the quarterly operation report (**AQ-SC8**).

AQ-16 The owner/operator shall perform a relative accuracy test audit (RATA) for NO_X, CO and O_2 as specified by 40 CFR Part 60, Appendix F, 5.11, at least once every four calendar quarters. The permittee shall comply with the applicable requirements for quality assurance testing and maintenance of the continuous emission monitor equipment in accordance with the procedures and guidance specified in 40 CFR Part 60, Appendix F. [District Rule 1080]

Verification: The project owner shall submit to the CPM and APCO CEMS audits demonstrating compliance with this condition as part of the quarterly operation report (**AQ-SC8**).

AQ-17 APCO or an authorized representative shall be allowed to inspect, as determined to be necessary, the required monitoring devices to ensure that such devices are functioning properly. [District Rule 1080]

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

AQ-18 Results of the CEM system shall be averaged over a one hour period for NO_X emissions and a three hour period for CO emissions using consecutive 15-minute sampling periods in accordance with all applicable requirements of CFR 60.13. [District Rule 4703 and 40 CFR 60.13]

Verification: The project owner shall submit to the District and CPM the report of emission data in the quarterly operation report (AQ-SC8) that follows the definitions of this condition.

AQ-19 Results of continuous emissions monitoring shall be reduced according to the procedures established in 40 CFR, Part 51, Appendix P, paragraphs 5.0 through 5.3.3, or by other methods deemed equivalent by mutual agreement with the District, the ARB, and the EPA. [District Rule 1080]

Verification: The project owner shall submit to the District and CPM emission data in the quarterly operation report (AQ-SC8) that follows the definitions of this condition.

AQ-20 Tgghe owner or operator shall, upon written notice from the APCO, provide a summary of the data obtained from the CEM systems. This summary shall be in the form and the manner prescribed by the APCO. [District Rule 1080]

Verification: The project owner shall submit to the District and CPM the report of CEM operations upon notice from the APCO.

AQ-21 The facility shall install and maintain equipment, facilities, and systems compatible with the District's CEM data polling software system and shall make CEM data available to the District's automated polling system on a daily basis. [District Rule 1080]

Verification: The project owner shall provide a Continuous Emission Monitoring System (CEM) protocol for approval by the APCO and CPM at least 60 days prior to installation of the CEM. The project owner shall make the site available for inspection by representatives of the District, ARB and the Commission upon request.

AQ-22 Upon notice by the District that the facility's CEM system is not providing polling data, the facility may continue to operate without providing automated data for a maximum of 30 days per calendar year provided the CEM data is sent to the District by a District-approved alternative method. [District Rule 1080]

Verification: The project owner shall provide required non-polled CEM data to the District by a District-approved alternative method.

AQ-23 The owner or operator shall submit a written report of CEM operations for each calendar quarter to the APCO. The report is due on the 30th day following the end of the calendar quarter and shall include the following: Time intervals, data and magnitude of excess NOx emissions, nature and the cause of excess (if known), corrective actions taken and preventive measures adopted; Averaging period used for data reporting corresponding to the averaging period specified in the emission test period used to determine compliance with an emission standard; Applicable time and date of each period during which the CEM was inoperative (monitor downtime), except for zero

and span checks, and the nature of system repairs and adjustments; A negative declaration when no excess emissions occurred. [District Rule 1080 and 40 CFR 60.4375(a) and 60.4395]

Verification: The project owner shall submit to the District and CPM the report of CEM operations, emission data, and monitor downtime data in the quarterly operation report (**AQ-SC8**) that follows the definitions of this condition.

AQ-24 Permittee shall notify the District of any breakdown condition as soon as reasonably possible, but no later than one hour after its detection, unless the owner or operator demonstrates to the District's satisfaction that the longer reporting period was necessary. [District Rule 1100, 6.1]

Verification: The project owner shall comply with the notification requirements of the District and submit written copies of these notification reports to the CPM and the APCO as part of the quarterly operation report (**AQ-SC8**).

AQ-25 The District shall be notified in writing within ten days following the correction of any breakdown condition. The breakdown notification shall include a description of the equipment malfunction or failure, the date and cause of the initial failure, the estimated emissions in excess of those allowed, and the methods utilized to restore normal operations. [District Rule 1100, 7.0]

Verification: The project owner shall comply with the notification requirements of the District and submit written copies of these notification reports to the CPM and the APCO as part of the quarterly operation report (**AQ-SC8**).

AQ-26 Emission rates from this unit (with duct burner firing), except during startup and shutdown periods, shall not exceed any of the following limits: NOx (as NO2) – 17.20 lb/hr and 2.0 ppmvd @ 15% O2; VOC (as methane) – 5.89 lb/hr and 2.0 ppmvd @ 15% O2; CO – 10.60 lb/hr and 2.0 ppmvd @ 15% O2; PM10 – 11.78 lb/hr; or SOx (as SO2) – 6.65 lb/hr. NOx (as NO2) emission limits are one hour rolling averages. All other emission limits are three hour rolling averages. [District Rules 2201, 4001, and 4703]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-27 Emission rates from this unit (without duct burner firing), except during startup and shutdown periods, shall not exceed any of the following limits: NOx (as NO2) – 13.55 lb/hr and 2.0 ppmvd @ 15% O2; VOC (as methane) – 3.34 lb/hr and 1.4 ppmvd @ 15% O2; CO – 8.35 lb/hr and 2.0 ppmvd @ 15% O2; PM10 – 8.91 lb/hr; or SOx (as SO2) – 5.23 lb/hr. NOx (as NO2) emission limits are one hour rolling averages. All other emission limits are three hour rolling averages. [District Rules 2201, 4001, and 4703]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-28 During start-up and shutdown, CTG exhaust emission rates shall not exceed any of the following limits: NO_X (as NO_2) – 160 lb/hr; CO – 1,000 lb/hr; VOC (as methane) – 16 lb/hr; PM_{10} – 11.78 lb/hr; SO_X (as SO_2) – 6.652 lb/hr; or NH_3 – 32.13 lb/hr. [District Rules 2201 and 4703]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-29 Daily emissions from the CTG shall not exceed the following limits: NO_X (as NO_2) – 412.8 lb/day; CO – 254.4 lb/day; VOC – 141.4 lb/day; PM_{10} – 282.7 lb/day; SO_X (as SO_2) – 159.6 lb/day, or NH_3 – 771.1 lb/day. [District Rule 2201]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-30 Emissions from this unit, on days when a startup and/or shutdown occurs, shall not exceed the following limits: NOx (as NO2) – 789.6 lb/day; VOC – 202.0 lb/day; CO – 5,590.8 lb/day; PM10 – 282.7 lb/day; SOx (as SO2) – 159.6 lb/day, or NH_3 – 771.1 lb/day. [District Rule 2201]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (AQ-**SC8**).

AQ-31 The ammonia (NH3) emissions shall not exceed 10 ppmvd @ 15% O2 over a 24 hour rolling average. [District Rule 2201]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (AQ-**SC8**).

AQ-32 The CTG shall be fired exclusively on PUC-regulated natural gas with a sulfur content no greater than 1.0 grain of sulfur compounds (as S) per 100 dry scf of natural gas. [District Rule 2201 and 40 CFR 60.4330(a)(2)]

Verification: The result of the natural gas fuel sulfur monitoring data and other fuel sulfur content source data shall be submitted to the District and CPM in the quarterly operation report (**AQ-SC8**).

AQ-33 Annual emissions from the CTG, calculated on a twelve month rolling basis, shall not exceed any of the following limits: NO_X (as NO_2) – 143,951 lb/year; CO – 601,810 lb/year; VOC – 34,489 lb/year; PM_{10} – 80,656 lb/year; or SO_X (as SO_2) – 16,694 lb/year; or NH_3 – 208,708 lb/year. [District Rule 2201]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-34 The duration of each startup or shutdown shall not exceed six hours. Startup and shutdown emissions shall be counted toward all applicable emission limits. [District Rules 2201 and 4703]

Verification: The project owner shall submit to the District and CPM the CTG startup and shutdown event duration data demonstrating compliance with this condition as part of the quarterly operation report (**AQ-SC8**).

AQ-35 Each one hour period shall commence on the hour. Each one hour period in a three hour rolling average will commence on the hour. The three hour average will be compiled from the three most recent one hour periods. Each one hour period in a twenty-four hour average for ammonia slip will commence on the hour. [District Rule 2201]

Verification: No verification needed.

AQ-36 Daily emissions will be compiled for a twenty-four hour period starting and ending at twelve-midnight. Each month in the twelve consecutive month rolling average emissions shall commence at the beginning of the first day of the month. The twelve consecutive month rolling average emissions to determine compliance with annual emissions limitations shall be compiled from the twelve most recent calendar months. [District Rule 2201]

Verification: No verification needed.

AQ-37 Startup shall be defined as the period of time during which a unit is brought from a shutdown status to its operating temperature and pressure, including the time required by the unit's emission control system to reach full operations. Shutdown shall be defined as the period of time during which a unit is taken from an operational to a non-operational status by allowing it to cool down from its operating temperature to ambient temperature as the fuel supply to the unit is completely turned off. [District Rules 2201 and 4703]

Verification: The project owner shall submit to the District and CPM the CTG startup and shutdown data demonstrating compliance with this condition as part of the quarterly operation report (**AQ-SC8**).

AQ-38 The emission control systems shall be in operation and emissions shall be minimized insofar as technologically feasible during startup and shutdown. [District Rule 4703]

Verification: The project owner shall submit to the District and CPM the CTG startup and shutdown emissions data demonstrating compliance with this condition as part of the quarterly operation report (**AQ-SC8**).

AQ-39 The exhaust stack shall be equipped with permanent provisions to allow collection of stack gas samples consistent with EPA test methods and shall be equipped with safe permanent provisions to sample stack gases with a portable NOx, CO, and O2 analyzer during District inspections. The sampling ports shall be located in accordance with the CARB regulation titled California

Air Resources Board Air Monitoring Quality Assurance Volume VI, Standard Operating Procedures for Stationary Emission Monitoring and Testing. [District Rule 1081]

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

AQ-40 Source testing to measure startup NOx, CO, and VOC mass emission rates shall be conducted for one of the gas turbines (C-3953-10 or C-3953-11) prior to the end of the commissioning period and at least once every seven years thereafter. CEM relative accuracy shall be determined during startup source testing in accordance with 40 CFR 60, Appendix B. [District Rule 1081]

Verification: The results and field data collected during source tests shall be submitted to the District and CPM within 60 days of testing and according to a pre-approved protocol (**AQ-47**). Testing of startups shall be conducted for the CTG upon initial operation, and at least once every seven years.

AQ-41 Source testing (with and without duct burner firing) to measure the NOx, CO, and VOC emission rates (lb/hr and ppmvd @ 15% O2) shall be conducted within 60 days after the end of the commissioning period and at least once every twelve months thereafter. [District Rules 1081 and 4703]

Verification: The results and field data collected during source tests shall be submitted to the District and CPM within 60 days of testing and according to a pre-approved protocol (**AQ-47**). Testing for steady operation shall be conducted upon initial operation and at least once every twelve months.

AQ-42 Source testing (with and without duct burner firing) to measure the PM10 emission rate (lb/hr) and the ammonia emission rate shall be conducted within 60 days after the end of the commissioning period and at least once every twelve months thereafter. [District Rule 1081]

Verification: The results and field data collected during source tests shall be submitted to the District and CPM within 60 days of testing and according to a pre-approved protocol (**AQ-47**). Testing for steady operation shall be conducted upon initial operation and at least once every twelve months.

AQ-43 Compliance with natural gas sulfur content limit shall be demonstrated within 60 days after the end of the commissioning period and weekly thereafter. After demonstrating compliance with the fuel sulfur content limit for eight consecutive weeks for a fuel source, then the testing frequency shall not be less than monthly. If a test shows noncompliance with the sulfur content requirement, the source must return to weekly testing until eight consecutive weeks show compliance. [District Rules 1081, 2540, and 4001].

Verification: The result of the natural gas fuel sulfur monitoring data and other fuel sulfur content source data shall be submitted to the District and CPM in the quarterly operation report (**AQ-SC8**).

AQ-44 Demonstration of compliance with the annual average sulfur content limit shall be demonstrated by a 12 month rolling average of the sulfur content either (i) documented in a valid purchase contract, a supplier certification, a tariff sheet or transportation contract or (ii) tested using ASTM Methods D1072, D3246, D4084, D4468, D4810, D6228, D6667 or Gas Processors Association Standard 2377. [District Rules 1081 and 2201]

Verification: The result of the natural gas fuel sulfur monitoring data and other fuel sulfur content source data shall be submitted to the District and CPM in the quarterly operation report (**AQ-SC8**).

AQ-45 Source testing to determine compliance with the NOx, CO and VOC emission rates (lb/hr and ppmvd @ 15% O_2), NH3 emission rate (ppmvd @ 15% O_2) and PM_{10} emission rate (lb/hr) shall be conducted at least once every 12 months. [District Rules 1081, 2201 and 4703 and 40 CFR 60.4400(a)]

Verification: The results and field data collected during source tests shall be submitted to the District and CPM within 60 days of testing and according to a pre-approved protocol (**AQ-47**). Testing for steady operation shall be conducted upon initial operation and at least once every twelve months.

AQ-46 Compliance with the NO_X and CO emission limits shall be demonstrated with the auxiliary burner both on and off. [District Rule 4703]

Verification: The project owner shall submit the proposed protocol for the source tests to both the District and CPM for approval in accordance with condition **AQ-47**.

AQ-47 Compliance demonstration (source testing) shall be District witnessed, or authorized and samples shall be collected by a California Air Resources Board certified testing laboratory. Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified 30 days prior to any compliance source test, and a source test plan must be submitted for approval 15 days prior to testing. The results of each source test shall be submitted to the District within 60 days thereafter. [District Rule 1081]

Verification: The project owner shall submit the proposed source test plan or protocol for the source tests 15 days prior to the proposed source test date to both the District and CPM for approval. The project owner shall notify the District and CPM no later than seven days prior to the proposed source test date and time. The project owner shall submit source test results no later than 60 days following the source test date to both the District and CPM.

AQ-48 The following test methods shall be used: NO_X – EPA Method 7E or 20; CO – EPA Method 10 or 10B; VOC – EPA Method 18 or 25; PM10 – EPA Method 5 (front half and back half) or 201 and 202a; ammonia – BAAQMD ST-1B; and O_2 – EPA Method 3, 3A, or 20. EPA approved alternative test methods as approved by the District may also be used to address the source testing requirements of this permit. [District Rules 1081 and 4703 and 40 CFR 60.4400(1)(i)]

Verification: The project owner shall submit the proposed protocol for the source tests to both the District and CPM for approval in accordance with condition **AQ-47**.

AQ-49 The sulfur content of each fuel source shall be: (i) documented in a valid purchase contract, a supplier certification, a tariff sheet or transportation contract or (ii) monitored within 60 days of the end of the commission period and weekly thereafter. If the sulfur content is demonstrated to be less than 1.0 gr/100 scf for eight consecutive weeks, then the monitoring frequency shall be every six months. If the result of any six month monitoring demonstrates that the fuel does not meet the fuel sulfur content limit, weekly monitoring shall resume. [District Rule 2201 and 40 CFR 60.4360, 60.4365(a) and 60.4370(c)]

Verification: The result of the natural gas fuel sulfur monitoring data and other fuel sulfur content source data shall be submitted to the District and CPM in the quarterly operation report (**AQ-SC8**).

AQ-50 Excess emissions shall be defined as any operating hour in which the 4-hour or 30-day rolling average NO_X concentration exceeds applicable emissions limit and a period of monitor downtime shall be any unit operating hour in which sufficient data are not obtained to validate the hour for either NO_X or O2 (or both). [40 CFR 60.4380(b)(1)]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-51 Fuel sulfur content shall be monitored using one of the following methods: ASTM Methods D1072, D3246, D4084, D4468, D4810, D6228, D6667 or Gas Processors Association Standard 2377. [40 CFR 60.4415(a)(1)(i)]

Verification: The result of the natural gas fuel sulfur monitoring data and other fuel sulfur content source data shall be submitted to the District and CPM in the quarterly operation report (**AQ-SC8**).

AQ-52 The permittee shall submit to the District information correlating the NO_X control system operating parameters to the associated measured NO_X output. The information must be sufficient to allow the District to determine compliance with the NO_X emission limits of this permit during times that the CEMS is not functioning properly. [District Rule 4703]

Verification: The project owner shall compile the required NOx control system and emissions data and submit the information to the District and CPM before issuance of the Operating Permit.

AQ-53 The permittee shall maintain the following records: the date, time and duration of any malfunction of the continuous monitoring equipment; dates of performance testing; dates of evaluations, calibrations, checks, and adjustments of the continuous monitoring equipment; date and time period which a continuous monitoring system or monitoring device was inoperative. [District Rules 1080 and 2201 and 40 CFR 60.8(d)]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-54 The permittee shall maintain the following records: date and time, duration, and type of any startup, shutdown, or malfunction; performance testing, evaluations, calibrations, checks, adjustments, any period during which a continuous monitoring system or monitoring device was inoperative, and maintenance of any continuous emission monitor. [District Rules 2201 and 4703]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-55 The permittee shall maintain the following records: hours of operation, fuel consumption (scf/hr and scf/rolling twelve month period), continuous emission monitor measurements, calculated ammonia slip, and calculated NOx mass emission rates (lb/hr and lb/twelve month rolling period). [District Rules 2201 and 4703]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-56 The owner or operator of a stationary gas turbine system shall maintain all records of required monitoring data and support information for inspection at any time for a period of five years. [District Rules 2201 and 4703]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-57 Disturbances of soil related to any construction, demolition, excavation, extraction, or other earthmoving activities shall comply with the requirements for fugitive dust control in District Rule 8021 unless specifically exempted under Section 4.0 of Rule 8021 or Rule 8011. [District Rules 8011 and 8021]

Verification: A summary of significant construction activities and monitoring records required shall be included in the construction monthly compliance report (**AQ-SC3**).

AQ-58 An owner/operator shall submit a Dust Control Plan to the APCO prior to the start of any construction activity on any site that will include 10 acres or more of disturbed surface area for residential developments, or five acres or more of disturbed surface area for non-residential development, or will include moving, depositing, or relocating more than 2,500 cubic yards per day of bulk materials on at least three days. [District Rules 8011 and 8021]

Verification: The Dust Control Plan shall be included within the Air Quality Construction Mitigation Plan and submitted to the District and CPM (**AQ-SC2**), and a summary of significant construction activities and monitoring records required shall be included in the construction monthly compliance report (**AQ-SC3**).

AQ-59 An owner/operator shall prevent or cleanup any carryout or trackout in accordance with the requirements of District Rule 8041 Section 5.0, unless specifically exempted under Section 4.0 of Rule 8041 (8/19/04) or Rule 8011(8/19/04). [District Rules 8011 and 8021]

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

AQ-60 Whenever open areas are disturbed, or vehicles are used in open areas, the facility shall comply with the requirements of Section 5.0 of District Rule 8051, unless specifically exempted under Section 4.0 of Rule 8051 or Rule 8011. [District Rules 8011 and 8051]

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

AQ-61 Any paved road or unpaved road shall comply with the requirements of District Rule 8061 unless specifically exempted under Section 4.0 of Rule 8061 or Rule 8011. [District Rules 8011 and 8061]

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

AQ-62 Water, gravel, roadmix, or chemical/organic dust stabilizers/suppressants, vegetative materials, or other District-approved control measure shall be applied to unpaved vehicle travel areas as required to limit Visible Dust Emissions to 20% opacity and comply with the requirements for a stabilized unpaved road as defined in Section 3.59 of District Rule 8011. [District Rule 8011 and 8071]

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

AQ-63 Where dusting materials are allowed to accumulate on paved surfaces, the accumulation shall be removed daily or water and/or chemical/organic dust stabilizers/suppressants shall be applied to the paved surface as required to maintain continuous compliance with the requirements for a stabilized unpaved road as defined in Section 3.59 of District Rule 8011 and limit Visible Dust Emissions (VDE) to 20% opacity. [District Rule 8011 and 8071]

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

AQ-64 On each day that 50 or more Vehicle Daily Trips or 25 or more Vehicle Daily Trips with three axles or more will occur on an unpaved vehicle/equipment traffic area, permittee shall apply water, gravel, roadmix, or chemical/organic dust stabilizers/suppressants, vegetative materials, or other District-approved control measure as required to limit Visible Dust Emissions to 20% opacity and comply with the requirements for a stabilized unpaved road as defined in Section 3.59 of District Rule 8011. [District Rule 8011 and 8071]

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

AQ-65 Whenever any portion of the site becomes inactive, Permittee shall restrict access and periodically stabilize any disturbed surface to comply with the conditions for a stabilized surface as defined in Section 3.58 of District Rule 8011. [District Rules 8011 and 8071]

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

AQ-66 Records and other supporting documentation shall be maintained as required to demonstrate compliance with the requirements of the rules under Regulation VIII only for those days that a control measure was implemented. Such records shall include the type of control measure(s) used, the location and extent of coverage, and the date, amount, and frequency of application of dust suppressant, manufacturer's dust suppressant product information sheet that identifies the name of the dust suppressant and application instructions. Records shall be kept for one year following project completion that results in the termination of all dust generating activities. [District Rules 8011, 8031, and 8071]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

EQUIPMENT DESCRIPTION, UNIT C-3953-12-0

37.4 MMBTU/HR CLEAVER BROOKS MODEL CBL-700-900-200#ST NATURAL GAS-FIRED BOILER WITH A CLEAVER BROOKS MODEL PROFIRE, OR DISTRICT APPROVED EQUIVALENT, ULTRA LOW NOx BURNER

AQ-67 Permittee shall submit an application to comply with SJVUAPCD District Rule 2520 – Federally Mandated Operating Permits within twelve months of commencing operation. [District Rule 2520]

Verification: The project owner shall submit to both the District and CPM the Operating Permit application after completing commissioning.

AQ-68 Prior to initial operation of C-3953-10-0, C-3953-11-0, and C-3953-12-0, permittee shall provide NOx (as NO2) emission reduction credits for the following quantities of emissions: 1st quarter – 67,103 lb; 2nd quarter – 67,104 lb; 3rd quarter – 67,104 lb; and 4th quarter – 67,104 lb. Offsets shall be provided at the appropriate distance ratio specified in Rule 2201. [District Rule 2201]

Verification: The project owner shall submit to both the District and CPM records showing that the project's offset requirements have been met prior to initiating operation.

AQ-69 Prior to initial operation of C-3953-10-0, C-3953-11-0, and C-3953-12-0, permittee shall provide VOC emission reduction credits for the following quantities of emissions: 1st quarter – 12,294 lb; 2nd quarter – 12,295 lb; 3rd quarter – 12,295 lb; and 4th quarter – 12,295 lb. Offsets shall be provided at the appropriate distance ratio specified in Rule 2201. [District Rule 2201]

Verification: The project owner shall submit to both the District and CPM records showing that the project's offset requirements have been met prior to initiating operation.

AQ-70 Prior to initial operation of C-3953-10-0, C-3953-11-0, and C-3953-12-0, permittee shall provide PM_{10} emission reduction credits for the following quantities of emissions: 1st quarter – 33,087 lb; 2nd quarter – 33,086 lb; 3rd quarter – 33,086 lb; and 4th quarter – 33,086 lb. Offsets shall be provided at the appropriate distance ratio specified in Rule 2201. SOx ERC's may be used to offset PM10 increases at an interpollutant ratio of 1.0 lb-SOx : 1.0 lb-PM10. [District Rule 2201]

Verification: The project owner shall submit to both the District and CPM records showing that the project's offset requirements have been met prior to initiating operation.

AQ-71 ERC certificate numbers (or any splits from these certificates) C-897-1, C-898-1, N-724-1, N-725-1, S-2812-1, S-2813-1, S-2817-1, C-899-2, C-902-2, N-720-2, N-722-2, N-726-2, N-728-2, S-2814-2, S-2321-2, C-896-4, N-721-4, N-723-4, S-2791-5, S-2790-5, S-2789-5, S-2788-5, or N-762-5 shall be used to supply the required offsets, unless a revised offsetting proposal is received and approved by the District, upon which this determination of compliance (DOC) shall be reissued, administratively specifying the new offsetting proposal. Original public noticing requirements, if any, shall be duplicated prior to reissuance of the DOC. [District Rule 2201]

Verification: The project owner shall submit to both the District and CPM records showing that the project's offset requirements have been met prior to initiating operation.

AQ-72 The permittee shall obtain written District approval for the use of any equivalent equipment not specifically approved by this Authority to Construct. Approval of the equivalent equipment shall be made only after the District's determination that the submitted design and performance of the proposed alternate equipment is equivalent to the specifically authorized equipment. [District Rule 2201]

Verification: The project owner shall submit to both the District and CPM the application for equivalent equipment as needed.

AQ-73 The permittee's request for approval of equivalent equipment shall include the make, model, manufacturer's maximum rating, manufacturer's guaranteed emission rates, equipment drawing(s), and operational characteristics/parameters. [District Rule 2010]

Verification: The project owner shall submit to both the District and CPM the application for equivalent equipment as needed.

AQ-74 Alternate equipment shall be of the same class and category of source as the equipment authorized by the Authority to Construct. [District Rule 2201]

Verification: The project owner shall submit to both the District and CPM the application for equivalent equipment as needed.

AQ-75 No emission factor and no emission shall be greater for the alternate equipment than for the proposed equipment. No changes in the hours of operation, operating rate, throughput, or firing rate may be authorized for any alternate equipment. [District Rule 2201]

Verification: The project owner shall submit to both the District and CPM the application for equivalent equipment as needed.

AQ-76 All equipment shall be maintained in good operating condition and shall be operated in a manner to minimize emissions of air contaminants into the atmosphere. [District Rule 2201]

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

AQ-77 No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]

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

AQ-78 No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]

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

AQ-79 Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-80 The unit shall only be fired on PUC-regulated natural gas. [District Rule 2201]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-81 Emission rates from this unit shall not exceed any of the following limits: NOx (as NO2) – 9.0 ppmvd @ 3% O2 or 0.011 lb/MMBtu; VOC (as methane) – 10.0 ppmvd @ 3% O2; CO – 50.0 ppmvd @ 3% O2 or 0.037 lb/MMBtu; PM10 – 0.005 lb/MMBtu; or SOx (as SO2) – 0.00285 lb/MMBtu. [District Rules 2201, 4305, and 4306]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-82 All emissions measurements shall be made with the unit operating either at conditions representative of normal operations or conditions specified in the Permit to Operate. No determination of compliance shall be established within two hours after a continuous period in which fuel flow to the unit is shut off for 30 minutes or longer, or within 30 minutes after a re-ignition as defined in Section 3.0 of District Rule 4306. [District Rules 4305 and 4306]

Verification: The project owner shall submit the proposed protocol for the source tests to both the District and CPM for approval in accordance with condition **AQ-47**.

AQ-83 Source testing to measure NOx and CO emissions from this unit while fired on natural gas shall be conducted within 60 days of initial start-up. [District Rules 2201, 4305, and 4306]

Verification: The project owner shall submit the proposed protocol for the source tests to both the District and CPM for approval in accordance with condition **AQ-47**.

AQ-84 Source testing to measure NOx and CO emissions from this unit while fired on natural gas shall be conducted at least once every twelve (12) months. After demonstrating compliance on two (2) consecutive annual source tests, the unit shall be tested not less than once every thirty-six (36) months. If the result of the 36-month source test demonstrates that the unit does not meet the applicable emission limits, the source testing frequency shall revert to at least once every twelve (12) months. [District Rules 4305 and 4306]

Verification: The project owner shall submit the proposed protocol for the source tests to both the District and CPM for approval in accordance with condition **AQ-47**. Testing for steady operation shall be conducted upon initial operation and at least once every twelve months.

AQ-85 The source test plan shall identify which basis (ppmv or lb/MMBtu) will be used to demonstrate compliance. [District Rules 4305 and 4306]

Verification: The project owner shall submit the proposed protocol for the source tests to both the District and CPM for approval in accordance with condition **AQ-47**.

AQ-86 Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified at least 30 days prior to any compliance source test, and a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081]

Verification: The project owner shall submit the proposed protocol for the source tests to both the District and CPM for approval in accordance with condition **AQ-47**.

AQ-87 NOx emissions for source test purposes shall be determined using EPA Method 7E or ARB Method 100 on a ppmv basis, or EPA Method 19 on a heat input basis. [District Rules 4305 and 4306]

Verification: The project owner shall submit the proposed protocol for the source tests to both the District and CPM for approval in accordance with condition **AQ-47**.

AQ-88 CO emissions for source test purposes shall be determined using EPA Method 10 or ARB Method 100. [District Rules 4305 and 4306]

Verification: The project owner shall submit the proposed protocol for the source tests to both the District and CPM for approval in accordance with condition **AQ-47**.

AQ-89 Stack gas oxygen (O2) shall be determined using EPA Method 3 or 3A or ARB Method 100. [District Rules 4305 and 4306]

Verification: The project owner shall submit the proposed protocol for the source tests to both the District and CPM for approval in accordance with condition **AQ-47**.

AQ-90 For emissions source testing, the arithmetic average of three 30-consecutive-minute test runs shall apply. If two of three runs are above an applicable limit the test cannot be used to demonstrate compliance with an applicable limit. [District Rules 4305 and 4306]

Verification: The project owner shall submit the proposed protocol for the source tests to both the District and CPM for approval in accordance with condition **AQ-47**.

AQ-91 The results of each source test shall be submitted to the District within 60 days thereafter. [District Rule 1081]

Verification: The project owner shall submit the proposed protocol for the source tests to both the District and CPM for approval in accordance with condition **AQ-47**. The results of each source test shall be submitted to the District within 60 days thereafter.

AQ-92 A non-resettable, totalizing mass or volumetric fuel flow meter to measure the amount of fuel combusted in the unit shall be installed, utilized and maintained. [District Rules 2201 and 40 CFR 60.48 (c)(g)]

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

AQ-93 Permittee shall maintain daily records of the type and quantity of fuel combusted by the boiler. [District Rules 2201 and 40 CFR 60.48 (c)(g)]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-94 All records shall be maintained and retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rules 1070, 4305, and 4306]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-95 The exhaust stack shall be equipped with a continuous emissions monitor (CEM) for NOx, CO, and O2. The CEM shall meet the requirements of 40 CFR parts 60 and 75 and shall be capable of monitoring emissions during startups and shutdowns as well as during normal operating conditions. [District Rules 2201 and 1080]

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

AQ-96 The facility shall install and maintain equipment, facilities, and systems compatible with the District's CEM data polling software system and shall make CEM data available to the District's automated polling system on a daily basis. [District Rule 1080]

Verification: The project owner shall provide a Continuous Emission Monitoring System (CEM) protocol for approval by the APCO and CPM at least 60 days prior to installation of the CEM. The project owner shall make the site available for inspection by representatives of the District, ARB and the Commission upon request.

AQ-97 Upon notice by the District that the facility's CEM system is not providing polling data, the facility may continue to operate without providing automated data for a maximum of 30 days per calendar year provided the CEM data is sent to the District by a District-approved alternative method. [District Rule 1080]

Verification: The project owner shall provide required non-polled CEM data to the District by a District-approved alternative method.

AQ-98 The exhaust stack shall be equipped with permanent provisions to allow collection of stack gas samples consistent with EPA test methods and shall be equipped with safe permanent provisions to sample stack gases with a portable NOx, CO, and O2 analyzer during District inspections. The sampling ports shall be located in accordance with the CARB regulation titled California Air Resources Board Air Monitoring Quality Assurance Volume VI, Standard Operating Procedures for Stationary Source Emission Monitoring and Testing. [District Rule 1081]

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

AQ-99 Results of continuous emissions monitoring shall be reduced according to the procedure established in 40 CFR, Part 51, Appendix P, paragraphs 5.0 through 5.3.3, or by other methods deemed equivalent by mutual agreement with the District, the ARB, and the EPA. [District Rule 1080]

Verification: The project owner shall submit to the District and CPM emission data in the quarterly operation report (**AQ-SC8**) that follows the definitions of this condition.

AQ-100 Audits of continuous emission monitors shall be conducted quarterly, except during quarters in which relative accuracy and total accuracy testing is performed, in accordance with EPA guidelines. The District shall be notified prior to completion of the audits. Audit reports shall be submitted along with quarterly compliance reports to the District. [District Rule 1080]

Verification: The project owner shall submit to the CPM and APCO CEMS audits demonstrating compliance with this condition as part of the quarterly operation report (**AQ-SC8**).

AQ-101 The owner/operator shall perform a relative accuracy test audit (RATA) as specified by 40 CFR Part 60, Appendix F, 5.11, at least once every four calendar quarters. The permittee shall comply with the applicable requirements for quality assurance testing and maintenance of the continuous emission monitor equipment in accordance with the procedures and guidance specified in 40 CFR Part 60, Appendix F. [District Rule 1080]

Verification: The project owner shall submit to the CPM and APCO CEMS audits demonstrating compliance with this condition as part of the quarterly operation report (**AQ-SC8**).

AQ-102 The permittee shall submit a written report to the APCO for each calendar quarter, within 30 days of the end of the quarter, including: time intervals, data and magnitude of excess emissions, nature and cause of excess emissions (if known), corrective actions taken and preventive measures adopted; averaging period used for data reporting shall correspond to the averaging period for each respective emission standard; applicable time and date of each period during which the CEM was inoperative (except for zero and span checks) and the nature of system repairs and adjustments; and a negative declaration when no excess emissions occurred. [District Rule 1080]

Verification: The project owner shall submit to the District and CPM the report of CEM operations, emission data, and monitor downtime data in the quarterly operation report (**AQ-SC8**) that follows the definitions of this condition.

EQUIPMENT DESCRIPTION, UNIT C-3953-13-0:

288 BHP CLARKE MODEL JW6H-UF40 DIESEL-FIRED EMERGENCY IC ENGINE POWERING A FIRE PUMP

AQ-103 Permittee shall submit an application to comply with SJVUAPCD District Rule 2520 – Federally Mandated Operating Permits within twelve months of commencing operation. [District Rule 2520]

Verification: The project owner shall submit to both the District and CPM the Operating Permit application after completing commissioning.

AQ-104 No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]

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

AQ-105 Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]

Verification: The project owner shall submit the results of source tests to both the District and CPM in accordance with **AQ-111**.

AQ-106 No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]

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

AQ-107 The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap, roof overhang, or any other obstruction. [District Rule 4102]

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

AQ-108 Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight is to be used. [District Rules 2201 and 4801 and 17 CCR 93115]

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

AQ-109 This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702 and 17 CCR 93115]

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

AQ-110 Emissions from this IC engine shall not exceed any of the following limits: 3.4 g-NOx/bhp-hr, 0.447 g-CO/bhp-hr, or 0.38 g-VOC/bhp-hr. [District Rule 2201 and 13 CCR 2423 and 17 CCR 93115]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-111 Emissions from this IC engine shall not exceed 0.059 g-PM10/bhp-hr based on USEPA certification using ISO 8178 test procedure. [District Rules 2201 and 4102 and 13 CCR 2423 and 17 CCR 93115]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-112 This engine shall be operated only for testing and maintenance of the engine, required regulatory purposes, and during emergency situations. For testing purposes, the engine shall only be operated the number of hours necessary to comply with the testing requirements of the National Fire Protection Association (NFPA) 25 – "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems", 1998 edition. Total hours of operation for all maintenance, testing, and required regulatory purposes shall not exceed 50 hours per calendar year. [District Rule 4702 and 17 CCR 93115]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-113 An emergency situation is an unscheduled electrical power outage caused by sudden and reasonably unforeseen natural disasters or sudden and reasonably unforeseen events beyond the control of the permittee. [District Rule 4702]

Verification: No verification necessary.

AQ-114 The permittee shall maintain monthly records of emergency and non-emergency operation. Records shall include the number of hours of emergency operation, the date and number of hours of all testing and maintenance operations, and the purpose of the operation (for example: load testing, weekly testing, rolling blackout, general area power outage, etc.). For units with automated testing systems, the operator may, as an alternative to keeping records of actual operation for testing purposes, maintain a readily accessible written record of the automated testing schedule. [District Rule 4702 and 17 CCR 93115]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-115 All records shall be maintained and retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rule 4702 and 17 CCR 93115]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

EQUIPMENT DESCRIPTION, UNIT C-3953-14-0

860 BHP CATERPILLAR MODEL 3456 NATURAL GAS-FIRED EMERGENCY IC ENGINE POWERING WITH NON-SELECTIVE CATALYTIC REDUCTION (NSCR) POWERING A 500 KW ELECTRICAL GENERATOR

AQ-116 Permittee shall submit an application to comply with SJVUAPCD District Rule 2520 – Federally Mandated Operating Permits within twelve months of commencing operation. [District Rule 2520]

Verification: The project owner shall submit to both the District and CPM the Operating Permit application after completing commissioning.

AQ-117 Permittee shall submit an application to comply with SJVUAPCD District Rule 2540 – Acid Rain Program within 12 months of commencing operation. [District Rule 2540]

Verification: The project owner shall submit to both the District and CPM the Acid Rain Program application after completing commissioning.

AQ-118 No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]

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

AQ-119 Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]

Verification: The project owner shall provide emissions records to both the District and CPM in accordance with **AQ-124**.

AQ-120 No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]

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

AQ-121 The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap, roof overhang, or any other obstruction. [District Rule 4102]

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

AQ-122 This IC engine shall be equipped with a three-way catalyst. [District Rule 2201]

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

AQ-123 This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702]

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

AQ-124 Emissions from this IC engine shall not exceed any of the following limits: 1.0 g-NOx/bhp-hr, 0.034 g-PM10/bhp-hr, 0.6 g-CO/bhp-hr, or 0.33 g-VOC/bhp-hr. [District Rule 2201]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-125 This engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702]

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

AQ-126 During periods of operation for maintenance, testing, and required regulatory purposes, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and con-

nections; change engine oil and filters; replace engine coolant; and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702]

Verification: The project owner shall submit to the District and CPM engine operation procedures and data demonstrating compliance with this condition as part of the quarterly operation report (**AQ-SC8**).

AQ-127 This engine shall be operated only for testing and maintenance of the engine, required regulatory purposes, and during emergency situations. Operation of the engine for maintenance, testing, and required regulatory purposes shall not exceed 50 hours per calendar year. [District Rule 4702]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-128 An emergency situation is an unscheduled electrical power outage caused by sudden and reasonably unforeseen natural disasters or sudden and reasonably unforeseen events beyond the control of the permittee. [District Rule 4702]

Verification: No verification necessary

AQ-129 This engine shall not be used to produce power for the electrical distribution system, as part of a voluntary utility demand reduction program, or for an interruptible power contract. [District Rule 4702]

Verification: The project owner shall submit to the District and CPM engine operation procedures and data demonstrating compliance with this condition as part of the quarterly operation report (**AQ-SC8**).

AQ-130 The permittee shall maintain monthly records of emergency and non-emergency operation. Records shall include the number of hours of emergency operation, the date and number of hours of all testing and maintenance operations, the purpose of the operation (for example: load testing, weekly testing, rolling blackout, general area power outage, etc.) and records of operational characteristics monitoring. For units with automated testing systems, the operator may, as an alternative to keeping records of actual operation for testing purposes, maintain a readily accessible written record of the automated testing schedule. [District Rule 4702]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

AQ-131 All records shall be maintained and retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rule 4702]

Verification: A summary of significant operation and maintenance events and monitoring records required shall be included in the quarterly operation report (**AQ-SC8**).

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AIR QUALITY APPENDIX AIR-1

Greenhouse Gas Emissions

Brewster Birdsall, P.E., QEP and Matthew Layton, P.E.

SUMMARY OF CONCLUSIONS

The Avenal Energy project is a proposed addition to the state's electricity system. It would be an efficient, new, dispatchable natural gas-fired combined cycle power plant that would produce greenhouse gas (GHG) emissions while generating electricity for California consumers. Its addition to the system would displace less efficient plants and facilitate the integration of renewable resources. Because the project's emissions per megawatt-hour (MWh) would be lower than those of other power plants that the project would displace, the addition of Avenal Energy would contribute to a reduction of the California and overall Western Electricity Coordinating Council system GHG[1] emissions and GHG emission rate average.

Staff notes that mandatory reporting of the GHG emissions provides the necessary information for the California Air Resources Board to develop greenhouse gas regulations and/or trading markets required by the California Global Warming Solutions Act of 2006 (AB 32 Núñez, Statutes of 2006, Chapter 488, Health and Safety Code sections 38500 et seq.). The project may be subject to additional reporting requirements and GHG reductions or trading requirements as these regulations are more fully developed and implemented.

On October 8, 2008, the Energy Commission adopted an order initiating an Order Instituting Informational (OII) proceeding to solicit comments on how to assess the greenhouse gas impacts of proposed new power plants in accordance with the California Environmental Quality Act (CEQA). This analysis provides the staff's conclusions for this siting case. Future power plant siting cases are likely to be reviewed with the benefit of new information and policy direction from the Energy Commission in response to the OII. This analysis recognizes that "prudent use" of natural gas for electricity generation will serve to optimize the system (for integrating intermittent renewable generation and providing reliability), but, without further analysis and policy direction by the Commission to refine this general understanding, this analysis leaves the implications for optimizing the system to future cases (CEC 2009a).

The operation of Avenal Energy would have an impact upon the overall electricity system operation and GHG emissions in several ways:

- Avenal Energy would provide flexible, dispatchable power necessary to integrate some of the growing generation from intermittent renewable sources, such as wind and solar generation.
- Avenal Energy would displace some less efficient local generation in the dispatch order of gas-fired facilities that are required to provide electricity reliability in the adjacent Greater Fresno Area.

[1] Fuel-use closely correlates to carbon dioxide (CO_2) emissions from natural gas-fired power plants. And since CO_2 emissions from the fuel combustion dominate greenhouse gas (GHG) emissions from power plants, CO_2 and GHG are used interchangeably in this section.

- Avenal Energy would facilitate to some degree the replacement of out-of-state coal electricity generation that must be phased out in conformance with the State's new Emissions Performance Standard.
- Avenal Energy could facilitate to some extent the replacement of generation provided by aging power plants that use once-through cooling.

The ability of, and the magnitude to which, Avenal Energy fulfills these roles are uncertain given that the project does not currently have a power purchase agreement specifying its obligations and roles within the system. While the energy displaced by the Avenal Energy project would result in a reduction in GHG emissions from the electricity system, the project's role in optimizing the system and its potential GHG benefits are less than ideal for two reasons: 1) its proposed technology would not provide fast-starting capabilities and 2) its proposed location would not be physically within a local reliability area. Still, the project would lead to a net reduction in GHG emissions across the electricity system that provides energy and capacity to California. Thus, staff believes that the project would result in a net reduction in GHG emissions from power plants, would not worsen, but would improve, current conditions, and would, thus, not result in impacts that are cumulatively significant.

Staff concludes that the short-term emission of greenhouse gases during construction would be sufficiently reduced by "best practices" and would not be significant.

The project would comply with the limits of the Greenhouse Gas Emission Performance Standard (Title 20, California Code of Regulations, section 2900 et seq.) that applies to utility purchases of base load power from power plants.

INTRODUCTION

Greenhouse gas (GHG) emissions are not criteria pollutants, but they are discussed in the context of cumulative impacts. The state has demonstrated its intent to address global climate change though research, adaptation,[2] and inventory reductions. In that context, staff evaluates the GHG emissions from the proposed project, presents information on GHG emissions related to electricity generation, and describes the applicable GHG standards and requirements.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

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

[2] While working to understand and reverse global climate change, it is prudent to also adapt to potential changes in the state's climate (for example, changing rainfall patterns).

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

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

GLOBAL CLIMATE CHANGE AND CALIFORNIA

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

In 1998, the Energy Commission identified a range of strategies to prepare for an uncertain climate future, including a need to account for the environmental impacts associated with energy production, planning, and procurement (CEC 1998, p.5). In 2003, the Energy Commission recommended that the state require reporting of greenhouse gases (GHG) or global climate change[3] emissions as a condition of state licensing of new electric generating facilities (CEC 2003, IEPR p. 42). In 2006, California enacted the California Global Warming Solutions Act of 2006 (AB 32). It requires the California Air Resources Board (ARB) to adopt standards that will reduce statewide GHG emissions to statewide GHG emissions levels in 1990, with such

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

reductions to be achieved by 2020.[4] To achieve this, ARB has a mandate to define the 1990 emissions levels and achieve the maximum technologically feasible and cost-effective GHG emission reductions.

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

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

It is possible that GHG reductions mandated by ARB will be non-uniform or disproportional across emitting sectors, in that most reductions will be based on cost-effectiveness (i.e., the greatest effect for the least cost). For example, the ARB proposes a 40 percent reduction in GHG from the electricity sector, even though the sector currently only produces about 25 percent of the state's GHG emissions. In response, in September 2008 the Energy Commission and the Public Utilities Commission provided recommendations (CPUC 2008) to ARB on how to achieve such reductions through both programmatic and regulatory approaches and identified points of regulation within the sector should ARB decide that a multi-sector cap and trade system is warranted.

The Energy Commission's *2007 Integrated Energy Policy Report* (IEPR) also addresses climate change within the electricity, natural gas, and transportation sectors (CEC 2007a). For the electricity sector, it recommends such approaches as pursuing all cost-effective energy efficiency measures and meeting the Governor's stated goal of a 33 percent Renewables Portfolio Standard.

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

SB 1368,[5] also enacted in 2006, and regulations adopted by the Energy Commission and the Public Utilities Commission pursuant to the bill, prohibits California utilities from entering into long-term commitments with any base load facilities that exceed the Greenhouse Gas Emission Performance Standard of 0.500 metric tonnes CO_2 per megawatt-hour[6] (1,100 pounds CO_2/MWh). Specifically, the SB 1368 Emission Performance Standard (EPS) applies to base load power from new power plants, new investments in existing power plants, and new or renewed contracts with terms of five years or more, including contracts with power plants located outside of California.[7] If a project, instate or out of state, plans to sell base load electricity to California utilities, the utilities will have to demonstrate that the project complies with the EPS. *Base load* units are defined as units that operate at a capacity factor higher than 60 percent. As a project applying for the flexibility to operate in baseload scenarios, Avenal Energy would have to meet the SB 1368 EPS.

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

ELECTRICITY PROJECT GREENHOUSE GAS EMISSIONS

Electricity use can be as simple as turning on a switch to operate a light or fan. The system to deliver the adequate and reliable electricity supply is complex and variable. But it operates as an integrated whole to meet demand, such that the dispatch of a new source of generation unavoidably curtails or displaces one or more less efficient or less competitive existing sources. Within the system, generation resources provide electricity, or energy, generating capacity, and ancillary services to stabilize the system and facilitate electricity delivery, or movement, over the grid. *Capacity* is the instantaneous output of a resource, in megawatts. *Energy* is the capacity output over a unit of time, for example an hour or year, generally reported as megawatt-hours or gigawatt-hours (GWh). Ancillary services[8] include regulation, spinning reserve, non-spinning reserve, voltage support, and black start capability. Individual generation resources can be built and operated to provide only one specific service. Alternatively, a resource may be able to provide one or all of these services, depending on its design and constantly changing system needs and operations.

California is actively pursuing policies to reduce GHG emissions that include adding non-GHG emitting renewable generation resources to the system mix. In this context, and because fossil-fueled resources produce GHG emissions, it is important to consider

[5] Public Utilities Code § 8340 et seq.

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

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

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

the role and necessity of also adding fossil-fuel resources. In a report prepared as a response to the GHG OII (CEC 2009a), five roles that gas-fired power plants are likely to fulfill are defined (CEC 2009b, pp 93 and 94):

1. Intermittent generation support
2. Local capacity requirements
3. Grid operations support
4. Extreme load and system emergency
5. General energy support.

The Energy Commission staff-sponsored report reasonably assumes that non-renewable power plants added to the system would almost exclusively be natural gas-fueled. Nuclear, geothermal and biomass plants are generally base load and not dispatchable. Solid fueled projects are generally base load, not dispatchable, and carbon sequestration technologies needed to reduce the GHG emission rates to meet the EPS are not yet developed (CEC 2009b, p. 92). Further, California has almost no sites available to add highly dispatchable hydroelectric generation.

The generation of electricity using fossil fuels, including natural gas, can produce air emissions known as greenhouse gases in addition to the criteria air pollutants that have been traditionally regulated under the federal and state Clean Air Acts. Greenhouse gas emissions contribute to the warming of the earth's atmosphere, leading to climate change. For fossil fuel-fired power plants, these include primarily carbon dioxide, with much smaller amounts of nitrous oxide (N_2O, not NO or NO_2, which are commonly known as NOx or oxides of nitrogen), and methane (CH_4 – often from unburned natural gas). Also included are sulfur hexafluoride (SF_6) from high voltage equipment and hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) from refrigeration/chiller equipment. GHG emissions from the electricity sector are dominated by CO_2 emissions from the carbon-based fuels; other sources of GHG emissions are small and also are more likely to be easily controlled or reused or recycled, but are nevertheless documented here as some of the compounds have very large relative global warming potentials. Global warming potential is a relative measure, compared to carbon dioxide, of a compound's residence time in the atmosphere and ability to warm the planet. Mass emissions of GHGs are converted into carbon dioxide equivalent (CO2E) metric tonnes (MT) for ease of comparison.

CONSTRUCTION

Construction of industrial facilities such as power plants requires coordination of a variety of equipment and personnel. The concentrated on-site activities result in short-term, unavoidable increases in vehicle and equipment emissions that include greenhouse gases. Avenal Energy did not estimate the construction-related GHG emissions from the proposed project, but based on other similar projects presently under review by the Energy Commission, construction could potentially emit between 3,000 and 7,000 metric tonnes of CO_2-equivalent (MTCO2E) GHG over the total proposed 27 month construction schedule.

OPERATIONS

Avenal Energy would be configured as a combined cycle power plant, in which electricity is generated by two combustion turbine generators (CTG) and additionally by a reheat steam turbine generator that operates on heat energy recovered from the gas turbines' exhaust (Avenal Power 2008). The applicant proposes to use mechanical inlet air chillers, heat recovery steam generators (HRSG), duct burners (re-heaters), multi-pressure HRSGs, and a steam turbine unit with an air cooled condenser to cool steam exhaust (Avenal Power 2008). The two-train CTG/HRSG configuration also allows for high efficiency during unit turndown because one CTG can operate at a more efficient full load while the other is shut down, rather than operating two CTGs at an inefficient 50 percent load. The project, while optimized for efficiency and turndown, can experience long startups (up to 6 hours for a cold startup). However, the project includes an auxiliary boiler to provide steam to preheat the combined cycle steam turbine and HRSG to shorten startups, and warm and hot startups[9] would be less than 2 hours.

The proposed Avenal Energy project would be permitted to operate up to 100 percent capacity or 8,760 hours annually at full load operation. The primary sources of GHG would be the natural gas fired combustion turbines. There would also be a small amount of GHG emissions from the auxiliary boiler, diesel-fueled fire pump engine, emergency generator engine, and sulfur hexafluoride emissions from new electrical component equipment. The employee and delivery traffic GHG emissions are not included in the operating emission GHG totals and are negligible in comparison with the gas turbine GHG emissions.

The proposed project would not be physically located in a local reliability area that has, or projected to have, capacity shortfalls. A project located in a load pocket, for example, the Los Angeles Local Reliability Area, would more likely provide local reliability support and facilitate the retirement of aging and/or OTC power plants to a degree that the Avenal Energy project could not.

Greenhouse Gas Table 2 shows what the proposed project, as permitted, could potentially emit in greenhouse gases on an annual basis. All emissions are converted to CO_2-equivalent and totaled. Electricity generation GHG emissions are dominated by CO_2 emissions from combustion of the carbon-based fuels; other sources of GHG are small and also are more likely to be easily controlled or reused or recycled, but are nevertheless documented here as some of the compounds have very large relative global warming potentials.

The proposed project would be permitted, on an annual basis, to emit over 1,700,000 metric tonnes of CO_2-equivalent per year if operated at its maximum permitted level.

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[9] A *cold startup* of the STG/HRSG system is defined as startup of the combined cycle system following a shutdown of the steam turbine lasting at least 48 to 72 hours. During a cold startup of the steam turbine system, the CTG/HRSG system is brought on line at low load to gradually increase the temperature of the STG and prevent thermal metal fatigue. A *warm startup* of the STG/HRSG system is defined as a startup of the combined cycle system following a shutdown of the steam turbine lasting at least 8 hours and less than 48 to 72 hours. A *hot startup* of the STG/HRSG system" is defined as a startup of the combined cycle system following a shutdown of the steam turbine lasting less than 8 hours.

The Avenal Energy project, at 0.383 MTCO2/MWh, would easily meet the limits of SB 1368 and the Greenhouse Gas Emission Performance Standard of 0.500 MTCO2/MWh.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff assesses the cumulative effects of GHG emissions caused by both construction and operation. As the name implies, construction impacts result from the emissions occurring during the construction of the project. The operation impacts result from the emissions of the proposed project during operation. Staff is continuing to monitor development of AB 32 Scoping Plan implementation efforts and general trends and developments affecting GHG regulation in the electricity sector.

Greenhouse Gas Table 2
Avenal Energy, Estimated Potential Greenhouse Gas (GHG) Emissions

Emissions Source	CO_2	CH_4	N_2O	SF_6
Combustion Turbine #1 w/o Duct Firing (tpy) [a]	835,703	92.9	1.58	---
Combustion Turbine #2 w/o Duct Firing (tpy)	835,703	92.9	1.58	---
Combustion Turbine #1 w/ Duct Firing (tpy)	105,194	11.7	0.20	---
Combustion Turbine #2 w/ Duct Firing (tpy)	105,194	11.7	0.20	---
Auxiliary Boiler (tpy)	0	0	0	---
Fire Pump Engine (tpy)	5.9	6.6×10^{-4}	1.1×10^{-5}	---
Emergency Standby Generator (tpy)	18.9	2.1×10^{-3}	3.6×10^{-5}	---
Gas Insulated Switches (MTCO2E/year)	---	---	---	63
Global Warming Potential [a]	1.0	21	310	23,900
Total Estimated GHG Emissions (MTCO2E/year)	1,707,175	3,985	1,001	63
Total Estimated GHG Emissions (MTCO2E/year)				1,712,224
Estimated Annual Generation (MWh) [b]				4,460,000
Estimated GHG Performance Factor (MTCO2/MWh)				0.383
Estimated GHG Performance Factor (MTCO2E/MWh)				0.384

Source: AFC Table 6.2-41 and Appendix Table 6.2-1.8.

Notes:

a. The units are short tons per year (tpy) or metric tonne (MT). One MT equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.

b. The global warming potential is a measure of the chemicals' warming properties and lifetime in the atmosphere relative to CO_2. The value shown is for 100-years. Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report (SAR 1996). In 2001, the IPCC published its Third Assessment Report (TAR), which adjusted the GWPs to reflect new information on atmospheric lifetimes and an improved calculation of the radiative forcing of carbon dioxide. However, SAR GWPs are still used by international convention and the U.S. to maintain the value of the carbon dioxide "currency". To maintain consistency with international practice, the ARB specifies use of GWPs from the SAR for reporting emissions.

c. Estimated annual baseload generation for Avenal Energy is (7,960 hr @ 500MW) plus (800 hr @ 600MW for duct firing).

The impact of GHG emissions caused by this natural gas-fired facility is characterized by considering how the power plant would impact the overall electricity system. The integrated electricity system depends on generation resources to provide energy and satisfy local capacity needs. As directed by the OII (CEC 2009a), staff is refining and

implementing the concept of a "blueprint" that describes the long-term role of fossil-fueled power plants in California's electricity system. At least five separate roles that gas-fired power plants are most likely to fulfill in the future include: 1) Intermittent generation support; 2) Local capacity requirements; 3) Grid operations support; 4) Extreme load and system emergencies support; and 5) General energy support (CEC 2009b, p. 93). Avenal Energy is analyzed here for its role in providing local capacity and generation and general energy support for expected generation retirements or replacements.

CONSTRUCTION IMPACTS

Staff does not believe that the minor GHG emission increases from construction activities would be significant for several reasons. First, the period of construction would be short-term and the emissions intermittent during that period, not ongoing during the life of the project. Additionally, control measures that staff recommends to address criteria pollutant emissions, such as limiting idling times and requiring, as appropriate, using equipment that meet the latest criteria pollutant emissions standards would further minimize greenhouse gas emissions to the extent feasible. The use of newer equipment will increase fuel efficiency and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment.

DIRECT/INDIRECT OPERATION IMPACTS AND MITIGATION

New, efficient, natural gas-fired generation promotes the state's efforts to improve GHG electrical generation efficiencies and, therefore, reduce the amount of natural gas used by electricity generation and greenhouse gas emissions. As the *2007 Integrated Energy Policy Report* (CEC 2007a, p. 184) noted:

> New natural gas-fueled electricity generation technologies offer efficiency, environmental, and other benefits to California, specifically by reducing the amount of natural gas used—and with less natural gas burned, fewer greenhouse gas emissions. Older combustion and steam turbines use outdated technology that makes them less fuel- and cost-efficient than newer, cleaner plants.…The 2003 and 2005 IEPRs noted that the state could help reduce natural gas consumption for electric generation by taking steps to retire older, less efficient natural gas power plants and replace or repower them with new, more efficient power plants.

Thus, in the context of the Energy Commission's *Integrated Energy Policy Report*, the Avenal Energy project furthers the state's strategy to promote generation system efficiency and reduce fuel use and GHG emissions. As stated in the 2009 Framework for Evaluating Greenhouse Gas Implications of Natural Gas-Fired Power Plants in California (CEC 2009b, p.20):

> When one resource is added to the system, all else being held equal, another resource will generate less power. If the new resource has a lower cost or fewer emissions than the existing resource mix, the aggregate system characteristics will change to reflect the cheaper power and lower GHG emissions rate.

Net GHG emissions for the integrated electric system will decline when new gas-fired power plants are added to: 1) permit the penetration of renewable generation to the 33 percent target; 2) improve the overall efficiency of the electric system; or 3) serve load growth or capacity needs more efficiently than the existing fleet (CEC 2009b, p. 98). Avenal Energy, with its lower heat rate than most other dispatchable gas-fired generation in the state, would be more efficient and lower GHG-emitting than the existing fleet.

The Role of Avenal Energy in Local Generation Displacement

The proposed Avenal Energy project would have a net heat rate between 6,800 and 7,400 Btu/kWh[10] and an estimated baseload annual GHG performance factor of 0.383 MTCO2/MWh. The local generation resources and heat rates of other local units are listed in **Greenhouse Gas Table 3**. Compared to other new and existing units in the Greater Fresno Area, Avenal Energy would be more efficient, and emit fewer GHG emissions during any hour of operation. Local generating units with the best, or lowest heat rate or lowest GHG performance factor, generally operate more than other units with higher heat rates, as shown by the relative amount of energy (GWh) produced in 2008 from the local units. However, dispatch order can change, or deviate from economic or efficiency dispatch, in any one year or due to other concerns such as permit limits, contractual obligations, droughts, heat waves, local reliability needs or emergencies. These deviations, however, are likely to occur infrequently.

Greenhouse Gas Table 3
Greater Fresno Area, Local Generation Heat Rates and 2008 Energy Outputs

Plant Name	Heat Rate (Btu/kWh) [a]	2008 Energy Output (GWh)	GHG Performance (MTCO2/MWh)
La Paloma Generating	7,172	6,185.2	0.380
Pastoria Energy Facility L.L.C.	7,032	4,900.9	0.373
Sunrise Power	7,266	3,604.9	0.385
Elk Hills Power, LLC	7,048	3,551.9	0.374
KRCD Malaga Peaking Plant	9,957	151.0	0.528
Henrietta Peaker	10,351	48.1	0.549
Hanford Energy Park Peaker	9,396	45.9	0.498
CalPeak Power – Panoche	10,376	7.0	0.550
Wellhead Power Gates, LLC [b]	12,305	4.6	0.652
Wellhead Power Panoche, LLC	13,716	2.7	0.727
MMC Mid-Sun, LLC	12,738	1.4	0.675
Fresno Cogen Partners, LP PKR	16,898	0.8	0.896
Proposed Avenal Energy (at baseload)	7,215	4,460 (max est.)	0.383

Source: Energy Commission staff based on Quarterly Fuel and Energy Report (QFER) and AFC Table 6.2-1.8.
Notes:
a. Based on the Higher Heating Value or HHV of the fuel.
b. Wellhead Power Gates, LLC, had anomalous data certain years, so an average heat rate from 2002 to 2007 excluding 2003 is shown here.

[10] Based on the High Heating Value (HHV) of the fuel(s) used. HHV is used for all heat rate and fuel conversions to GHG mass emissions that are discussed in this document.

While Avenal Energy is close to the Greater Fresno Local Reliability area, it is not physically located in the area and may not be able to provide capacity during some system operating conditions.

The Role of Avenal Energy in the Integration of Renewable Energy

As California moves towards an increased reliance on renewable energy, the bulk of renewable generation available to, and used in California, will be intermittent wind generation with some intermittent solar (CEC 2009b, p.3). To accommodate the increased variability in generation due to increasing renewable penetration, compounded by increasing load variability, control authorities such as the California Independent System Operator (CAISO) need increased flexibility from other generation resources such as hydro generation, dispatchable pump loads, energy storage systems, and fast ramping and fast starting fossil fuel generation resources (ISO 2007, p. 14).

Avenal Energy would provide flexible, dispatchable and fast ramping[11] power that would not obstruct penetration of renewable energy. In general, combined cycle combustion turbines can ramp up quickly, but the combined cycle facility overall output is limited to about 15 MW per minute[12] by the steam turbine and HRSG.

Avenal Energy would not, however, provide fast starting[13] capabilities when the HRSG and steam turbine are cold. Intermittent renewable sources of energy would be accommodated by Avenal Energy varying its energy output as needed to integrate the renewable sources, but the lack of fast-start capabilities under all conditions make it likely that Avenal Energy may not be able to play a role in some system operating scenarios.

The amount of dispatchable fossil fuel generation will have to be significantly increased to meet the 20 percent RPS (ISO 2007, p.113); the 33 percent RPS will require even more dispatchable resources to integrate the renewables. However, this does not suggest the existing and new fossil fuel capacity will operate more. **Greenhouse Gas Table 4** shows how the build-out of either the 20 percent or the 33 percent RPS will affect generation from new and existing non-renewable resources. Should California reach its goal of meeting 33 percent of its retail demand in 2020 with renewable energy, non-renewable, most likely fossil-fueled, energy needs will fall by over 36,000 GWh/year. In other words, all growth will need to come from renewable resources to achieve the 33 percent RPS. And some existing and new fossil units will generate less energy than they currently do, given the expected growth in retail sales.

These assumptions are conservative in that the forecasted growth in retail sales assumes that the impacts of planned increases in expenditures on (uncommitted)

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[11] The CAISO categorizes *fast-ramping* as a generator capable of going from lowest power to highest in under 20 minutes, or greater than 10 MW per minute.

[12] Of the 2,821 MW of thermal resources providing Ancillary Services to the CAISO, most (2,441 MW) have ramp rates between 10 and 31 MW/min. The bulk of the resources providing Ancillary Services with ramp rates greater than 10 MW/min (7,141 MW) are hydroelectric facilities (ISO 2007).

[13] In general, fast starts are defined as being less than two hours.

energy efficiency are already embodied in the current retail sales forecast.[14] If, for example, forecasted retail sales in 2020 should be lowered by 10,000 GWh due to the success of increased energy efficiency expenditures, non-renewable energy needs fall by an additional 6,700 to 8,000 GWh/year, depending on whether 20 percent or 33 percent RPS is assumed.

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

California Electricity Supply	**Annual GWh**	
Statewide Retail Sales, 2008, estimated [a]	265,185	
Statewide Retail Sales, 2020, forecast [a]	308,070	
Growth in Retail Sales, 2008-20	42,885	
Growth in Net Energy for Load [b]	46,316	
California Renewable Electricity	**GWh @ 20% RPS**	**GWh @ 33% RPS**
Renewable Energy Requirements, 2020 [c]	61,614	101,663
Current Renewable Energy, 2008	29,174	
Change in Renewable Energy-2008 to 2020 [c]	32,440	72,489
Resulting Change in Non-Renewable Energy [d]	13,876	(-36,173)

Source: Energy Commission staff 2009.
Notes:
a. Not including eight percent transmission and distribution losses
b. Based on eight percent transmission and distribution losses, or 42,885 GWh x 0.08 = 46,316 GWh.
c. Renewable standards are calculated on retail sales and not on total generation, which accounts for eight percent transmission and distribution losses.
d. Based on net energy (including eight percent transmission and distribution losses), not based on retail sales.

The Role of Avenal Energy in Retirements/Replacements

Avenal Energy would provide more than 4,400 GWh of natural gas-fired generation to replace resources that are or will likely be precluded from serving California loads. State policies, including GHG goals, are discouraging or prohibiting new contracts and new investments in coal-fired generation, generation that relies on water for once-through cooling, and aging power plants (CEC 2007a). Some of the existing plants that are likely to require significant capital investments to continue operation in light of these policies may be unlikely to undertake the investments and will retire or be replaced.

Replacement of Coal-Fired Generation

Coal-fired resources are effectively prohibited from entering into new contracts for California deliveries as a result of the Emissions Performance Standard adopted in 2007 pursuant to SB 1368. Between now and 2020, more than 18,000 GWh of energy procured by California utilities under existing contracts will have to be replaced; these contracts are listed in **Greenhouse Gas Table 5**.

[14] The extent to which uncommitted energy efficiency savings are already represented in the current Energy Commission demand forecast is a subject of study for the 2009 IEPR.

This represents almost half of the energy associated with California utility contracts with coal-fired resources that will expire by 2030. If the State enacts a carbon adder[15], all the coal contracts (including those in **Greenhouse Gas Table 5**, which expire by 2020 and, other contracts that expire beyond 2020 and are not shown in the table) may be retired at an accelerated rate as coal-fired energy becomes uncompetitive. Also shown are the approximate 500 MW of in-state coal and petroleum coke-fired capacity that may not be able to contract with California utilities due to the SB 1368 Emission Performance Standard. As these contracts expire, new and existing generation resources will replace the lost energy and capacity. Some will come from renewable generation; some will come from new and existing natural gas fired generation. New generation resources generally will emit significantly less GHG than the coal and petroleum coke-fired generation, which average about 1.0 MTCO2/MWh, or almost three times more than new natural gas-fired combined-cycle projects like Avenal Energy, resulting in a significant net reduction in GHG emissions from the California electricity sector.

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

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

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

Notes:

a. All facilities are located out-of-state except for the Miscellaneous In-state Qualifying Facilities.

b. Estimated annual reduction in energy provided to LADWP by Utah utilities from their entitlement by 2013.

c. Contract not subject to Emissions Performance Standard, but the Department of Water Resources has stated its intention not to renew or extend.

Retirement of Generation Using Once-Through Cooling

New, dispatchable resources like Avenal Energy would also be required to provide generation capacity (that is, the ability to meet fluctuating, intermittent electricity loads) in the likely event that facilities utilizing once-through cooling (OTC) are retired. The State Water Resource Control Board (SWRCB) has proposed significant changes to OTC units, which would likely require retrofit, retirement, or significant curtailment of dozens of generating units. In 2008, these units collectively produced about 58,000 GWh. While those OTC facilities owned and operated by utilities and recently-built

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

combined cycles may well install dry or wet cooling towers, it is unlikely that the aging, merchant plants will do so. Most of these units operate at low capacity factors, suggesting a limited ability to compete in the current electricity market. Although the timing would be uncertain, new resources would out-compete aging plants and would likely displace the energy provided by OTC facilities and accelerate the retirements.

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

New generation resources that can either provide local support or energy will emit significantly less GHGs. Existing aging and OTC natural gas generation average about 0.75 MTCO2/MWh, or about two times more than new natural gas-fired combined-cycle projects like Avenal Energy. When Avenal can provide energy and capacity, given its location, it can provide a significant net reduction in GHG emissions from the California electricity sector. A project located in a load pocket, for example, the Los Angeles Local Reliability Area, would more likely provide local reliability support as well as facilitate the retirement of aging and/or OTC power plants to a degree that the Avenal Energy project could not.

Applicant GHG Analysis for Avenal Energy

Energy Commission staff notes that the applicant commissioned an independent study of GHG impacts due to Avenal Energy (Avenal 2009) and found that the proposed project would reduce GHG emissions from the entire network of power plants in the western U.S. The applicant's study uses a proprietary production cost model of all generation and the transmission configuration of the entire WECC region. By adding the project's anticipated energy output to central California, the applicant's study showed that electricity imports from out-of-state could be reduced. The applicant shows the project would generate electricity in California with fewer GHG emissions than the imports it displaces, resulting in indirect GHG reductions across the western U.S. The conclusions of Avenal's study of GHG impacts support staff's conclusion of less than significant impacts, but staff does not formally endorse or oppose the analysis. Staff has not reviewed the proprietary modeling tool and assumptions, in particular, the treatment of existing in-state and out of state resources subject to various market conditions, operational constraints, and evolving regulations and GHG policies.

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

Plant, Unit Name	Owner	Local Resource Area	Aging?	Capacity (MW)	2008 Energy Output (GWh)	GHG Performance (MTCO2 /MWh)
Diablo Canyon 1, 2	Utility	None	No	2,232	17,091	Nuclear
San Onofre 2, 3	Utility	L.A. Basin	No	2,246	15,392	Nuclear
Broadway 3 [b]	Utility	L.A. Basin	Yes	75	90	0.648
El Centro 3, 4 [b]	Utility	None	Yes	132	238	0.814
Grayson 3 - 5 [b]	Utility	LADWP	Yes	108	150	0.799
Grayson CC [b]	Utility	LADWP	Yes	130	27	0.896
Harbor CC	Utility	LADWP	No	227	203	0.509
Haynes 1, 2, 5, 6	Utility	LADWP	Yes	1,046	1,529	0.578
Haynes CC [c]	Utility	LADWP	No	560	3,423	0.376
Humboldt Bay 1, 2 [a]	Utility	Humboldt	Yes	107	507	0.683
Olive 1, 2 [b]	Utility	LADWP	Yes	110	11	1.008
Scattergood 1 – 3	Utility	LADWP	Yes	803	1,327	0.618
Utility-Owned				**7,776**	**39,988**	**0.693**
Alamitos 1 – 6	Merchant	L.A. Basin	Yes	1,970	2,533	0.661
Contra Costa 6, 7	Merchant	S.F. Bay Area	Yes	680	160	0.615
Coolwater 1 – 4 [b]	Merchant	None	Yes	727	576	0.633
El Segundo 3, 4	Merchant	L.A. Basin	Yes	670	508	0.576
Encina 1 – 5	Merchant	San Diego	Yes	951	997	0.674
Etiwanda 3, 4 [b]	Merchant	L.A. Basin	Yes	666	848	0.631
Huntington Beach 1, 2	Merchant	L.A. Basin	Yes	430	916	0.591
Huntington Beach 3, 4	Merchant	L.A. Basin	No	450	620	0.563
Mandalay 1, 2	Merchant	Ventura	Yes	436	597	0.528
Morro Bay 3, 4	Merchant	None	Yes	600	83	0.524
Moss Landing 6, 7	Merchant	None	Yes	1,404	1,375	0.661
Moss Landing 1, 2	Merchant	None	No	1,080	5,791	0.378
Ormond Beach 1, 2	Merchant	Ventura	Yes	1,612	783	0.573
Pittsburg 5 – 7	Merchant	S.F. Bay Area	Yes	1,332	180	0.673
Potrero 3	Merchant	S.F. Bay Area	Yes	207	530	0.587
Redondo Beach 5 - 8	Merchant	L.A. Basin	Yes	1,343	317	0.810
South Bay 1 - 4	Merchant	San Diego	Yes	696	1,015	0.611
Merchant-Owned				**15,254**	**17,828**	**0.605**
Total In-State OTC				**23,030**	**57,817**	

Source; Energy Commission staff based on Quarterly Fuel and Energy Report (QFER) filings
Notes:
OTC Humboldt Bay Units 1 and 2 are included in this list. They must retire in 2010 when the new Humboldt Bay Generating Station (not ocean-cooled), currently under construction, enters commercial operation.
Units are aging but are not OTC.
The Los Angeles Department of Water and Power (LADWP) reported a 2007 aggregate energy number of 4,003 GWh for all the Haynes units. Staff allocated the energy between the units based on Haynes' current and historical output allocations in the LADWP fillings for 2009 Integrated Energy Policy Report EPR Resources Plan.

CUMULATIVE IMPACTS

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

This entire assessment is a cumulative impact assessment. The project would emit greenhouse gases and, therefore, has been analyzed as a potential cumulative impact in the context of its effect on the electricity system, resulting GHG emissions from the system, and existing GHG regulatory requirements and GHG energy policies.

COMPLIANCE WITH LORS

Ultimately, ARB's AB 32 regulations are likely to address both the degree of electricity generation sector emissions reductions (through cap-and-trade), and the method by which those reductions will be achieved (e.g., through command-and-control). However, the exact approach to be taken is currently under development. That regulatory approach may address emissions not only from the newer, more efficient, and lower emitting facilities licensed by the Energy Commission, but also from the older, higher-emitting facilities not subject to any GHG reduction standard that this agency could presently impose. This programmatic approach is likely to be more effective in reducing GHG emissions overall from the electricity sector than one that merely relies on displacing out-of-state coal plants ("leakage") or older "dirtier" facilities.

The Energy Commission and the Public Utilities Commission provided recommendations (CPUC 2008) to ARB on how to achieve such reductions through both programmatic and regulatory approaches and identified the regulation points should ARB decide that a multi-sector cap-and-trade system is warranted. As ARB codifies accurate GHG inventories and methods, it may become apparent that emission reductions from the generation sector are less cost-effective than other sectors, and that other sectors of sources can achieve reductions with relative ease and cost-effectiveness.

The project would be subject to ARB's mandatory reporting requirements and potentially other future requirements mandating compliance with AB 32 that are being developed by ARB. How the project would comply with these ARB requirements is speculative at this time, but compliance would be mandatory. The ARB's mandatory GHG emissions reporting requirements do not indicate whether the project, as defined, would comply with the potential GHG emissions reduction regulations being formulated under AB 32. The project may have to provide additional reports and GHG reductions, depending on the future regulations expected from ARB.

Reporting of GHG emissions would enable the project to demonstrate consistency with the policies described above and the regulations that ARB adopts and to provide the

information to demonstrate compliance with any applicable EPS that could be enacted in the next few years. The Avenal Energy project would meet the current Emission Performance Standard in SB 1368.

NOTEWORTHY PUBLIC BENEFITS

Electricity is produced by operation of inter-connected generation resources and, by knowing the fuel used by the generation sector, the resulting GHG emissions can be known. The operation of Avenal Energy would have an impact upon the overall electricity system operation and GHG emissions in several ways:

- Avenal Energy would provide flexible, dispatchable power necessary to integrate some of the growing generation from intermittent renewable sources, such as wind and solar generation.
- Avenal Energy would displace some less efficient local generation in the dispatch order of gas-fired facilities that are required to provide electricity reliability in the adjacent Greater Fresno Area.
- Avenal Energy would facilitate to some degree the replacement of out-of-state coal electricity generation that must be phased out in conformance with the State's new Emissions Performance Standard.
- Avenal Energy could facilitate to some extent the replacement of generation provided by aging power plants that use once-through cooling.

The project would likely lead to a net reduction in GHG emissions across the electricity system providing energy and capacity to California. Thus, staff believes that the project would result in a cumulative overall reduction in GHG emissions from the state's power plants, would not worsen current conditions, and would thus not result in impacts that are cumulatively significant. Moreover, it would be consistent with AB 32 goals.

The energy displaced by the Avenal Energy project would result in a reduction in GHG emissions from the electricity system. In other system roles, as described in **Greenhouse Gas Table 7**, the ability to minimize its GHG impacts by filling the expected future roles for gas-fired generation, in a high-renewables, low-GHG system, is not well defined for the Avenal Energy project due to its proposed technology and location.

CONCLUSIONS

Avenal Energy would be an efficient, new, dispatchable natural gas-fired combined cycle power plant that would cause GHG emissions while generating electricity for California consumers. AB 32 emphasizes that GHG emission reductions must be "big picture" reductions that do not lead to "leakage" of such reductions to other states or countries. The project's GHG emissions per MWh are expected to be lower than those of other power plants and peaking projects that the project would displace and, thus, would contribute to continued improvement of the California and overall Western Electricity Coordinating Council system's GHG emissions and GHG emission rate average.

Greenhouse Gas Table 7
Avenal Energy, Summary of Role in Providing Energy and Capacity Resources

Services Provided by Generating Resources	Discussion, Avenal Energy
Integration of Renewable Energy	• *Would not* provide fast startup capability (within 2 hours), except during warm and hot start conditions. • Would provide rapid ramping capability. • Would have ability to provide regulation and reserves, and energy when renewable resources are unavailable.
Local Generation Displacement	• *Would not* be able to satisfy/partially satisfy local capacity area (LCA) resource requirements. • Would provide voltage support. • *Would not* provide black start capability.
Ancillary Services, Grid System, and Emergency Support	• *Would not* provide fast start-up capability (within 2 hours or less). • *Would not* have low minimum load levels. • Would provide rapid ramping capability. • Would have ability to provide regulation and reserves. • *Would not* provide black start capability.
General Energy Support	• Would provide general energy support. • Could facilitate some retirements and replacements • Would provide cost-competitive energy. • Would be able to help a load-serving entity (LSE) meet resource adequacy (RA) requirements.

Source: Energy Commission staff; based on: Expected Roles for Gas-Fired Generation (CEC2009b, p. 7).

The project would lead to a net reduction in GHG emissions across the electricity system that provides energy and capacity to California. Thus, staff believes that the project would result in a cumulative overall reduction in GHG emissions from the state's power plants, would not worsen current conditions, and would thus not result in impacts that are cumulatively significant. Other potential GHG benefits gained by the project's role in optimizing the system are less defined for the Avenal Energy natural gas-fueled project with its proposed technology and in its proposed location.

Staff notes that mandatory reporting of GHG emissions per Air Resources Board greenhouse gas regulations would occur, and this would enable the ARB to gather the information needed to regulate Avenal Energy in trading markets if required by the regulations implementing the California Global Warming Solutions Act of 2006 (AB 32). The project may be subject to additional reporting requirements and GHG reduction or trading requirements as these regulations become more fully developed and implemented.

Staff does not believe that the minor GHG emission increases from construction activities would be significant for several reasons. First, the period of construction would be short-term and the emissions intermittent during that period, not ongoing during the life of the project. Additionally, control measures, or best practices, that staff recommends for minimizing criteria pollutants, such as limiting idling times and requiring, as appropriate, equipment that meets the latest emissions standards, would further minimize greenhouse gas emissions since staff believes that the use of newer

equipment would increase fuel efficiency and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment. For all these reasons, staff concludes that the short-term emission of greenhouse gases during construction would be substantially reduced and would, therefore, not be significant.

The Avenal Energy project would meet Emission Performance Standard of SB 1368.

PROPOSED CONDITIONS OF CERTIFICATION

None proposed. The project owner would comply with mandatory ARB GHG emissions reporting regulations (California Code of Regulations, tit. 17, section 95100 et. seq.) and/or future GHG regulations formulated by the ARB, such as limits set by GHG emissions cap and trade markets.

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BIOLOGICAL RESOURCES

Testimony of Richard Anderson

SUMMARY OF CONCLUSIONS

Avenal Power, LLC proposes to construct and operate the Avenal Energy project, a 600-MW natural gas-fired power plant proposed to be located approximately two miles east of Interstate 5 on Avenal Cutoff Road in the city of Avenal, Kings County, California. The project site is a 148-acre agricultural parcel in the city of Avenal's industrial zone. The site provides limited habitat for protected wildlife species such as the state threatened and federal endangered San Joaquin kit fox (*Vulpes macrotis mutica*) and state threatened Swainson's hawk (*Buteo swainsoni*) but there are movement corridors and foraging opportunities immediately adjacent to the site. California Energy Commission staff analyzed the potential impacts to biological resources that are expected to occur during construction and operation of the proposed project and has proposed Conditions for Certification **BIO-1** through **BIO-13** to minimize and mitigate these impacts.

The applicant has agreed to provide the 300-foot setback requested by Energy Commission, California Department of Fish and Game (CDFG), and United States Fish and Wildlife Service (USFWS) staff. The setback is important to preserve a larger area for foraging and movement for San Joaquin kit fox and other species such as the Tulare grasshopper mouse (*Onychomys torridus tularensis*) and the San Joaquin pocket mouse (*Perognathus inornatus inornatus*) (Avenal Power 2008a, CNDDB 2008). Energy Commission staff has proposed Condition of Certification **BIO-7** to address this setback.

The applicant, Energy Commission, CDFG, and USFWS staff have agreed upon habitat compensation ratios of 1.1 acres for every acre permanently impacted by the Avenal Energy project and 0.3 acre for every acre temporarily impacted to mitigate impacts to the San Joaquin kit fox and Swainson's hawk. The USFWS and the CDFG have explained to the applicant that providing land acquisition or other funds to either the Kern Water Bank (KWB) or Kreyenhagen Hills Conservation Bank (KHCB) would be appropriate for habitat compensation. The applicant has informed staff that they will pursue an agreement for compensation at the KHCB. If an agreement cannot be reached with the KHCB, then KWB will be used. Either of these banks would mitigate habitat impacts to a level that is less than significant. Staff has proposed Condition of Certification **BIO-9** to address the habitat compensation requirement.

Staff has included proposed conditions of certification that will minimize and mitigate impacts to biological resources to a level that is less than significant. The construction and operation of the project would comply with all federal, state, and local laws, ordinances, regulations, and standards relating to biological resources if staff's conditions of certification are adopted and implemented.

INTRODUCTION

This section provides California Energy Commission staff's analysis of potential biological resource impacts from the applicant's proposal to construct and operate a

new 600-MW natural gas-fired power plant in the city of Avenal's industrial zone. This analysis will determine if there would be any impacts to state and federally listed species, species of special concern, wetlands, surface waters, and other areas of critical biological concern. This analysis presents information regarding the affected biotic community; the potential environmental impacts associated with the construction and operation of the proposed project; and where necessary, specifies mitigation measures to reduce potential impacts to less than significant levels. This analysis is based, in part, on information provided in Avenal Power, LLC's (Avenal Power) application for certification (AFC) for the Avenal Energy project (Avenal Energy)(Avenal Power 2008a), data responses round 1 and 2 (Avenal Power 2008e, Avenal Power 2008f), and answers from the Data Response and Issues Identification Workshop on July 1, 2008 (DRIRW 2008) and February 18, 2009; staff's observations at an informal site visit on April 11, 2008; and staff's consultation with the USFWS and CDFG.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The applicant will need to abide by the following laws, ordinances, regulations, and standards (LORS) during project construction and operation.

FEDERAL

Federal Endangered Species Act

Title 16, United States Code, section 1531 et seq., and Title 50, Code of Federal Regulations, part 17.1 et seq., designates and provides for protection of threatened and endangered plant and animal species, and their critical habitat.

Migratory Bird Treaty Act

Title 16, United States Code, sections 703 through 711, makes it unlawful to take or possess any migratory nongame bird (or any part of such migratory nongame bird) as designated in the Migratory Bird Treaty Act.

Clean Water Act

Title 33, United States Code, sections 1251 through 1376, and Code of Federal Regulations, part 30, section 330.5(a) (26), requires the permitting and monitoring of all discharges to surface water bodies. Section 404 requires a permit from the U.S. Army Corps of Engineers (USACE) for a discharge from dredged or fill materials into waters of the U.S., including wetlands. Section 401 requires a permit from a Regional Water Quality Control Board (RWQCB) for the discharge of pollutants. By federal law, every applicant for a federal permit or license for an activity which may result in a discharge into a California water body, including wetlands, must request state certification that the proposed activity will not violate state and federal water quality standards.

Fish and Wildlife Coordination Act

Title 16, United States Code, section 661, requires all federal agencies to coordinate with USFWS in the preservation of fish and wildlife implementing federal actions.

Fish and Wildlife Conservation Act

Title 16, United States Code, section 2901 et seq.; Title 50 Code of Federal Regulations part 83, requires states to develop conservation plans for fish and wildlife.

STATE

California Endangered Species Act of 1984

Fish and Game Code, sections 2050 through 2098, protects California's rare, threatened, and endangered species.

California Code of Regulations

Title 14, sections 670.2 and 670.5, lists the plants and animals of California that are declared rare, threatened, or endangered.

Fully Protected Species

Fish and Game Code, sections 3511, 4700, 5050, and 5515, designates certain species as fully protected and prohibits the take of such species or their habitat unless for scientific purposes (see also California Code of Regulations Title 14, section 670.7).

Nest or Eggs

Fish and Game Code section 3503 and 3503.3, protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird.

Migratory Birds

Fish and Game Code section 3513, protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame birds.

California Environmental Quality Act (CEQA)

Public Resources Code section 15380, CEQA defines rare species more broadly than the definitions for species listed under the state and federal Endangered Species Acts. Under section 15830, rare species that meet the criteria for listing but are not otherwise protected (e.g., through state and federal listing) receive additional consideration. Included in this category are many plants considered rare by the California Native Plant Society and some animals on CDFG's Special Animals list.

Native Plant Protection Act of 1977

Fish and Game Code section 1900 et seq., designates state rare, threatened, and endangered plants.

California Species Preservation Act of 1970

California Fish and Game Code section 900-903, requires the protection and enhancement of birds, mammals, fish, amphibians, and reptiles of California.

California Pesticide Regulations

3 California Code of Regulations (CCR), Division 6, requires the minimal use of rodenticides and herbicides.

California Native Species Conservation and Enhancement Act

Fish and Game Code section 1750 et seq., mandates maintenance of sufficient populations of native species to ensure continued existence.

LOCAL

City of Avenal General Plan. Open Space, Conservation and Recreation Element.

Contains open space and conservation area protection policies and standards and requires preservation of natural resources and the promotion of biological diversity (Avenal Power 2008a). Objectives of the Open Space, Conservation and Recreation Element include “protection of natural resources, including groundwater, soils, and air quality, to meet the needs of present and future generations; ensure that environmental hazards, including potential flooding and impacts from agricultural practices, are adequately addressed in the development process within the City and Planning Area; and create and preserve open space in the Avenal area to meet the needs of the community now and in the future to include the protection of natural and biological resources” (City of Avenal General Plan 2005).

SETTING

REGIONAL SETTING

The city of Avenal is located in the southwest portion of the San Joaquin Valley, California in western Kings County, south of the Fresno County line. Avenal Energy has proposed a project approximately two miles east of Interstate 5 and adjacent the California Aqueduct San Luis Canal (San Luis Canal) to the east. The project site is located on the floor of the San Joaquin Valley on an alluvial fan between the Kettleman Hills and the historic Tulare Lake basin. West of Interstate 5 is the Kettleman Hills, Guijarral Hills, and Kreyenhagen Hills where natural habitat still exists. Further to the west, on the opposite side of the Kettleman Hills from the project area is the Kettleman Plain. The region consists of agricultural production on the San Joaquin Valley floor, open spaces and petroleum production in the Guijarral Hills and Kettleman Hills, and open space and a habitat conservation bank in the Kreyenhagen Hills. The Kettleman Hills and Kreyenhagen Hills, in addition to areas farther north and west, support large expanses of grasslands consisting of mostly non-native annual grasses, which are successful at colonizing disturbed soils.

The United States Bureau of Reclamation (USBR) right-of-way dissects the agricultural lands in this region and consists of the man-made concrete-lined San Luis Canal and adjacent maintained grassland swaths that occur between the canal and the edge of the right-of-way (Avenal Power 2008a). The Department of Water Resources (DWR) manages the San Luis Canal and adjacent grassland areas by mowing and applying

occasional pesticide applications (Avenal Power 2008a). The USBR right-of-way width varies from 20 to 400 feet, with an average of 80 feet in most places (Avenal Power 2008a). The USBR right-of-way provides some habitat, foraging opportunities, and acts as a wildlife corridor.

Within the project region, a federal protected species recovery plan has been established to address the loss and fragmentation of habitat in the valley. The USFWS has designated the natural habitats west of Interstate 5 and the lands that interconnect them as important areas to protect for their contributions to meeting the overall objectives of the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (The Plan) (USFWS 1998). There are several animal species listed under the state and federal Endangered Species Acts, which are found in the natural communities west of Interstate 5. Some of these special status species include the San Joaquin kit fox, Swainson's hawk, blunt-nosed leopard lizard (*Gambelia silia*), Tulare grasshopper mouse, San Joaquin pocket mouse, and short-nosed and Tipton kangaroo rat (*Dipodomys nitratoides brevinasus* and *D. nitratoides nitratoides*). The Kettleman Hills and Kreyenhagen Hills provide habitat for special status plants including the San Joaquin woollythreads (*Monolopia congdonii*) and California jewel-flower (*Caulanthus californicus*).

By connecting large areas of isolated natural land, there should be a reduction in the harmful effects of habitat loss and fragmentation. The Plan lists three core San Joaquin kit fox populations, and the Kettleman Hills provide linkages between these core populations, and also most likely the smaller, more isolated populations in adjacent valleys (USFWS 1998, p. 132). It is important to maintain and enhance connecting corridors so San Joaquin kit fox and other species can move between the Kettleman Hills and the San Joaquin Valley's edge through the farmed gap between the Kettleman Hills and Guijarral Hills, and the Guijarral Hills and the Anticline Ridge, approximately 23 miles northwest of the project site (USFWS 1998, p. 135). All of these areas referenced as important in The Plan are west of Interstate 5 and would not be affected by the project. The San Luis Canal right-of-way has been identified by the USFWS as a kit fox movement route through the agricultural region on the San Joaquin Valley floor.

LOCAL

The city of Avenal contains a mixture of agriculture, light industrial, light commercial, residential areas, and Avenal State Prison. The proposed project site is located eight miles south of Huron, 10 miles northwest of Kettleman City, and 16 miles east of Coalinga. The City of Avenal population center is six miles southwest of the project site. The proposed project site is located two miles east of Interstate 5 off Avenal Cutoff Road near the existing Avenal Water Plant (AWP) which treats the city's drinking water. The San Luis Canal of the California Aqueduct is located to the east and the remaining bordering properties are agricultural fields. The city of Avenal designated the project area as an industrial area in 1992 due to the proximity of the natural gas supply pipeline, transmission line, Pacific Gas and Electric's (PG&E) Gates Substation, and Interstate 5. Special plant or animal species once associated with the natural habitats historically found in the project area are currently only found in the few remaining natural areas in the hills to the west that have not been disturbed by agriculture or development.

PROJECT SITE AND VICINITY DESCRIPTION

The proposed Avenal Energy facilities would be permanently located on a 34.8-acre portion of a 148-acre parcel of agricultural land. The project site and land surrounding has been in agricultural production as croplands, orchards, and vineyards for more than 50 years. The proposed project site as of the April 11, 2008 staff site visit was an irrigated grain field.

The applicant and wildlife agencies propose a 300-foot setback from the edge of the USBR right-of-way to the project security fence onsite. The USBR right-of-way width in the area adjacent to Avenal Energy is approximately 180 feet measured from the top edge of the canal according to the applicant (DRIRW 2008). The proposed 300-foot setback will result in a wider open space setback to be used as a wildlife corridor and habitat for state and federally listed species. The applicant has agreed to redesign the project's storm water holding basin and project layout to accommodate the setback.

Avenal Energy's linear facilities would consist of a new transmission lines, water supply pipelines, and a natural gas supply pipeline. The transmission line would be 6.4 miles long, and the new poles would permanently occupy a total of 1.2 acres. The new transmission line would parallel an existing transmission line for a portion of the route to the Pacific Gas and Electric (PG&E) Gates Substation. The main water supply pipelines would come from the AWP, located directly adjacent to Avenal Energy to the northeast. A backup water supply would come from three existing agricultural wells to the northeast and southwest of the project site. The natural gas supply pipeline would travel 2.5 miles southeast and south on Avenal Cutoff Road and to Plymouth Road to the existing PG&E Kettleman Compressor Station where the new natural gas pipeline will tap into an existing PG&E natural gas pipeline.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Staff reviews the best scientific and factual data available for a project to make a determination of whether a project would have a significant effect on biological resources. The biological significance is based primarily on the habitat characteristics of the particular project site and appurtenant facilities. Disturbance of a "brownfield" or developed site may not be significant due to the lack of biological resources, but construction on a "greenfield" or undeveloped site may result in significant impacts due to the higher likelihood of biological resources within the area.

Significant impacts to biological resources would occur if special status species are likely to be impacted by construction or operation of the proposed project. Special status species include:

- state- or federally-listed species,
- state Fully Protected species,
- candidates for state or federal listing, and/or
- Species of Special Concern.

Other potential impacts staff considers to be significant include:

- interruption of species migration;
- reduction of native fish, wildlife, and plant habitat;
- causing a fish or wildlife population to drop below self-sustaining levels; and
- disturbance of wetlands, marshes, riparian areas, or other wildlife habitat.

Harassment of a protected species regardless of whether or not loss of habitat or reduction in population occurs, and substantial degradation of the quality of the environment or environmental effects that are individually limited, but cumulatively considerable, would also be considered significant. Biological Resources Table 1 lists the special status biological resources known to occur in the general project area.

DIRECT AND INDIRECT IMPACTS AND MITIGATION

Direct impacts result at the same time and place as the project. Indirect impacts are caused by the project, but can occur later in time or farther removed in distance and are still reasonably foreseeable and related to the project.

Projects in developed sites typically have less of an impact on sensitive biological resources because they lack suitable habitat on site. However, such projects are evaluated for the impacts they could have on surrounding areas that remain in natural conditions and support sensitive biological resources. For certain projects, such as Avenal Energy, impacts to agricultural lands can impact particular sensitive species that utilize these areas for foraging and cover.

Biological Resources Table 1
Special Status Species Potentially Occurring in Avenal Energy Area

Plants	**Scientific Name**	**Status***
Round-leaved filaree	*California macrophylla*	__/__/1B.1
California jewel-flower	*Caulanthus californicus*	FE/SE/1B.1
Lemmon's jewel-flower	*Caulanthus coulteri* var. *lemmonii*	__/__/1B.2
Recurved larkspur	*Delphinium recurvatum*	__/__/1B.2
Pale-yellow layia	*Layia herterotricha*	__/__/1B.1
Showy madia	*Madia radiata*	__/__/1B.1
San Joaquin woollythreads	*Monolopia congdonii*	FE/__/1B.2
Invertebrates		
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT/__
Doyen's trigonoscuta dune weevil	*Trigonoscuta* sp.	__/CSC
Amphibians		
California tiger salamander	*Ambystoma californiense*	FT/CSC
Western spadefoot	*Spea hammondii*	__/CSC
Reptiles		
Blunt-nosed leopard lizard	*Gambelia sila*	FE/SE
San Joaquin whipsnake	*Masticophis flagellum ruddocki*	__/CSC
Birds		
Cooper's hawk	*Accipiter cooperi*	__/CSC
Tricolored blackbird	*Agelaius tricolor*	__/CSC
Long-eared owl	*Asio otus*	__CSC
Burrowing owl	*Athene cunicularia*	__/CSC
Swainson's hawk	*Buteo swainsoni*	__/ST
Merlin	*Falco columbarius*	__/CSC
Prairie falcon	*Falco mexicanus*	__/CSC
Loggerhead shrike	*Lanius ludovicanus*	__/CSC
Double-crested cormorant	*Phalacrocorax auritus*	__/CSC
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	__/CSC
Mammals		
Nelson's or San Joaquin antelope squirrel	*Ammospermophilus nelsoni*	__/ST
Short-nosed kangaroo rat	*Dipodomys nitratoides brevinasus*	__/CSC
Tipton kangaroo rat	*Dipodomys nitratoides nitratoides*	FE/SE
Western mastiff bat	*Eumopos perotis californicus*	__/CSC
Tulare grasshopper mouse	*Onychomys torridus tularensis*	FE/CSC
San Joaquin pocket mouse	*Perognathus inornatus inornatus*	__/CSC
American badger	*Taxidea taxus*	__/CSC
San Joaquin kit fox	*Vulpes macrotis mutica*	FE/ST

***Status Legend** (Federal/State/California Native Plant Society (CNPS) lists, CNPS list is for plants only):
FE = Federally listed Endangered; **FT** = Federally listed Threatened; **FC** = Candidate Species for Listing; **SE** = State-listed Endangered; **ST** = State-listed Threatened; **CSC** = California Species of Concern; **List 1B** = Rare or Endangered in California and elsewhere; **.1** = Very endangered in California; **.2** = Rare, threatened, or endangered in California, more common elsewhere __ = not listed in that category. (Sources: Avenal Power 2008a; CNDDB 2008).

Construction Impacts and Mitigation

Biological Resources at Project Site and Adjacent Areas

When staff visited the site April 11, 2008, the project site consisted of irrigated grain row crop and dirt roads surrounding the property. The adjacent canal right-of-way consisted of some weedy and native species which provides some habitat for sensitive species. The adjacent USBR right-of-way vegetation included various native and non-native plant species. Historically, sensitive plant species like round-leaved filaree (*California macrophylla*), California and Lemmon's jewel-flower (*Caulanthus californicus* and *C. coulteri* var. *lemmonii*), recurved larkspur (*Delphinium recurvatum*), pale-yellow layia (*Layia herterotricha*), and showy madia (*Madia radiata*) were found in the region, however none of these rare species are found on the site.

The region of the proposed project historically contained several sensitive wildlife species including valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), California tiger salamander (*Ambystoma califoriense*), blunt-nosed leopard lizard, San Joaquin whipsnake (*Masticophis flagellum ruddocki*), Cooper's hawk (*Accipiter cooperi*), tricolored blackbird (*Agelaius tricolor*), yellow-headed blackbird (*Xanthocephalus xanthocephalus)*, Swainson's hawk, loggerhead shrike (*Lanius ludovicanus*), Nelson's or San Joaquin antelope squirrel (*Ammospermophilus nelsoni*), short-nosed and Tipton kangaroo rat, western mastiff bat (*Eumopos perotis californicus*), Tulare grasshopper mouse, San Joaquin pocket mouse, and San Joaquin kit fox. Habitat for some of these wildlife species does occur in limited capacity onsite and to a greater extent in the vegetated areas associated with the USBR right-of-way, the soil berms, and the San Luis Canal.

Sensitive wildlife species are found in the project area that could potentially be affected by Avenal Energy. The state Species of Special Concern western burrowing owl (*Athene cunicularia*) is known to occupy areas such as the soil berms adjacent to the site and within the USBR right-of-way. It is likely that the burrowing owl and other wildlife species use the habitat within the USBR right-of-way, the San Luis Canal, and the soil berms to the south and east of the site. On the April 11, 2008 site visit, staff determined that the soil berms contained several small mammal burrows and a potential burrowing owl burrow. The San Luis Canal supports a variety of fish and aquatic insect species which provide foraging opportunities for several birds, including the state Species of Special Concern, double-crested cormorant (*Phalacrocorax auritus*) which was observed using the canal during the field surveys (Avenal Power 2008a).

Construction Laydown, Parking Area, and Power Plant Site

The applicant states that the power plant site facilities would permanently occupy approximately 34.8 acres of the 148-acre parcel (TRC 2009). The site would include a power plant island and switchyard, and storm water holding basin inside security fencing for a permanent impact of 31.9 acres (Avenal Power 2008g). In addition to the facilities inside the security fencing, primary and secondary site access roads will permanently occupy approximately 2.9 acres. Temporary impacts would be incurred from the heavy equipment staging area, two parking areas, an emergency staging area, and temporary construction disturbance for access roads and pipelines. These

temporary disturbances total 39.3 acres of the 148-acre parcel. Biological Resources Table 3, later in this analysis, lists the total permanent and temporary impacts associated with the linear facilities.

Staff has been informed of the potential for additional impacts through discussions with USFWS. If the temporary construction facilities, such as the proposed laydown area on site would have roadbed gravel laid down on the soil and if it is not removed following construction activities, these impacts would be considered permanent impacts because the land would no longer be suitable for wildlife (USFWS 2008e). The applicant has responded to a USFWS letter for more information and stated that the roadbed gravel will be removed from temporary disturbance areas (Avenal Power 2008g). USFWS has stated that if the gravel or security fencing remains on the land 24 months or longer, the impact would be considered permanent and not temporary even if the gravel or security fence is eventually removed. The applicant has confirmed that the duration of temporary construction disturbance will be less than 24 months (TRC 2009). Staff has proposed Condition of Certification **BIO-14** to allow for a determination of actual area impacted both temporarily and permanently. This condition of certification recommends aerial photographs be taken of the project site and out to 1000 feet surrounding the site at the start of the Avenal Energy power plant operation at a scale of one inch equals 100 feet. In this way the actual area of impact can be determined and any appropriate adjustment in habitat compensation made.

Biological Resources Table 2
Avenal Energy Permanent and Temporary
Acreage Impacts on the 148-Acre Parcel

Facility Structure	Permanent Acres	Temporary Acres	Total Acres
Area Inside Security Fencing	31.9 acres	0 acre	31.9 acres
Heavy Equipment Staging Area	0 acres	3.1 acres	3.1 acres
Staff Parking	0 acres	1.5 acres	1.5 acres
Craft Parking	0 acres	4.5 acres	4.5 acres
Construction Laydown	0 acres	23.5 acres	23.5 acres
Emergency Staging Area	0 acres	0.9 acres	0.9 acres
Access Roads	2.9 acres	2.4 acres	5.3 acres
Water pipelines onsite	0 acres	2.03 acres	2.03 acres
Natural gas pipelines onsite	0 acres	1.3 acres	1.3 acres
Total acres	34.8 acres	39.3 acres	74.1 acres

Source: Exhibit 83-3 from Avenal Power 2008f; Avenal Power 2008g; Gilliland 2008.

Mitigation of Construction Impacts

Mitigation of construction impacts is necessary in projects such as Avenal Energy because sensitive species such as San Joaquin kit fox, Swainson's hawk, and burrowing owl are known to use agricultural land for habitat and foraging. The project AFC stated that burrowing owl burrows were found within 0.2 and 0.4 mile of the project

site and San Joaquin kit fox was observed in the USBR right-of-way 0.5 mile north of the project site. Construction of Avenal Energy would permanently and temporarily disturb the habitat and foraging opportunities and this loss requires habitat compensation.

Impacts to wildlife species during construction would need to be minimized and measures are included to protect species from harm through staff's proposed conditions of certification. Staff proposes Conditions of Certification **BIO-1** to **BIO-4** which would require that the applicant hire a Designated Biologist and Biological Monitor(s) to ensure that Avenal Energy would be in compliance with the LORS. The applicant would also need to create and implement a Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) as prescribed by staff's Condition of Certification **BIO-6**. The applicant proposes and staff supports the development and implementation of a Worker Environmental Awareness Program (WEAP) to train workers for protection of sensitive biological species and to avoid impacts during facility construction and operation (Condition of Certification **BIO-5**). The applicant also proposes and staff supports conducting pre-construction surveys according to the *USFWS Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 1999) and the California Burrowing Owl Consortium (CBOC) Survey Protocol and Mitigation Guidelines (Avenal Power 2008e) for preconstruction survey protocols and mitigation guidelines (Condition of Certification **BIO-11**). The applicant proposed and staff supports implementation of impact avoidance methods if burrowing owls are found (Conditions of Certification **BIO-7, BIO-8,** and **BIO-12**). During construction, the applicant proposes and staff supports fencing the USBR right-of-way and soil berms in areas near construction activities to keep workers and equipment from entering habitat and movement corridor areas (Conditions of Certification **BIO-7** and **BIO-8**).

Transmission Line Impacts

The project proposes to build an onsite 230 kilovolt (kV) switchyard to connect new transmission lines traveling 6.4 miles offsite to the PG&E Gates Substation. The planned transmission lines would include 43 steel tubular towers at a height of 120 feet each and set 800 feet apart. The new transmission line would travel south for approximately 0.4 mile from the southeast corner of the project site, then travel west for approximately 0.7 miles until meeting with an existing transmission line traveling northwest which it would parallel for approximately 5.0 miles and then turn west for approximately 0.3 mile until ending at the Gates Substation. The new transmission line poles will be within areas that are currently orchards and row crops. The applicant stated in comments to staff's PSA (TRC 2009) that the temporary disturbance for the transmission line installation would be 2,400 square feet per pole installation site. In addition to this temporary disturbance, an average of 1,200 square feet would be permanently impacted for each pole. For the estimated 43 poles, there would be a total of 1.2 acres of permanent surface disturbance and 2.4 acres of temporary disturbance.

Transmission lines can be a collision threat to birds in certain situations. The threat of collision is greater when the transmission line is on a flight corridor such as between daily roosting and feeding areas for waterfowl, migratory pathways, adjacent to a water body in which there might be large flocks of birds, or when special-status species such

as California condors are found in the region. None of these situations exist at this project site and concern for collision impacts are considered low by staff, so no significant impacts from collisions with new transmission lines are expected.

Transmission lines can pose a bird and other wildlife electrocution threat, but due to the size of the Avenal Energy transmission line and its configuration, this concern is minor. However, electrocution at substations and other associated features can result in wildlife electrocutions. Therefore, staff has proposed Condition of Certification **BIO-10** (Avian Power Line Interaction Committee [APLIC] Compliance) to address electrocution threat to wildlife. With the implementation of staff's proposed condition of certification (**BIO-10**), any transmission line impacts are expected to be less than significant.

Pipeline Impacts

Avenal Energy would require the installation of natural gas and water supply pipelines on and off the project site. The natural gas pipeline would be 2.5 miles long and consist of a 20-inch diameter pipe connecting with the PG&E Kettleman Compressor Station east of the site. The natural gas pipeline would cross an established orchard to the west until reaching Avenal Cutoff Road, then travel southwest on Avenal Cutoff Road, south on an unpaved road, east on Plymouth Avenue, and then south on an unpaved road near the east side of the compressor station (See Exhibit 84-1 in the AFC). The natural gas pipeline would be buried beneath dirt roads at the edge of agricultural fields located along Avenal Cutoff Road and Plymouth Avenue after leaving the orchard. The total temporary offsite habitat impacts from the natural gas pipeline would be 1.2 acres.

The sewer and water supply pipelines would be relatively short and located underground at the edge of agricultural fields. The sewer pipeline would be part of the sanitary system connected to an onsite septic tank and leach field.

The water supply pipelines would come from the Avenal Water Plant (AWP) on the northeast corner of the site, a potable water pipeline from the north side of Avenal Cutoff Road, and the agricultural wells northeast and southwest of the project site. The water supply pipeline to the AWP would be approximately 0.3 miles long and entirely onsite. The potable water pipeline would travel the same path as agricultural well 24-5 until offsite where it would travel approximately 0.75 mile offsite to tap into a suitable location. Agricultural wells #18-1 and #18-4 are located at the edge of the USBR right-of-way within a 60-foot right-of-way (DRIRW 2008). The applicant stated during the Data Response and Issues Resolution Workshop (DRIRW) on July 1, 2008 that during installation of the 1.1 mile water pipeline from agricultural wells #18-1 and #18-4 to the project site, the pipeline would be at least 30 feet from the USBR right-of-way within the middle of the agricultural well right-of-way. Agricultural well #24-5 is located within an area of agricultural fields and the pipeline connection would be 1.3 miles long. The total temporary impact of the water pipelines would be 5.4 acres.

All of the pipeline area of disturbance is calculated based on an installation width of 25 feet according to Data Response Round 2 (Avenal Power 2008f). Originally, the applicant stated in the AFC that the area of disturbance would be 50 feet wide. Typically, pipelines are installed with a width of 50 to 75 feet area of disturbance. The applicant has confirmed their intent to maintain pipeline construction within a 25-foot wide area of disturbance. The installation of pipelines will not result in permanent

surface disturbance since the pipelines will be underground. The temporary construction impact of 5.4 acres is included in the disturbance acreage impact that will require habitat compensation at a ratio of 0.3 acres of compensation for every acre impacted. Considering that habitat will be provided, staff concludes that the pipelines would have a less than significant effect on biological resources.

Biological Resources Table 3
Avenal Energy Off-site Linear Facility Permanent and Temporary Acreage Impacts

Facility Structure	Permanent Acres	Temporary Acres	Total Acres
Transmission Line	1.2 acres	2.4 acre	3.6 acres
Water Pipelines	0 acre	5.4 acres	5.4 acres
Natural Gas Pipeline	0 acre	1.2 acre	1.2 acres
Total acres	1.2 acres	9.0 acres	10.2 acres

Source: Exhibit 83-2 from Avenal Power 2008f, Gilliland 2008

Lighting Impacts

Lights can disorient migratory birds flying at night, or attract wildlife such as insects and insect-eaters, and this project would be located in an agricultural area with little night lighting. The project site was not found to have any sensitive species that would be impacted by additional lighting, however, sensitive species such as San Joaquin kit fox and burrowing owl were found within 0.5 mile of the project site on adjacent areas which serve as habitat for these sensitive species. The applicant states that there would be no nighttime construction and therefore no impact from nighttime lighting onsite (Avenal Power 2008a). Since there would be no nighttime construction, staff concludes that construction lighting would have a less than significant effect on biological resources.

Noise Impacts

The noise levels for common construction equipment is presented in Table 6.12-5 (page 6.12-17 to 6.12-18) of the AFC and show typical dBA measurements at 50, 500, and 1,500 feet (Avenal Power 2008a). The loudest equipment is expected to be the 250 to 700 horsepower bulldozer and the 6 to 15 cubic yard front end loader. Both are expected to range from 68 dBA at 500 feet to 58 dBA at 1,500 feet. Sensitive species such as San Joaquin kit fox and burrowing owls could be within several hundred feet of the construction activities, so the noise level would be higher and could affect these sensitive species. Studies have shown that animal behavior can change as a result of exposure to noise. The sound levels that can result in behavioral changes range from 60 dBA to 85 dBA, depending on the study and the species (Knight and Gutzwiller 1995; Sarigul-Klijn 1997). The change in the ambient noise measurement from construction of the proposed Avenal Energy could result in behavioral changes in nearby wildlife. Some sensitive species like the burrowing owl and San Joaquin kit fox could be disturbed by increases in noise, and could abandon burrows or dens due to the increase in noise expected during construction. This disruption from noise due to construction would be, expected to last 27 months, and occur with different equipment at different times on and offsite.

The AFC also states that construction activities during the nesting season of the state Species of Special Concern tricolored and yellow-headed blackbirds, mid-April to late

July, could result in site or nest abandonment if construction and noise occur too close to the colony's nests (Avenal Power 2008a). Both the tricolored and yellow-headed blackbirds were observed in 2007 in the cattail marsh associated with the Avenal Water Plant (AWP) ponds located adjacent to Avenal Energy. To avoid site or nest abandonment, the applicant plans to install a temporary barrier fence 250 feet from the nearest active nest to establish a construction buffer zone until the nesting season is complete. CDFG would require that the time frame for barrier fencing be extended from mid-March through August to include potential early and late season nesters which is required in Condition of Certification **BIO-8** (Mitigation Management to Avoid Harassment or Harm) (CDFG 2008a). Staff concludes that implementing these impact avoidance and minimization measures would result in less than significant effects to sensitive species that may nest or occupy the project site and adjacent areas.

Habitat Loss and Compensation

Projects constructed on "greenfield" sites, or undeveloped sites, can result in significant impacts to biological resources and require that habitat compensation be provided. Avenal Energy would be constructed on an agricultural site that provides limited habitat and foraging opportunities for two sensitive species, the Swainson's hawk (state listed threatened) and San Joaquin kit fox (state listed threatened and federally listed endangered). These impacts to sensitive species would require habitat compensation and other mitigation. Avenal Energy would permanently impact 34.8 acres onsite and 1.2 acres offsite, and temporarily impact 39.3 acres onsite and 9.0 acres offsite.

For the loss of Swainson's hawk habitat, CDFG would require one acre for every acre permanently impacted by Avenal Energy. CDFG has agreed that impacts to Swainson's hawk can be covered by land purchased for San Joaquin kit fox as long as the land is suitable for both species. For the loss of San Joaquin kit fox habitat, CDFG and USFWS would require 1.1 acres for every acre permanently impacted by Avenal Energy and 0.3 acre for every acre temporarily impacted.

The preconstruction survey results would determine if any additional mitigation would be required by CDFG for impacts to active burrowing owl burrows as outlined in CDFG's *Staff Report on Burrowing Owl Mitigation* (CDFG 1995). Staff has proposed Condition of Certification **BIO-12** (Burrowing Owl Impact Avoidance and Minimization Measures) in the event that burrowing owls are found within 500 feet of the project site or linears. Biological Resources Table 4 lists the habitat compensation for permanent and temporary impacts.

Biological Resources Table 4
Habitat Compensation Acreage Required for Avenal Energy

	Total Impacts (acres)	Compensation Ratio	Compensation Acres Required
Permanent • Power plant • Transmission line towers Total:	34.8 1.2 36.0	1.1 to 1	39.6
Temporary Onsite Offsite Total:	39.3 9.0 48.3	0.3 to 1	14.5
TOTAL	84.3 acres		54.1 acres

Source: Exhibit 83-2 from Avenal Power 2008f, Gilliland 2008

The applicant, Energy Commission, CDFG, and USFWS staff have agreed upon habitat compensation ratios. The Kern Water Bank (KWB) and the Kreyenhagen Hills Conservation Bank (KHCB) have both been deemed acceptable to CDFG and USFWS. The applicant has informed staff that they will pursue an agreement for habitat compensation of 54.1 acres at the KHCB. If an agreement cannot be reached with the KHCB, then KWB will be used. Either of these banks would mitigate habitat impacts to a level that is less than significant. To address the habitat compensation requirement, staff proposes Condition of Certification **BIO-9**.

Setback from San Luis Canal to Maintain Wildlife Movement Corridor

Providing open space, a wildlife corridor or setback, to allow for wildlife movement if the project is constructed is considered important by the USFWS, CDFG, and Energy Commission staff for the region's protected species. These species currently use the area for a wildlife corridor. The applicant has come to an agreement with Energy Commission, CDFG, and USFWS staff that project facilities will be set back 300 feet to maintain the existing wildlife corridor along the canal. The setback will be calculated from the USBR right-of-way as requested by USFWS, CDFG, and Energy Commission staff.

The applicant stated at the Commission staff Data Response and Issues Identification Workshop on July 1, 2008, that the USBR and DWR, which manages the adjacent canal and right-of-way, would not maintain the setback land if deeded to the USBR and

DWR, therefore, the applicant has proposed "Recommended Buffer Zone [Setback] Management Guidelines" to maintain the setback land (DRIRW 2008). The applicant's guidelines recommend the following actions be taken:

- Mow one to four times each spring, March to May during the grass peak growing season, to maintain the height of the grass between four and ten inches.
- Monitor once every two weeks from March 1 to May 31 to determine if mowing is needed to meet the grassland height criteria.
- If the grassland vegetation is succeeded by a native San Joaquin Valley vegetation community, such as valley saltbush scrub, no mowing would occur.
- Ground or vegetation disturbing activities outside of mowing would be prohibited within the buffer zone.
- Trash removal would be conducted every three months in the buffer zone.
- Human activities not associated with maintaining suitable habitat for San Joaquin kit fox would be prohibited within the buffer zone.
- Night lighting within the buffer zone would be prohibited or minimized to the necessary level for security purposes.
- The perimeter fence would be constructed to be wildlife compatible, which would allow for unobstructed and unhampered movement through the fence. The internal security fencing would not be a wildlife compatible fence since it would be constructed to preclude human access to the plant.

With the establishment of the 300-foot setback and associated management of that setback, and the habitat compensation, staff concludes that there would not be a significant impact to any sensitive biological resources from the project. Staff has proposed Condition of Certification **BIO-7** to implement the establishment and maintenance of the setback.

Operation Impacts and Mitigation

Potential operation impacts include those to wildlife due to electrocution by transmission lines and associated facilities, bird collision with transmission line conductors, towers and other tall structures, and disturbance to wildlife due to increased noise and lighting.

Transmission lines, exhaust stacks, and other structures can be bird collision hazards and lead to bird fatalities. The applicant would be installing new transmission lines on 120-foot tall tubular steel poles, a new 123-foot tall air cooled condenser, and a 145-foot tall exhaust stack. These heights are taller than the surrounding landscape and could pose a threat to birds flying through the area.

Transmission lines and associated facilities can pose electrocution hazards to birds with large wingspans and other wildlife. In order to protect birds and other wildlife, staff has recommended the applicant follow the guidelines outlined in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (APLIC 2006). Staff has recommended Condition of Certification **BIO-10** which recommends measures to reduce electrocutions and collisions. If the applicant complies with the APLIC

guidelines, staff believes that the impact to birds from collision or bird or wildlife electrocution would be minimized to a less than significant level.

Lighting Impacts

The Avenal Energy site was not found to have any sensitive species that would be impacted from additional lighting and noise. However, sensitive species such as San Joaquin kit fox and burrowing owl were found within 0.2 to 0.5 mile of the project site in the USBR right-of-way and adjacent areas which serve as foraging, habitat, and movement corridors for these sensitive species. The lighting to be used during operations is designed to shield light downward to eliminate escape of light off site (Avenal Power 2008a). Lights can also disorient migratory birds flying at night, nocturnal species, or attract wildlife such as insects and insect-eaters in some cases. Due to the nocturnal habits of the burrowing owl and San Joaquin kit fox, the nighttime lighting onsite should be shielded to light only the power plant site, and not the adjacent areas that serve as sensitive species habitat. Staff has proposed Condition of Certification **BIO-7** (Impact Avoidance Mitigation Features) that requires appropriate lighting be installed to limit effects to biological resources to less than significant levels.

Noise Impacts

According to Table 6.12-7 on page 6.12-24 of the AFC, the predicted operational noise at the eastern property line will be 63 dBA (Avenal Power 2008a). This change in operational noise is on the low end of the range of 60 to 85dBA which can cause behavioral change in animals (Knight and Gutzwiller 1995; Sarigul-Klijn 1997). The increase in noise during operation could disturb some sensitive species like the burrowing owl and San Joaquin kit fox. The CDFG and USFWS have stated that there could be some changes in behavior, but do not expect any major negative impacts to animals using the adjacent USBR right-of-way as a wildlife corridor. With the agencies concluding that there would be no major negative impacts to the sensitive species in the vicinity, staff concludes the impacts would be less than significant for operational noise impacts to biological resources.

Storm Water and Wastewater Impacts

Storm water drainage from the proposed project could contain pollutants that would affect the local water quality if not handled appropriately. Storm water drainage would be treated two ways by the project. Storm water that comes in contact with plant facilities that could have oil or other chemicals in the storm water would be routed through an oil/water separator and then collected to be recycled for plant operations (Avenal Power 2008a). Clean storm water runoff would be collected onsite and drained by plant drainage system into a retention basin where water would be allowed to evaporate or percolate (Avenal Power 2008a). Wastewater would be routed to a sanitary system connecting to an onsite septic tank and leach field (Avenal Power 2008a).

Staff concludes that there would be no significant impacts to biological resources associated with the discharge of storm water and wastewater during operations. Please see the **SOIL AND WATER RESOURCES** section of this analysis for more detailed information on storm water discharge, wastewater treatment, and permitting.

CUMULATIVE IMPACTS

A project could result in a significant adverse cumulative impact where its effects are cumulatively considerable. “Cumulatively considerable” means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, of other current projects, and of probable future projects (Cal. Code Regs., Tit. 14, Section 15130).

The other energy projects closest to Avenal Energy that could be considered a cumulative habitat loss with Avenal Energy would be the Panoche Energy Center (PEC) project, Starwood Power-Midway Peaking (Starwood Midway) project, and Great Valley Ethanol (GVE) project. The PEC and Starwood Midway projects are adjacent to each other and are both approximately 55 miles northwest of Avenal Energy. Both projects have compensated for their habitat losses by purchasing land credits in the Kreyenhagen Hills Mitigation Bank as was required by the wildlife agencies and Energy Commission. The GVE project is approximately 27 miles northwest and located within the Kings Industrial Park on property zoned for industrial use (GVE 2008). Staff has no information on whether GVE compensated for their habitat losses.

Habitat Loss

The proposed Avenal Energy site occurs in the city of Avenal industrial zone on a parcel of land currently farmed in field crops. The applicant states that the foraging opportunities for wildlife species are limited on row crop land and that the removal of this land from agriculture would not significantly affect the local common and special status species in the vicinity (Avenal Power 2008a). The applicant has agreed with USFWS and CDFG on habitat compensation ratios of 1.1 acres for every acre permanently disturbed and 0.3 acre for every acre of temporarily disturbed land. Due to the significant distances PEC, Starwood Midway, and GVE are from the Avenal Energy site, the lack of other new development in the City of Avenal industrial zone, the low urbanization pressures in the area, and the habitat compensation Avenal Energy would obtain, the proposed Avenal Energy site would not significantly affect biological resources and therefore would not contribute to any significant cumulative impact concerns for habitat loss.

Wildlife Movement

The Avenal Water Plant (AWP) is located adjacent to Avenal Energy on the northeast corner of the site and supplies the City of Avenal with water taken from the San Luis Canal. The AWP has no setback from the USBR right-of-way, which is approximately 50 to 180 feet wide at the AWP. The project will increase development and human presence adjacent to the water treatment plant, which created a narrowing of the USBR right-of-way and restricted wildlife movement. Considering that that the applicant has agreed to provide the 300-foot setback, staff believes that the projects cumulative impacts to wildlife movement corridors will be less than significant.

COMPLIANCE WITH LORS

The proposed Avenal Energy would not be located adjacent to any riparian habitat or sensitive natural communities that exist in the region. Within or immediately adjacent to

the proposed Avenal Energy area, there are no federally protected wetlands, including vernal pools or marsh habitats. There are possible vernal pools within the adjacent USBR right-of-way, but these would not be impacted by Avenal Energy. The proposed Avenal Energy does not conflict with provisions of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other approved local, regional, or state habitat conservation plan because there are no applicable HCP's or NCCP's for this area (USFWS 2008d).

Avenal Energy would not require a state Incidental Take Permit (ITP), but would require a federal Section 7 of the Endangered Species Act (ESA) take authorization (Avenal Power 2008a, CDFG 2008a, U.S. EPA 2008b). The applicant would obtain the Biological Opinion (BO) from the Environmental Protection Agency (EPA) under the Section 7 consultation process with USFWS. If granted, the BO would include a Section 7 take authorization to address the impacts to the federally listed species associated with this project (see Condition of Certification **BIO-13**).

Biological Resources Table 5 outlines the LORS and staff's conclusion regarding whether Avenal Energy would be in compliance with LORS.

Biological Resources Table 5
Laws, Ordinances, Regulations, and Standards Compliance

Applicable LORS	LORS Compliance Status
Federal	
Federal Endangered Species Act	Yes – the applicant has agreed the wildlife corridor 300-foot setback will be from the edge of the USBR's right-of-way. Habitat compensation has been agreed to. A Biological Opinion is being written and will be available prior to the project certification decision.
Migratory Bird Treaty Act	Yes – if the applicant installs temporary barrier fencing around burrowing owl burrows, tricolored and yellow-headed blackbird nests, and follows APLIC guidelines.
Clean Water Act	Yes – if the applicant implements their proposed storm water and wastewater treatment plans as outlined in the "Storm water and Wastewater Impacts" section.
Fish and Wildlife Coordination Act	Yes – through Section 7 consultation the USEPA and USFWS are coordinating on Avenal Energy (U.S. EPA 2008b).
Fish and Wildlife Conservation Act	Yes - the applicant agrees to provide habitat compensation at one of the two approved compensation banks.
State	
California Endangered Species Act of 1984	Yes – maintaining the wildlife corridor 300-foot setback has been agreed to by the applicant. No Incidental Take Permit (ITP) would be necessary; and the BO includes measures for San Joaquin kit fox that meet the state protection requirements.
California Code of Regulations	Yes – the applicant has listed the plants and animals that are declared rare, threatened, or endangered
Fully Protected Species	Yes – there are no fully protected species that could be affected by this project
Nest or Eggs	Yes – if the applicant installs temporary barrier fencing around burrowing owl burrows and tricolored and yellow-headed blackbird nests.
Migratory Birds	Yes – if the applicant installs temporary barrier fencing around burrowing owl burrows, tricolored and yellow-headed blackbird nests, and follows APLIC guidelines.
California Environmental Quality Act (CEQA)	Yes – if the applicant does preconstruction surveys for burrowing owl, installs temporary barrier fencing around burrowing owl burrows and tricolored and yellow-headed blackbird nests.
Native Plant Protection Act of 1977	Yes – the applicant will not affect state listed rare, threatened, or endangered plants onsite or offsite.

Applicable LORS	LORS Compliance Status
California Species Preservation Act of 1970	Yes – the wildlife corridor 300-foot setback, and habitat compensation have been agreed to.
California Pesticide Regulations	Yes – the applicant proposes the setback management practices that will limit the use of rodenticides and herbicides.
California Native Species Conservation and Enhancement Act	Yes – Avenal Energy will not impact native species populations that would affect their continued existence.
Local	
City of Avenal General Plan, Open Space, Conservation, and Recreation Element	Yes – the applicant would be constructing Avenal Energy within the City of Avenal Industrial Zone and purchasing habitat compensation from a compensation bank to mitigate for habitat loss.

NOTEWORTHY PUBLIC BENEFITS

Staff does not believe that the project has any noteworthy public benefits related to biological resources.

CONCLUSIONS

Direct impacts to biological resources onsite would be largely avoided because the proposed Avenal Energy site and laydown areas are being used for agriculture. Potential direct impacts to special-status species in the surrounding area can be mitigated with implementation of the 300-foot setback from the USBR right-of-way, habitat compensation, Best Management Practices, and other impact minimization and avoidance measures set forth in the conditions of certification. The USFWS is writing the federal Biological Opinion for the proposed project and it is anticipated it will be finalized prior to project certification. Staff has included proposed conditions of certification that will minimize and mitigate impacts to biological resources to a level that is less than significant. The construction and operation of the project would comply with all federal, state, and local laws, ordinances, regulations, and standards relating to biological resources if staff's proposed conditions of certification are adopted and implemented.

PROPOSED CONDITIONS OF CERTIFICATION

Staff proposes the following biological resources conditions of certification.

DESIGNATED BIOLOGIST SELECTION

BIO-1 The project owner shall assign a Designated Biologist to the project. The project owner shall submit the resume of the proposed Designated Biologist, with at least three references and contact information to the Energy Commission Compliance Monitor (CPM) for approval.

The Designated Biologist must at least meet the following minimum qualifications:

1. Bachelor's Degree in biological sciences, zoology, botany, ecology, or a closely related field;

2. Three years of experience in field biology or current certification of a nationally recognized biological society, such as the Ecological Society of America or the Wildlife Society; and

3. At least one year of field experience with biological resources found in or near the project area.

In lieu of the above requirements, the resume shall demonstrate to the satisfaction of the CPM that the proposed Designated Biologist or alternate has the appropriate training and background to effectively implement the conditions of certification.

Verification: The project owner shall submit the specified information at least 90 days prior to the start of any site (or related facilities) mobilization. No site or site related facility activities shall commence until an approved Designated Biologist is available to be on site.

If a Designated Biologist needs to be replaced, the specified information of the proposed replacement must be submitted to the CPM at least ten working days prior to the termination or release of the preceding Designated Biologist. In an emergency, the project owner shall immediately notify the CPM to discuss the qualifications and approval of a short-term replacement while a permanent Designated Biologist is proposed to the CPM for consideration.

DESIGNATED BIOLOGIST DUTIES

BIO-2 The project owner shall ensure that the Designated Biologist performs the following during any site (or related facilities) mobilization, ground disturbance, grading, construction, operation, and closure activities. The Designated Biologist may be assisted by the approved Biological Monitor(s), but remains the contact for the project owner and CPM.

1. Advise the project owner's Construction and Operation Managers on the implementation of biological resources Conditions of Certification;

2. Consult on the preparation of the Biological Resource Mitigation Implementation and Monitoring Plan (BRMIMP), to be submitted by the project owner;

3. Be available to supervise, conduct and coordinate mitigation, monitoring, and other biological resources compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources such as special status species or their habitat;

4. Clearly mark sensitive biological resource areas and inspect these areas at appropriate intervals for compliance with regulatory terms and conditions;

5. Inspect active construction areas where animals may have become trapped prior to construction commencing each day. At the end of the day, inspect for installation of structures that prevent entrapment or allow escape during periods of construction inactivity. Periodically inspect areas with high vehicle activity (i.e. parking lots) for animals in harm's way;

6. Notify project owner and CPM of any non-compliance with any biological resources Condition of Certification;

7. Respond directly to inquires of the CPM regarding biological resource issues;

8. Maintain written records of the tasks specified above and those included in the BRMIMP. Summaries of these records shall be submitted in the Monthly Compliance Report and the Annual Report; and

9. Train the Biological Monitors as appropriate, and ensure their familiarity with the BRMIMP, Worker Environmental Awareness Program (WEAP) training and all permits.

Verification: The Designated Biologist shall submit in the Monthly Compliance Report to the CPM copies of all written reports and summaries that document biological resources activities. If actions may affect biological resources during operation a Designated Biologist shall be available for monitoring and reporting. During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless their duties are ceased as approved by the CPM.

BIOLOGICAL MONITOR SELECTION

BIO-3 The project owner's CPM-approved Designated Biologist shall submit the resume, at least three references and contact information for the proposed Biological Monitors to the CPM for approval. The resume shall demonstrate to the satisfaction of the CPM, the appropriate education and experience to accomplish the assigned biological resources tasks.

Biological Monitor(s) training by the Designated Biologist shall include familiarity with the Conditions of Certification and the BRMIMP, WEAP, and all permits.

Verification: The project owner shall submit the specified information to the CPM for approval at least 30 days prior to the start of any site (or related facilities) mobilization. The Designated Biologist shall submit a written statement to the CPM confirming that

individual Biological Monitor(s) have been trained including the date when training was completed. If additional Biological Monitors are needed during construction, the specified information shall be submitted to the CPM for approval 10 days prior to their first day of monitoring activities.

DESIGNATED BIOLOGIST AND BIOLOGICAL MONITOR AUTHORITY

BIO-4 The project owner's Construction/Operation Manager(s) shall act on the advice of the Designated Biologist and Biological Monitor(s) to ensure conformance with the biological resources Conditions of Certification. If required by the Designated Biologist and Biological Monitor(s), the project owner's Construction/ Operation Manager shall halt all site mobilization, ground disturbance, grading, construction, and operation activities in areas specified by the Designated Biologist.

The Designated Biologist shall:

1. Require a halt to all activities in any area when determined that there would be an unauthorized adverse impact to biological resources if the activities continued;

2. Inform the project owner and the Construction/Operation Manager when to resume activities; and

3. Notify the CPM if there is a halt of any activities, and advise the CPM of any corrective actions that have been taken, or will be instituted, as a result of the work stoppage.

If the Designated Biologist is unavailable for direct consultation, the Biological Monitor shall act on behalf of the Designated Biologist.

Verification: The project owner shall ensure that the Designated Biologist or Biological Monitor notifies the CPM immediately (and no later than the morning following the incident, or Monday morning in the case of a Friday or weekend incident) of any non-compliance or a halt of any site mobilization, ground disturbance, grading, construction, and operation activities. The project owner shall notify the CPM of the circumstances and actions being taken to resolve the problem.

Whenever corrective action is taken by the project owner, a determination of success or failure will be made by the CPM within five working days after receipt of notice that corrective action is completed, or the project owner will be notified by the CPM that coordination with other agencies will require additional time before a determination can be made.

WORKER ENVIRONMENTAL AWARENESS PROGRAM

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

The WEAP shall:

1. Be developed by or in consultation with the Designated Biologist and consist of an on-site or training center presentation in which supporting written material and electronic media is made available to all participants;

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

3. Present the reasons for protecting these resources;

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

5. Identify whom to contact if there are further comments and questions about the material discussed in the program; and

6. Include a training acknowledgment form to be signed by each worker indicating that they received training and shall abide by the guidelines.

The specific program can be administered by a competent individual(s) acceptable to the Designated Biologist.

Verification: At least 60 days prior to the start of any site (or related facilities) mobilization, the project owner shall provide to the CPM two (2) copies of the proposed WEAP and all supporting written materials and electronic media prepared or reviewed by the Designated Biologist and a resume of the person(s) administering the program.

The project owner shall provide in the Monthly Compliance Report the number of persons who have completed the training in the prior month and a running total of all persons who have completed the training to date. At least 10 days prior to site and related facilities mobilization submit two copies of the CPM approved materials.

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

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

BIOLOGICAL RESOURCES MITIGATION IMPLEMENTATION AND MONITORING PLAN

BIO-6 The project owner shall submit two copies of the proposed Biological Resources Mitigation Implementation and monitoring Plan (BRMIMP) to the CPM (for review and approval) and to USFWS (for review and comment) and

shall implement the measures identified in the approved BRMIMP. The BRMIMP shall be prepared in consultation with the Designated Biologist and shall identify:

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

2. All biological resources Conditions of Certification identified as necessary to avoid or mitigate impacts;

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

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

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

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

7. Required habitat compensation strategy, including provisions for acquisition, enhancement, and management for any temporary and permanent loss of sensitive biological resources;

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

9. All locations on a map, at an approved scale, of sensitive biological resource areas subject to disturbance and areas requiring temporary protection and avoidance during construction;

10. Aerial photographs, at an approved scale, of all areas to be disturbed during project construction activities - one set prior to any site or related facilities mobilization disturbance and one set taken at the start of commercial operation (see **BIO-14** for more detailed information regarding the aerial photographs taken at time of commercial operation);

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

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

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

14. A plan to return the site to agricultural production after construction;

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

16. A copy of all biological resources-related permits obtained.

Verification: The project owner shall provide the specified document at least 60 days prior to start of any site (or related facilities) mobilization.

The CPM, in consultation with the USFWS and any other appropriate agencies, will determine the BRMIMP's acceptability within 45 days of receipt. If there are any permits that have not yet been received when the BRMIMP is first submitted, these permits shall be submitted to the CPM and the USFWS within five (5) days of their receipt and the BRMIMP shall be revised or supplemented to reflect the permit condition within 10 days of their receipt by the project owner. Ten days prior to site and related facilities mobilization the revised BRMIMP shall be resubmitted to the CPM.

The project owner shall notify the CPM no less than five working days before implementing any modifications to the approved BRMIMP to obtain CPM approval. Any changes to the approved BRMIMP must also be approved by the CPM and submitted to the USFWS to ensure no conflicts exist.

Implementation of BRMIMP measures will be reported in the Monthly Compliance Reports by the Designated Biologist (i.e. survey results, construction activities that were monitored, species observed). Within thirty (30) days after completion of project construction, the project owner shall provide to the CPM, for review and approval, a written construction closure report identifying which items of the BRMIMP have been completed, a summary of all modifications to mitigation measures made during the project's site mobilization, ground disturbance, grading, and construction phases, and which mitigation and monitoring items are still outstanding.

IMPACT AVOIDANCE MITIGATION MEASURES

BIO-7 Any time the project owner modifies or finalizes the project design they shall incorporate all feasible measures that avoid or minimize impacts to the local biological resources, including:

1. Design, install, and maintain transmission line poles, access roads, pulling sites, and storage and parking areas to avoid identified sensitive resources;

2. Eliminate any California Exotic Pest Plants of Concern (CalEPPC) List A species from landscaping plans;

3. Establish a plan to return the site to agricultural production after construction;

4. Prescribe a road sealant that is non-toxic to wildlife and plants that will limit dust on dirt roads;

5. Design, install, and maintain facility lighting to prevent side casting of light towards wildlife habitat;

6. Establish the 300-foot setback zone between the proposed project security fence and the Bureau of Reclamation's San Luis Canal right-of-way. This is intended to minimize effects of the proposed project on San Joaquin kit fox use of the Canal. The applicant has proposed to manage the area between the security fence and the canal as follows:

   A. Mow one to four times each spring, March to May during the grasses peak growing season, to maintain the height of the grass between four and ten inches.

   B. Monitor once every two weeks from March 1 to May 31 to determine if mowing is needed to meet the grassland height criteria.

   C. If the grassland vegetation is succeeded by a native San Joaquin Valley vegetation community, such as valley saltbrush scrub, no mowing will occur.

   D. Ground or vegetation disturbing activities outside of mowing would be prohibited within the buffer zone.

   E. Trash removal would be conducted every three months in the buffer zone.

   F. Human activities not associated with maintaining suitable habitat for San Joaquin kit fox would be prohibited within the buffer zone.

   G. Night lighting within the buffer zone would be prohibited or minimized to the necessary level for security purposes.

   H. The perimeter fence would be constructed to be wildlife compatible, which would allow for unobstructed and unhampered movement through the fence. The internal security fencing would not be a wildlife compatible fence since it would be constructed to preclude human access to the plant;

7. Install a wildlife compatible perimeter fence to allow for unobstructed and unhampered wildlife movement through the fence; and

8. Do not exceed a 25-foot wide disturbance corridor for water and natural gas pipeline installation and 3,600 square foot area of temporary disturbance for transmission tower installation as stated in Exhibit 83-2 (Avenal Power 2008f).

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP. Implementation of the measures shall be reported in the Monthly Compliance Reports by the Designated Biologist. Within thirty (30) days after completion of project construction, the project owner shall provide to the CPM, for review and approval, a written construction termination report describing how measures for the setback have been completed.

MITIGATION MANAGEMENT TO AVOID HARASSMENT OR HARM

BIO-8 The project owner shall implement the following measures[1] to manage their construction site, and related facilities, in a manner to avoid or minimize impacts to the local biological resources.

1. Install temporary fencing and provide wildlife escape ramps for construction areas that contain steep walled holes or trenches if outside of an approved, permanent exclusionary fence. The temporary fence shall be hardware cloth or similar materials that are approved by USFWS. Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals by the Designated Biologist or Biological Monitor;

2. Make certain all food-related trash is disposed of in closed containers and removed at least once a week from the project site;

3. Prohibit feeding of wildlife by staff and subcontractors;

4. Prohibit non-security related firearms or weapons from being brought to the site;

5. Prohibit pets from being brought to the site;

6. Report all inadvertent deaths of special-status species to the appropriate project representative. Injured animals shall be reported to CDFG and the project owner shall follow instructions that are provided by CDFG. The Sacramento USFWS Office shall be notified in writing within three working days of the accidental death or injury to a San Joaquin kit fox during project related activities. Contact USFWS and CDFG for specific notification procedures;

7. Use of rodenticides and pesticides in the project areas will be restricted. This is necessary to prevent primary or secondary poisoning of kit foxes and the depletion of prey populations on which it depends. All uses of such compounds should observe label and other restrictions mandated by the EPA, California Department of Food and Agriculture, and other State and Federal legislation, as well as additional project-related restrictions deemed necessary by the USF WS.

8. Project-related vehicles shall observe a 20-mph speed limit in all project areas, except on county roads and State and Federal highways; this is particularly important at night when kit foxes are most active. Off-road traffic outside of designated project areas is prohibited.

[1] Some of the following measures were adopted from *USFWS Standardized Recommendations for Protection of SJKF Prior to or During Ground Disturbance* (1999).

9. Fence areas with sensitive species and habitat such as the USBR right-of-way, the soil berms to the south of the site, and areas of nesting tricolored and yellow-headed blackbirds to 250 feet from nearest active nest between mid-March through August;

10. Design transmission line poles, access roads, pulling sites, and storage and parking areas to avoid identified sensitive resources;

11. Establish a 300-foot minimum buffer/avoidance zone measured from the edge of the USBR right-of-way to any project related buildings, other structures, impervious surfaces, outdoor activity areas and ornamental landscaped areas to minimize potential disturbance to the San Joaquin kit fox and other sensitive species;

12. Design and construct transmission lines and all electrical components to reduce the likelihood of electrocutions of large birds; and

13. Use hooded lights on the project facilities and face lights downward and away from the San Luis Canal.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP. Implementation of the measures shall be reported in the Monthly Compliance Reports by the Designated Biologist. Within thirty (30) days after completion of project construction, the project owner shall provide to the CPM, for review and approval, a written construction termination report describing how all biological resource-related mitigation measures have been completed.

HABITAT COMPENSATION

BIO-9 The project owner shall provide 54.1 acres of habitat compensation for temporary and permanent impacts to San Joaquin kit fox and Swainson's hawk habitat. The compensation ratios agreed upon are 1.1:1 ratio for permanent impacts and 0.3:1 ratio for temporary impacts. The same mitigation lands may be used for both species provided that it is suitable habitat for both species.

Verification: No less than 30 days prior to the start of any site or related facilities mobilization activities, the project owner shall submit written verification to the CPM, USFWS, and CDFG that the transaction for habitat compensation has occurred.

COMPLIANCE WITH AVIAN POWER LINE INTERACTION COMMITTEE (APLIC) GUIDELINES

BIO-10 The project owner shall design, install, and maintain transmission lines and all electrical components in accordance with the Avian Power Line Interaction Committee, *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006*, to reduce the likelihood of electrocutions of large birds.

Verification: Within 30 days of transmission line construction, the project owner shall submit written and photographic verification to the CPM that the transmission line has been constructed to APLIC guideline specifications.

PRE-CONSTRUCTION SURVEYS

BIO-11 The Designated Biologist shall survey for the presence of sensitive species and nesting birds on the 148-acre proposed project site and within 500 feet of the site and project linear facilities. Preconstruction surveys shall follow *USFWS Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or* During *Ground Disturbance* (USFWS1999) and California Burrowing Owl Consortium Survey Protocol and Mitigation Guidelines.

Verification: At least 14 days prior to the expected start of any project-related site or related facilities mobilization, the project owner shall provide the CPM, USFWS, and CDFG with the survey results and identify any mitigation measures to be employed in consultation with the CPM, USFWS, and CDFG.

BURROWING OWL IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-12 If burrowing owls are found during preconstruction surveys within 500 feet of the project site or linear facilities, then the CDFG burrowing owl guidelines (1995) shall be implemented as follows:

1. Monitor burrowing owl pairs within 500 feet of any activities that exceed ambient noise and/or vibration levels;

2. Establish a 500-foot setback from any active burrow and construct additional noise/visual barriers (e.g., haystacks or plywood fencing) to shield the active burrow from construction activities. Post signs (in both English and Spanish) designating presence of sensitive area;

3. Passively relocate all owls occupying burrows that will be temporarily or permanently impacted by the project and implement the following CDFG take avoidance measures:

   A. Occupied burrows shall not be disturbed during the nesting season (February 1 – August 31) unless a qualified biologist can verify through non-invasive methods that egg laying/incubation has not begun or juveniles are foraging independently and able to fly;

   B. A qualified biologist must relocate owls, confirm that owls have left burrows prior to ground-disturbing activities, and monitor the burrows. Once evacuation is confirmed, the biologist should hand excavate burrows and then fill burrows to prevent reoccupation; and

   C. Relocation of owls shall be approved by and conducted in consultation with CDFG.

4. Submit a Burrowing Owl Mitigation and Monitoring Plan to CDFG for review and approval prior to relocation of owls (and incorporate it into the project's BRMIMP) to CDFG and CPM for approval no less than 10 days prior to completing owl relocation and monitoring.

Verification: The project owner shall submit a report to CDFG and the CPM at least 14 days prior to the start of site mobilization that describes when surveys were

completed, observations, mitigation measures, and the results of the measures. If owls are to be relocated, the project owner shall coordinate with CDFG on the number of new burrows, their locations, and how any created burrows and compensation land will be protected for the life of the project in a Burrowing Owl Mitigation and Monitoring Plan. Within 30 days after completion of owl relocation and monitoring, and the start of ground disturbance, the project owner shall provide written verification to the CDFG and CPM that burrowing owl mitigation measures have been completed.

FEDERAL BIOLOGICAL OPINION

BIO-13 The project owner shall provide a copy of the Biological Opinion per Section 7 of the federal Endangered Species Act written by the U. S. Fish and Wildlife Service in consultation with U.S. Environmental Protection Agency. The terms and conditions contained in the Biological Opinion shall be incorporated into the project's BRMIMP and implemented by the project owner.

Verification: At least 30 days prior to the start of any site or related facilities mobilization activities, the project owner shall submit to the CPM a copy of the U. S. Fish and Wildlife Service's Biological Opinion and verification that the terms and conditions contained in the Biological Opinion are included in the BRMIMP.

AERIAL PHOTOGRAPHS

BIO-14 The project owner shall provide aerial photographs of the Avenal Energy site and out 1000 feet surrounding the site, taken at the start of the Avenal Energy power plant operation at a scale of one inch equals 100 feet. The aerial photographs will be used to determine the actual area impacted by the project and can be used to determine if any additional habitat compensation is appropriate.

Verification: Within 30 days following the start of power plant commercial operation, the project owner shall submit to the CPM a copy of the aerial photographs and actual area impacted calculations. Also, the project owner will provide an analysis of whether or not additional habitat compensation is necessary to compensate for additional temporary and permanent impacts and, if additional habitat compensation is necessary, how the additional impacts will be mitigated.

REFERENCES

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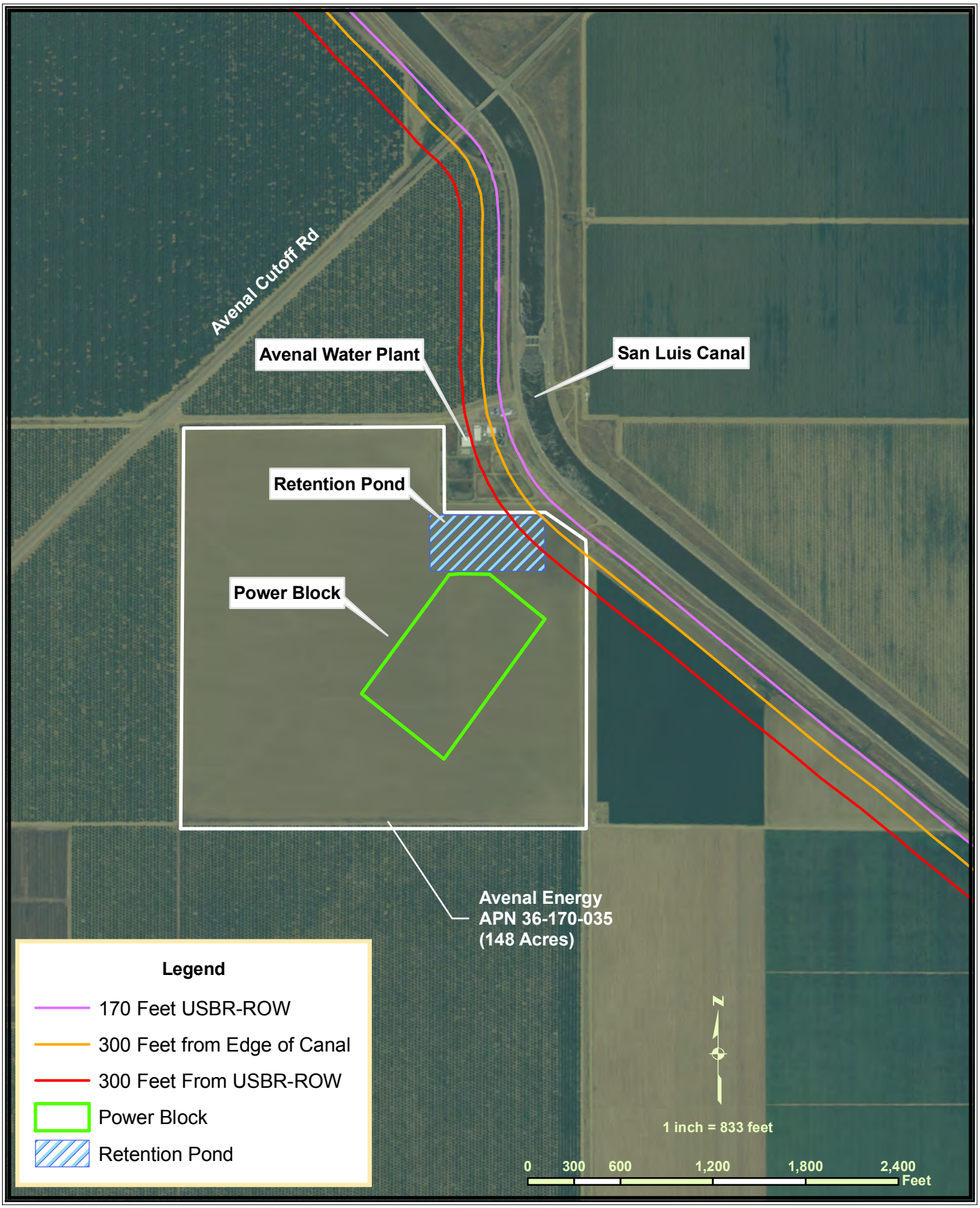
ACRONYMS LIST

FC	Application for Certification
AWP	Avenal Water Plant
BO	Biological Opinion
BRMIMP	Biological Resources Mitigation Implementation and Monitoring Plan
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity Database
CPM	Compliance Project Manager
DWR	Department of Water Resources
EPA	Environmental Protection Agency
ESA	Environmental Species Act
FSA	Final Staff Assessment
GVE	Great Valley Ethanol
HCP	Habitat Conservation Plan
ITP	Incidental Take Permit
KHCB	Kreyenhagen Hills Conservation Bank
LORS	Laws Ordinances Regulations and Standards
NCCP	Natural Community Conservation Plan
PEC	Panoche Energy Center
PG&E	Pacific Gas and Electric
PSA	Preliminary Staff Assessment
RWQCB	Regional Water Quality Control Board
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USFWS	United States Fish and Wildlife Service
WEAP	Worker Environmental Awareness Program

BIOLOGICAL RESOURCES - FIGURE 1

Avenal Energy - Approximate San Joaquin kit fox travel corridor buffer along aqueduct



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

SOURCE: NAIP Background Image & Tele Atlas

CULTURAL RESOURCES

Testimony of Beverly E. Bastian

SUMMARY OF CONCLUSIONS

Staff's cultural resources analysis has determined that the proposed Avenal Energy power plant project (AE) would have no impact on known significant archaeological resources, ethnographic resources, historic districts, or cultural landscapes. Construction-related ground disturbance, however, could have a significant adverse impact on as-yet-unknown buried archaeological resources potentially eligible for the California Register of Historical Resources (CRHR). Additionally, the construction of the AE project's new transmission line could have a significant adverse impact on a potentially CRHR-eligible, built-environment resource, the Tesla–Midway 230-kV transmission line, possibly a constituent of the early California electrical grid, dating to the 1950s.

To facilitate the identification and assessment of previously unidentified archaeological resources encountered during construction-related excavation in excess of five feet in depth and to mitigate any significant impacts from the project on any newly found resources assessed as CRHR-eligible, staff recommends that the Commission adopt cultural resources Conditions of Certification **CUL-1** through **CUL-7**. These conditions provide for the hiring of a Cultural Resources Specialist and archaeological monitors, for cultural resources awareness training for construction workers, for the archaeological and Native American monitoring of ground-disturbing activities, for the recovery of data from significant discovered archaeological deposits, for the writing of a technical archaeological report on all archaeological activities and results, and for the curation of recovered artifacts and other data.

In addition, staff recommends that the Commission adopt cultural resources Condition of Certification **CUL-8**, which, in the event that the construction of the AE's proposed new transmission line unavoidably results in alterations to any original towers of the Tesla–Midway 230-kV transmission line, which alterations have been identified by staff as a significant impact, would provide for mitigation for that impact in the form of recordation and documentation.

When properly implemented and enforced, staff believes that cultural resources Conditions of Certification **CUL-1** through **CUL-8** would reduce to less than significant any impacts to known and to previously unidentified cultural resources encountered during construction or operation. Additionally, with the adoption and implementation of these conditions, the proposed AE project would be in conformity with all applicable laws, ordinances, regulations, and standards.

INTRODUCTION

This cultural resources assessment identifies the potential impacts of the project on cultural resources. Cultural resources are defined under state law as buildings, sites, structures, objects, and historic districts. Three kinds of cultural resources, classified by their origins, are considered in this assessment: prehistoric, ethnographic, and historic.

Prehistoric archaeological resources are associated with the Native American occupation and use of California prior to prolonged European contact. These resources may include sites and deposits, structures, artifacts, rock art, trails, and other traces of Native American human behavior. In California, the prehistoric period began over 12,000 years ago and extended through the eighteenth century until 1769, when the first Europeans settled in California.

Ethnographic resources represent the heritage of a particular ethnic or cultural group, such as Native Americans or African, European, Latino, or Asian immigrants. They may include traditional resource collecting areas, ceremonial sites, topographic features, cemeteries, shrines, or ethnic neighborhoods and structures.

Historic-period resources, both archaeological and architectural, are associated with the Euro-American exploration and settlement of California and the beginning of a written historical record for the state. They may include archaeological deposits, sites, structures, traveled ways, artifacts, or other evidence of human activity. Groupings of historic-period resources are also recognized as historic districts and as historic vernacular landscapes. Under federal and state historic preservation law, cultural resources must be at least 50 years old to have the potential to be of sufficient historical importance to merit consideration of eligibility for listing in the California Register of Historical Resources (CRHR). A resource less than 50 years of age must be of exceptional historical importance to be considered for listing.

For the AE project, staff provides an overview of the environmental setting and history of the project area, an inventory of the cultural resources identified in the project vicinity, and an analysis of the potential impacts to cultural resources from the proposed project using criteria from the California Environmental Quality Act (CEQA).

If cultural resources are identified, staff determines which are historically significant (defined as eligible for the CRHR) and whether the AE would have a significant impact on those that are CRHR-eligible. Staff's primary concern is to ensure that all potentially CRHR-eligible cultural resources are identified, that all potential AE impacts to those resources are identified and assessed, and that conditions are proposed that ensure that all significant impacts that cannot be avoided are mitigated to a less-than-significant level.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Projects licensed by the Energy Commission are reviewed to ensure compliance with all applicable laws. For this project, in which there is no federal involvement,[1] the applicable laws are primarily state and local. Although the Energy Commission's permit supersedes local laws, it typically ensures compliance with local laws, ordinances, regulations, standards, plans, and policies.

[1] Cultural resources in California are also protected under provisions of the federal Antiquities Act of 1906 (Title 16, United States Code, Section 431, et seq.) and subsequent related legislation, policies, and enacting responsibilities, e.g., federal agency regulations and guidelines for implementation of the Antiquities Act.

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

Applicable Law	Description
State	
Public Resources Code 5097.98 (b) and (e)	Requires a landowner on whose property Native American human remains are found to limit further development activity in the vicinity until he/she confers with the NAHC-identified Most Likely Descendents (MLDs) to consider treatment options. In the absence of MLDs or of a treatment acceptable to all parties, the landowner is required to reinter the remains elsewhere on the property in a location not subject to further disturbance.
California Health and Safety Code, Section 7050.5	This code makes it a misdemeanor to disturb or remove human remains found outside a cemetery. This code also requires a project owner to halt construction if human remains are discovered and to contact the county coroner.
Local	
Kings County General Plan (Pacific Legacy 2001, p. 5)	Goal 26: Preserve significant historical and archaeological sites relevant to Kings County history. Objective 26.1: Establishes Kings County Museum Advisory Committee as keeper of list of designated county landmarks, and as review board for landmark designations and for projects potentially affecting county landmarks.
City of Avenal General Plan Policies, 2005	The Open Space, Conservation, and Recreation Element (3.0) identifies cultural resources among the resources addressed in this element, but no specific objectives, policies, or standards are set forth.

SETTING

Information provided regarding the setting of the proposed project places it in its geographical and geological context and specifies the technical description of the project. Additionally, the archaeological, ethnographic, and historical background provides the context for the evaluation of the CRHR eligibility of any identified cultural resources within the project's impact area.

REGIONAL SETTING

The proposed project area is located in the southwestern portion of the San Joaquin Valley Geomorphic Province, bordered on the east by the Sierra Nevada Mountain Range and on the west by the Coast Mountain Ranges. On the north end, the San Joaquin Valley is delimited by the confluence of the Sacramento and San Joaquin Rivers and on the south end by the Tehachapi and San Emigdio Mountains. The valley is a vast trough filled with sedimentary deposits, the oldest of marine origin and the

youngest resulting from the erosion of the surrounding mountains and deposition of the eroded material as alluvium up to 2,800 feet deep beneath the proposed AE site (AP 2008a, pp. 6.3-1–6.3-2).

VICINITY, SITE, AND PROJECT DESCRIPTION

The vicinity of the proposed AE site is relatively flat. The land use historically has been almost exclusively for agriculture—mostly orchards—but the proposed AE site has been annexed by the City of Avenal and zoned for industrial use. The 148-acre proposed AE site, with an elevation range of 320–360 feet above mean sea level, is on the west side of the San Joaquin Valley, about two miles east of the Kettleman Hills and Interstate 5 and about six miles northeast of the City of Avenal. The California Aqueduct's San Luis Canal is located approximately 200 feet northeast of the proposed AE site, but there are no natural perennial streams in the project vicinity. While the proposed AE site will be owned by APC, the routes of the linear facilities pass across privately owned farmland by means of easements acquired by APC. Within the 148-acre AE parcel, the area permanently required for the proposed plant is about 34.8 acres. An additional 1.2 acres of permanent disturbance would occur off-site for transmission line tower footings between the site and the Gates substation. In addition to these permanent disturbances, the area that would be used temporarily during construction is about an additional 39.3 acres onsite and nine acres off-site.

Within the 148-acre AE parcel, the area permanently required for the proposed plant is about 34 acres. The area that would be used temporarily is about an additional 34 acres. The unused part of APC's parcel would be returned to agricultural use after the plant is constructed (AP 2008a, pp. 2-3; 2-11; 6.3-2; 6.4-1; 6.5-2; AP 2008f, exh. 83-3 (revised fig. 2.3-12)).

The proposed AE project consists of the construction and continuous operation of a 600-MW, combined-cycle, electrical power-generating facility. The primary installed equipment would include two natural-gas-fired combustion turbine generators, each with a heat recovery steam generator, which would use waste heat from the combustion turbine generators to drive a steam turbine generator and thus produce more power. Additional support structures would include an air-cooled condenser, water treatment facilities, an on-site switchyard, a 4.15-acre storm-water holding pond; administrative and control buildings, site access roads, water and natural gas pipelines, and a 230-kV transmission line (AP 2008a, pp. 2-9–2-10).

Prehistoric Setting

Regional Climatic and Environmental History

The proposed AE is located in the western San Joaquin Valley, a large interior valley composed of alluvial plains and river channels. In the past, prior to a dramatic warming trend and modern reclamation projects, almost 2,000 square miles of the valley were covered in wetlands, marshes, sloughs, and ancient lakes (Moratto 1984, p. 168). Until the late nineteenth century, a large, seasonal, shallow lake, Tulare Lake, was located immediately east of the proposed project area. The run-off from rivers rising in the south-central Sierra Nevada fed the lake, so the extent of the lake varied with the season and with regional precipitation. Geologists believe the average level of Tulare

Lake fluctuated seven or eight times during the past 11,500 years. The lake level was generally higher during the early Holocene (prior to about 4,200 BC, but reached a major high level from about 1250 to 1850 AD (Negrini, et al. 2005). In 1862, Tulare Lake reached its highest recorded level, covering 486,000 acres (Lindsay n.d.). Starting in the 1870s, American grain farmers on the east side of the valley began building levees and irrigating crops with water from the rivers that fed Tulare Lake, resulting in the disappearance of the lake by 1895 (Menefee and Dodge 1913, Ch. 24). Since then, in especially wet years, Tulare Lake reappears—visible as an extensive but shallow flooding of the agricultural fields that replaced the lake (Balkin, Halbur, and Stringfellow 2006).

Human Occupation in the San Joaquin Valley

The lower San Joaquin Valley "remains one of the least known archaeological areas in California" (Moratto 1984, p. 215). A recent review of the status of archaeology in the Central Valley identified reasons why the area remains enigmatic (Rosenthal, et al. 2007, pp. 149-150):

- Surface sites have been mostly destroyed by agriculture, levee construction, and river erosion;
- Sampling biases of early excavations emphasized artifacts and burials over such evidence as food remains and technological features, resulting in a lack of data appropriate to reconstructing a full picture of prehistoric lifeways; and
- Geological processes have hidden older sites under deposited alluvium, leaving only more recent ones on the surface of the young sediments, representing only the past 2,500 years or so, or, in a few cases, 5,500 years ago.

California prehistorians have divided the prehistory of the San Joaquin Valley into three periods. The Early Period is the least well known and the least well evidenced in known archaeological sites, although the Middle Period is only marginally better represented. Sites of the Late Period have had the most archaeological attention, and they have been richer in artifacts than sites of the earlier periods. Because the Late Period ends with the settlement of Europeans in California, the early historical record also provides important information on the lifeways of California Native Americans, and this information is useful for interpreting the archaeological sites of the Late Period. Consequently, the reconstruction of prehistoric lifeways for the Late Period is both fuller and better anchored in time than the earlier two periods.

Historians of California recognize three periods, as well: the eighteenth- and nineteenth-century Spanish exploration and settlement of California, the brief tenure of Mexico, and the subsequent American takeover and annexation. All three historical periods are contemporaneous with the ethnographic period for California Native Americans, during which any written records regarding Native Americans, all anthropological writings about Native Americans, and the contributions of Native Americans themselves compose what scholars know about Native American lifeways in California since Euro-American contact.

Early Period (~10,000 to 5,000 BC)

The earliest generally accepted evidence for the human occupation of the North American continent, dating from about 12,000 years ago, is the occurrence of large, very skillfully made stone spear points, sometimes in association with the remains of large game animals. This occupation is known archaeologically as the Big Game Hunting Tradition. The Big Game Hunting Tradition, centered in the Great Plains and American Southwest, but evidenced all over the continent, apparently had a nearly exclusive focus on the exploitation of now-extinct giant mammals, such as giant bison and wooly mammoths, collectively referred to as megafauna. This tradition coincided with the end of the last major North American glaciation, known geologically as the Late Pleistocene, followed by the Holocene, our own geological era.

Archaeologists have not identified the Big Game Hunting Tradition in its classic form in California, although its characteristic fluted projectile points have been found all over the state. Such projectile points, known as Clovis points, have been recovered from the relict shores of Tulare Lake in association with the bones of such extinct animals as horse, bison, giant sloth, and mammoth/mastodon, indicating a date for the occupation of Tulare Lake before 9,000 BC (Moratto 1984, pp. 81–82). When the glaciers of the Pleistocene era retreated and the warmer and drier climate of the Holocene caused the sea level to rise along the coast, the formerly plentiful inland lakes began to shrink or dry up, and the megafauna became extinct (Moratto 1984, pp. 78–81). California's late Pleistocene peoples were forced to adopt a general hunter-forager subsistence mode and to live near reliable water sources where food and plant resources were consistently available.

As the Pleistocene gave way to the Holocene, technological and lifestyle adaptations enabled Native Americans to expand their resource base to include a wide variety of seasonal and locally available resources. For the Early Holocene time period, archaeologists have identified a prevailing region-wide hunting tradition in central and southern California. Moratto presents a discussion of this synthesis of archaeological findings known as the Western Pluvial Lakes Tradition, characterized by the following (Moratto 1984, pp. 90–103):

- site locations on or near shorelines of bodies of water;
- an economy based on hunting a variety of animals and birds and on gathering shellfish and vegetal products;
- the absence of groundstone artifacts (indicating that hard seeds were not used as food);
- characteristic percussion-flaked stone artifacts; and
- a diverse stone toolkit, including distinctive flaked-stone crescent-shaped tools, core/cobble tools, choppers, scraper plane-tools, and leaf-shaped ovate and lanceolate bifaces.

As with fluted projectile points, the Western Pluvial Lakes Tradition is represented at Tulare Lake, but "it is likely that most of the archaeological evidence of Central Valley habitation prior to circa 4,000–5,000 B.C. lies deeply buried under alluvium" (Moratto 1984, p. 214).

One putatively Early Period site on the margins of ancient Tulare Lake is the Tranquility site (CA-FRE-48). The site was discovered in 1939 a short distance north of the town of Tranquillity, approximately 50 miles north of the proposed AE location, along the Kings River. Highly mineralized human skeletons of 25 adults, 8 children, and 2 infants were found in apparent association with fossilized bones of extinct bison, camel, and horse, as well as more recent animals. Ultimately, the fossils and human remains were determined to lie in separate strata, and associated artifacts and a radiocarbon date placed the site within the late Middle Period at 550 BC (Angel 1966; Hewes 1946; Moratto 1984, pp. 65–66). Nevertheless, the data from the Tranquility site confirm early human use of marsh resources in the project region.

Additional evidence of early occupation in the San Joaquin Valley occurs at site CA-KER-116, situated on the ancient shores of Buena Vista Lake, another Central Valley vanished lake, at one time located just south of Tulare Lake. Radiocarbon dating of freshwater shell suggests CA-KER-116 may have been occupied as early as 6,000 BC, and probably reflects the Western Pluvial Lakes Tradition (Fredrickson 1964; Fredrickson and Grossman 1977).

Middle Period (5,000 to 500 BC)

After 5,000 BC, for the most part, the fluctuating climate and environment stabilized, resulting in present conditions in California. Such San Joaquin Valley sites as are known for this period represent the younger end of the Middle Period time span and evidence two eras of significant occupation, one between 2,000 BC and 500 AD, and another between 1500 and 1850 AD. The interval between the two may indicate a period of climatic aridity. The known sites of the period suggest cultural affiliations with both the Santa Barbara coast and the Mojave Desert, but not with the Delta region to the north (Moratto 1984, p. 215). Sites occupied during this time period in the lower San Joaquin Valley, as is the case elsewhere in California, contain higher numbers of groundstone milling artifacts used to process hard seeds into meal, suggesting an increased use of vegetal food sources.

Late Period (500 BC to 1700 AD)

In this period, known prehistoric sites are, again, not many, but there is evidence that populations expanded and villages increased in numbers after about 1500 AD in the southern and western parts of the San Joaquin Valley (Moratto 1984, p. 215). The archaeological evidence indicates that significant changes occurred from the Middle to the Late Period. Important differences include groundstone artifacts associated with acorn processing, bow-and-arrow technology, and large occupation sites representing permanent villages with large, semi-subterranean communal structures. Other types of artifacts typical of the Late Period include freshwater and marine shell ornaments, ornaments and utilitarian implements made of steatite and bone, tools of obsidian from eastern California sources, and notched cobbles possibly associated with fishing activities.

Local Chronological Sequence

A more detailed local chronological sequence for the western San Joaquin Valley during the Middle and Late Periods is based on excavations at sites CA-FRE-128 and 129 at Little Panoche Reservoir (Olsen and Payen 1968); the Grayson site (CA-MER-94) at

San Luis Reservoir (Olsen and Payen 1969); CA-MER-130 at Pacheco Pass (Olsen and Payen 1983); CA-MER-3, the Menjoulet site (Pritchard 1970); and CA-MER-119, the San Luis Forebay site (Pritchard 1983).

The earliest period in the western San Joaquin Valley sequence is the Positas Complex (ca. 3,200–2,500 BC), which is characterized by small, shaped mortars, short cylindrical pestles, milling stones, and spire-lopped *Olivella* (olive shell) beads. Radiocarbon dates of 450 ± 100 BC and 1305 ± 90 AD from the Positas component at the Grayson site are more consistent with Middle- and Late-Period occupations.

The succeeding Pacheco Complex includes two phases. The earlier one, Pacheco B (ca. 2,500–500 BC) is poorly documented but includes characteristic leaf-shaped bifaces, large, stemmed and side-notched points, rectangular *Haliotis* (abalone) ornaments, thick rectangular *Olivella* beads, as well as abundant milling stones, mortars, and pestles. The Pacheco A Complex (500 BC–1000 AD) is represented by flexed burials associated with distinctive *Olivella* and *Macoma* (clam) bead types, both mortars and pestles and millingslabs and handstones, and a variety of projectile points. The earliest evidence of architecture appears in the form of small circular houses about 10 to12 feet in diameter.

The Gonzaga Complex (ca. 1000–1550 AD) is marked by extended and flexed burials, bowl mortars, shaped pestles, relatively rare squared- and tapered-stemmed projectile points, distinctive Haliotis ornaments, and thin rectangular, split-punched, and oval Olivella beads. Bone artifacts include awls, pins, mammal-bone tubes, bird-bone whistles, and grass cutters made from the scapulae of large mammals. Distinctive spool-shaped polished stone ear ornaments and cylindrical plugs are also found. Milling equipment continues to include both mortars and milling slabs. House pits increase in size up to 20 to 30 feet in diameter, some with evidence of center posts.

The protohistoric Panoche Complex (1550–1800 AD) is separated from the earlier Gonzaga Complex by a hiatus that may reflect abandonment of the region due to adverse environmental conditions. Panoche Complex deposits are identified by large circular structures, up to 75 feet in diameter, and smaller dwellings about 30 to 50 feet in diameter. Mortuary practices include flexed burials, as well as primary and secondary cremations. Artifacts typical of this complex include small side-notched arrow points and a varied assortment of shell and groundstone artifacts. Beads recovered from Panoche deposits include clamshell disk; *Haliotis* epidermis disk; and *Olivella* lipped, side-ground, and rough disk.

In their review of the above sequences for a regional study, Hildebrandt and Mikkelsen (1993, p. 44) observed:

> Based on regional comparisons of numerous traits, it was noted that each major temporal period seemed to reflect occupations by different populations, or at least populations with divergent cultural/geographic affinities. The Positas Complex, although poorly represented, showed relationships to the south coast while the Pacheco Complex was thought to possibly represent intrusion of peoples from the Monterey Bay area. Most conspicuous of all was the Gonzaga Complex with its extended

burials similar to the delta, followed by the protohistoric Panoche Complex, probably representing the ethnographically recorded Yokuts.

Ethnographic Setting

The project area is located within the vast traditional territory claimed by the California Native American group known as Yokuts. Yokuts is a term applied to a large and diverse group who formerly inhabited the San Joaquin Valley and Sierra Nevada foothills of central California. Anthropologists have divided the Yokuts into three groups based on geographical location. The Northern Valley Yokuts are identified with a 40- to 60-mile-wide area straddling the San Joaquin River, south of the Mokelumne River, east of the Diablo Range, and north of the sharp bend that the San Joaquin River takes to the northeast. The Foothill Yokuts are associated with the western slopes of the Sierra Nevada from the Fresno River southward to the Kern River. The Southern Valley Yokuts, in whose former territory the AE site is probably located, claimed the area around Tulare, Buena Vista, and Kern Lakes, between their connecting sloughs, and around the lower portions of the Kings, Kaweah, Tule, and Kern Rivers. The waterways provided a ready means of travel, as well as an abundant supply of animal and plant foods and materials. Tules, which could grow as tall as 10–12 feet, dominated the region, with sage, greasewood, and bunchgrass found in the drier areas, but the entire territory lacked the oaks that were so central to the diet of many California Native Americans (Wallace 1978, pp. 448–449).

The marshes and sloughs reliably provided lake trout, chub, perch, and suckers, with salmon and sturgeon sometimes also available. The Southern Valley Yokuts hunted waterfowl, such as geese and ducks, and would take an occasional elk when one came to the lakes to drink, but the Yokuts rarely ventured into the open country to hunt the antelope, elk, and deer that ranged there. The marshes also provided turtles, shellfish, seeds, and tule roots. Tule reeds were the raw material for many necessities, including containers, shelters, and rafts. The Southern Valley Yokuts had ample fish and tule reeds to trade for the resources they lacked but needed, such as wood for structures, digging sticks, and bows, stone for arrowheads and tools, and acorns (Wallace 1978, pp. 449–452). The Southern Valley Yokuts used asphaltum for various items of their material culture (Wallace 1978, figs. on pp. 452, 456, 458). They obtained the asphaltum from natural seepages in the Kettleman Hills, east of the AE site, in Tar Canyon and near the town of Coalinga (Avenal Historical Society n.d.).

The Southern Valley Yokuts built permanent villages including single-family and multi-family houses consisting of a wooden framework with woven tule mat coverings. Other village structures included raised tule-mat covered granaries and a dirt-covered men's sweathouse (Wallace 1978, pp. 450–451). The Southern Valley Yokuts lived most of the year in their villages, but starting in the spring and for most of the summer, migrated to camp out in various parts of their territories to gather various wild plant foods, shifting locations as each crop became mature (Wallace 1978, p. 454).

The smallest political unit was a tribelet averaging 350 persons, living in a single village or in several settlements among which one was the largest and recognized as dominant. Each tribelet had a territory of some 250 square miles whose resources every member had a right to use. No unified organization of Southern Valley Yokuts tribelets existed. A chief headed each village and had considerable, if only local, authority. This

office usually was inherited through the male line of the most prestigious totemic lineage, that of the Eagle. The chief scheduled ceremonies, mediated disputes, handed down death sentences for transgressors, authorized trading expeditions, played host to visitors, and was expected to give charity to the indigent. Neighboring tribelets were generally on friendly terms, but small wars and feuds occasionally occurred (Wallace 1978, p. 454).

The Spanish settlement of Alta California began in 1769, but it was not until the early nineteenth century that the Spanish governor and the missionaries of the Catholic Church began systematically to explore the great interior valley, hopeful of making fresh converts and expanding the mission system (Wallace 1978, p. 459). The missionaries recruited and settled a few Southern Valley Yokuts at Missions San Luis Obispo, San Juan Bautista, Soledad, and San Antonio, but the Spanish had little impact on the great majority of the Southern Valley Yokuts. Of much greater influence were the many runaway mission neophytes, for whom the southern San Joaquin Valley became a refuge from the discipline and never-ending labor the padres imposed on them. The runaways brought to the Southern Valley Yokuts a wide range of new practices, both from their previous traditional ways and the new ways taught them by the Spanish. From their exposure to the runaways, the Southern Valley Yokuts became particularly keen to acquire horses, both to eat and to ride. They began raiding mission and rancho herds and were so successful at taking horses that the Spanish referred to them as the “Horsethief Indians” (Wallace 1978, pp. 459-460).

After 1821, the succeeding Mexican administration made no greater inroads into settling the San Joaquin Valley than the Spanish had, but vengeful rancheros pursued a policy of raiding the interior villages to recover livestock, to punish thieves, and to capture slaves to work on their ranchos. This interaction exposed the Southern Valley Yokuts to European diseases to a much greater degree than had occurred previously, and in the summer of 1833, a particularly severe malaria epidemic devastated them, resulting in a mortality rate estimated at 75% (Wallace 1978, p. 460).

In the wake of the Gold Rush, the territory of the Southern Valley Yokuts was overrun and seized by white settlers. The Yokuts, never very warlike, greatly reduced in numbers, and vulnerable in their exposed open habitat, put up little resistance. In 1851, representatives of the Southern Valley Yokuts signed a land cession treaty in exchange for large reservations and payments in goods. The treaty, however, was never ratified by the U. S. Senate, and the reservations never materialized. After several relocations to temporary reservations, the remaining Southern Valley Yokuts, along with other Native American groups, were settled on two reservations, the Tule River Reservation, in the Sierra Nevada foothills near Porterville, and the Santa Rosa Reservation, in the valley near Lemoore (Wallace 1978, p. 460).

Historic Setting

Because the aridity of much of the San Joaquin Valley made it unsuitable for the kind of agriculture Euro-Americans practiced, non-Native American settlement did not occur on any significant scale in the project area until the late nineteenth century, when irrigation systems were developed.

Spanish Period (1769 to 1821)

Starting in 1769 at what would become San Diego, Spain sought to reinforce its claims to California, as a territory of Mexico, by establishing a series of missions to pacify and Christianize the Indians, with the object of making them stable, tax-paying citizens of Mexico. Expeditions in the early nineteenth century, sent from the established coastal missions into the interior to find suitable locations for new missions, returned in discouragement, and one explorer-missionary's 1806 journal described the interior as a dry, miserable place, unsuitable for settlement (Smith 2004). Sporadic Spanish, and later Mexican, Russian, and American, explorations in the "Great Valley" fed international tensions, but resulted in no settlement.

Mexican Period (1821 to 1848)

Mexico gained her independence from Spain in 1821, and Alta California became one of the provinces of the new Republic of Mexico. After the government secularized the missions, starting in 1834, the Mexican governors of California began making large rancho grants of former mission lands to Mexican citizens, particularly to soldiers and members of prominent families who had financed various government initiatives. In the 1840s, the Mexican authorities made a few large rancho grants of San Joaquin Valley land, but no actual homesteads were established there under the Mexican authorities. Granted to Mañuel de Jesus Castro in 1846, Rancho Laguna de Tache was the only Mexican land grant in the AE vicinity, consisting of over 48,000 acres of land straddling the boundary of present-day Fresno and Kings Counties where the boundary coincides with the Kings River (Beck and Haase 1974, map 33). The AE site was not included in this Mexican land grant.

American Period (1848 to the Present)

Following the conclusion of the Mexican War in 1848, the AE area came under the control of the United States. After the first frenzy of the Gold Rush, farmers began to settle the Upper Kings River area, but the area where the proposed AE is located was seen as only suitable for grazing cattle and sheep. Eventually, however, American settlers moved out onto the Central Valley floor to farm. The vast network of valley marshes, wetlands, and lakes, including Tulare Lake, were drained to create fields. Canals were dug to divert the waters of the rivers running down from the Sierra Nevada Mountains. The fertility of the region's soils under irrigation proved to be great.

The earliest American use of the Avenal area was the cattle-raising enterprise of Dave Kettelman, Jim McClure, and John Fisher, which supplied beef to the miners in the gold fields. Kettelman received the first patent for land in central California from the United States in 1852. Stock-raising was the primary economic activity in the area until the late nineteenth century, with Basque shepherds among the last arrivals (AP 2008a, p. 6.7-9).

At the time of California's statehood, in 1850, what would eventually become Kings County was part of a vast Mariposa County that extended from the Los Angeles County line to the northern end of the San Joaquin Valley, and from the summit of the Coast Mountains to the summit of the Sierra Nevada Mountains. The giant county over time

was subdivided into Tulare County (1852), Fresno County (1856), and Kern and Inyo Counties (1866). Kings County was the last to become a separate entity, splitting off from Tulare County in 1893 (Bentley n.d.).

The town of Avenal and the town of Kettleman City are the most recently founded towns in Kings County. Both came into being in 1929 as a result of a major oil strike in the Kettleman Hills. The presence of petroleum was known from the natural asphaltum seeps in the area, but early exploration proved fruitless because, as was eventually discovered, the oil reservoirs lay very deep. Elliott Well No. 1, which was pushed past the 7,000-foot depth on October 5, 1928 after 19 months of drilling, put the Kettleman Hills on the map as a new major oil field when the well blew with a roar heard 20 miles away. The newly discovered crude was so light and sweet, its color was white, and automobile engines could use it unrefined. It took three weeks to contain the flow, during which thousands of sightseers visited the site for the sheer spectacle of the gusher (Avenal Historical Society n.d.; Horn and Stanton n.d.; Brown and Richmond 1940).

Needing to establish a permanent work force to develop the new field, in 1929 Standard Oil surveyed a new company town to house workers and called it Avenal. Water and sewer lines were laid, and tents were soon replaced with houses hauled in from Taft. Avenal was a boomtown, and before the year was out, nearly 20 businesses had sprung up along Kings Street and Skyline Boulevard (Avenal Historical Society n.d.).

Standard Oil owned every other section in the oil field area, which left room for other oil companies to come in as well. Production from the Kettleman Hills North Dome oil field, as in all of California at that time, was unrestricted, causing friction with oil producers in Oklahoma and Texas, whose marketing strategy kept prices high by limiting production (Brown and Richmond 1940). North Dome production peaked in 1936, and by the post-World War II era, the reservoir was greatly reduced. In 1953, the various oil companies with holdings in the area fields consolidated and made Standard Oil the sole operator of the field. Production continued to dwindle, and so did Avenal's economy and population. During the 1960s an influx of agricultural workers boosted the town's population, but it was the construction of the Avenal State Prison in 1987 that finally provided the town's economy a stable basis (Anonymous n.d.).

RESOURCES INVENTORY

A project-specific cultural resources inventory is a necessary step in staff's effort to determine whether the proposed project may cause significant impacts to historically significant cultural resources and would therefore, under CEQA, have an adverse effect on the environment.

Inventory Compilation Methods

The development of a cultural resources inventory entails working through a sequence of investigatory phases. Generally, the research process proceeds from the known to the unknown. These phases typically involve doing background research to identify known cultural resources, conducting fieldwork to collect requisite primary data on not-yet-identified cultural resources in the vicinity of the proposed project, assessing the results of any geotechnical studies or environmental assessments completed for the

proposed project site, and compiling recommendations or determinations of historical significance (see "Determining the Historical Significance of Cultural Resources," below) for any cultural resources that are identified.

This subsection ("Methods") describes the research methods used by the applicant and Energy Commission staff for each phase, including literature and records searches (California Historical Resources Information System (CHRIS) and local records), Native American consultation, and field investigations. In the subsection that follows this one ("Results"), staff summarizes the results of all the research and provides a description of each identified cultural resource, its historical significance, and the basis for its significance evaluation. Assessments of the project's impacts on historically significant cultural resources, potential impacts on previously unidentified, buried archaeological resources, and proposed mitigation measures for all significant impacts are presented in a separate subsection below.

Determining the Historical Significance of Cultural Resources

CEQA requires the Energy Commission, as a lead agency, to evaluate the historical significance of cultural resources by determining whether they meet several sets of specified criteria. Under CEQA, the definition of a historically significant cultural resource is that it is eligible for listing in the CRHR, and such a cultural resource is referred to as a "historical resource, which is a "resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR", or "a resource listed in a local register of historical resources or identified as significant in a historical resource survey meeting the requirements of section 5024.1 (g) of the Public Resources Code," or "any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the agency's determination is supported by substantial evidence in light of the whole record" (Cal. Code Regs., tit. 14, § 15064.5(a)). The term, "historical resource," therefore, indicates a cultural resource that is historically significant and eligible for the CRHR.

Consequently, under the CEQA Guidelines, to be historically significant, a cultural resource must meet the criteria for listing in the CRHR. These criteria are essentially the same as the eligibility criteria for the NRHP. In addition to being at least 50 years old,[2] a resource must meet at least one (and may meet more than one) of the following four criteria (Pub. Resources Code, § 5024.1):

- Criterion 1, is associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion 2, is associated with the lives of persons significant in our past;
- Criterion 3, embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values; or

[2] The Office of Historic Preservation's Instructions for Recording Historical Resources (1995) endorses recording and evaluating resources over 45 years of age to accommodate a potential five-year lag in the planning process.

- Criterion 4, has yielded, or may be likely to yield, information important to history or prehistory.

In addition, historical resources must also possess sufficient integrity of location, design, setting, materials, workmanship, feeling, and association to convey their historical significance (Cal. Code Regs., tit. 14, § 4852(c)).

Additionally, cultural resources listed in or formally determined eligible for the National Register of Historical Places (NRHP) and California Registered Historical Landmarks numbered No. 770 and up are automatically listed in the CRHR and are therefore also historical resources (Pub. Resources Code, § 5024.1(d)). Even if a cultural resource is not listed or determined to be eligible for listing in the CRHR, CEQA allows a lead agency to make a determination as to whether it is a historical resource (Pub. Resources Code, § 21084.1).

The assessment of potentially significant impacts to historical resources and the mitigation that may be required of a proposed project to ameliorate any such impacts depend on CRHR-eligibility evaluations.

Methods: Literature and Records Search

Completed to accompany an earlier application to the Energy Commission for the certification of a power plant in the same location as the presently proposed AE, the first cultural resources investigation (Pacific Legacy 2001) included a records search at the Southern *S*an Joaquin Valley Information Center (SSJVIC, part of the California Historical Resources Information System, or CHRIS) at California State University, Bakersfield (AP 2008a, p. 6.7-4). The requested search was to identify all recorded cultural resources located within one-half mile of the components of the proposed project, consisting of the proposed AE site, three alternate transmission line routes, two alternate natural gas pipeline routes, three alternate water pipeline routes, and the three water well sites. Sources checked included:

- previous archaeological studies within one-half mile of the components of the proposed AE site;
- previously documented cultural resources or archaeological studies in the project area; and
- resources listed on the National Register of Historic Places (NRHP) or California Register of Historical Resources (CRHR) within the project area.

Additionally, Pacific Legacy conducted historical research on Kings and Fresno County history at the Avenal Museum, in the Kings County Library's history collection, and on the Internet (Pacific Legacy 2001, p. 13).

Staff Data Request Nos. 35 and 36, made to the APC during the Energy Commission review of the 2001 application, asked for the age and potential CRHR-eligibility of the Tesla–Midway 230-kV transmission line, into which the proposed project, as then configured, would have interconnected. APC contacted PG&E, the owner of the line, obtained and provided historical information to staff, but did not evaluate the resource's eligibility (Duke 2002, pp. 31–32).

Pacific Legacy completed another cultural resources investigation for APC in 2006, to update the project application to the Energy Commission (Pacific Legacy 2006). Documented in a letter report dated September 17, 2006, this investigation was limited to a records search, Native American coordination, and field survey of a new transmission line route. The new records search was obtained from the Southern San Joaquin Valley Information Center, focused this time on the area within one-quarter mile of the proposed AE site and within one-quarter mile of the new transmission line route, different from the three considered in the 2001 study. Sources consulted in this records search included (Pacific Legacy 2006, p. 3):

- Southern San Joaquin Valley Information Center site and study base maps
- National Register of Historic Places (NRHP) directory
- Office of Historic Preservation database of historical resources
- California Historic Resources Inventory
- California Historical Landmarks
- California Points of Historical Interest

On October 22, 2007, Pacific Legacy provided APC with an addendum to their 2006 letter report in which additional field survey was documented. No new records search was undertaken. Rather, the 2006 records search, focused on the area within one-quarter mile of the proposed AE site and within one-quarter mile of the new transmission line route, was presumed adequate (Pacific Legacy 2007, pp. 1-2; AP 2008a, p. 6.7-6).

Staff's initial assessment of the APC's 2008 AFC found some provided data inadequate under revised Energy Commission regulations, and APC subsequently submitted an AFC Supplement to supply required data. For cultural resources, additional research documented in the supplement consisted of the completion of a CHRIS records search inclusive of a larger area than had been requested in 2006, inquiries to Kings County, the City of Avenal, and local historical and archaeological organizations regarding locally recognized historical resources, and a field survey to identify potentially significant historical structures (AP 2008b, pp. 2-5).

As documented in the AFC Supplement, the 2008 Southern San Joaquin Valley Information Center record search focused on the area within one mile surrounding the project area and the newly proposed transmission line route (Pacific Legacy 2006, p. 3). In addition to Pacific Legacy's 2001 AE study, the Information Center identified one other cultural resources survey that covered any part of the proposed AE's impact area (Binning and Laylander 1998). This 1998 survey examined about 12.75 miles of Highway FRE-269 prior to its widening and upgrading by CALTRANS. The survey coverage of this highway study intersects the proposed AE transmission line in approximately the middle of Section 11, Township 21 South, Range 17 East.

As documented in the AFC Supplement, representatives of the Kings County Planning Department were contacted on March 7, 2008, and a representative of the City of Avenal Planning Department was contacted on March 12, 2008. Also, letters inquiring

about locally recognized historical resources were sent to the Fresno City and County Historical Society and to the Fresno Archaeological Society on March 7 and March 21, 2008 (AP 2008b, p. 3; att. C.2).

During the review of the current application, on May 22, 2008, staff asked APC in Data Request No. 20 to provide information pertinent to the kinds of buried archaeological deposits that have been found in the vicinity of the proposed AE site and their relationship to the local geology, as possibly indicative of the potential for buried archaeological deposits at the proposed AE site. In response, the APC researched the extant literature for archaeology, geoarchaeology, and Quaternary science and provided a summary of the archaeology, paleoenvironment, and historical geomorphology of the area in the vicinity of the proposed AE site (AP 2008e, Data Response No. 20).

Methods: Native American Coordination

On March 21, 2001, consultants for APC requested the Native American Heritage Commission (NAHC) to search its Sacred Lands File for any Native American traditional cultural properties. The consultants also asked for a list of Native Americans who had heritage ties to Kings and Fresno Counties and wanted to be informed about new development projects there. The NAHC responded on March 29, 2001, indicating a negative return from the search of their Sacred Lands File and providing contact information for nine Native Americans. Letters dated April 3 and September 11, 2001, were sent to four of the NAHC-listed persons, and to six other Native Americans, describing the proposed AE project and requesting information on known cultural resources that could be affected by the project (Pacific Legacy 2001, p. 13; app. A).

Pacific Legacy's 2006 updated cultural resources study for the proposed AE also included again requesting from the NAHC, on August 18, 2006, a Sacred Lands database search and a list of Native Americans interested in development in Kings and Fresno Counties. The NAHC responded on September 6, 2006, indicating that no sites of concern to Native Americans had been found in the Sacred Lands database and providing contact information for six Native Americans. On September 15 and September 21, 2006, Pacific Legacy sent letters describing the proposed project to these six Native Americans and to an additional two officials representing tribes known to be associated with the project area (Pacific Legacy 2006, pp. 3-4). Pacific Legacy's 2007 addendum included no Native American coordination additional to that undertaken in 2006, which was considered adequate (Pacific Legacy 2007, p. 2; AP 2008a, p. 6.7-6; AP 2008b, att. C.4).

On May 13, 2008, Energy Commission staff also requested from the NAHC a list of Native Americans interested in development in Kings and Fresno Counties and on May 15, staff received a list of seven contacts from the NAHC. Staff then sent letters informing the seven Native American individuals or groups about the proposed AE project on June 18, 2008, and requested them to contact staff if they had any concerns regarding cultural resources.

Methods: Field Investigations

Pacific Legacy's 2001 cultural resources field survey included a windshield survey to identify potential historic structures, done on April 2, 2001, and a survey for

archaeological resources, conducted from April 17 through April 20, 2001, and August 14 through August 15, 2001. The intensive pedestrian archaeological survey used 15-meter transects to examine the proposed AE site, three alternate transmission line routes, two alternate natural gas pipeline routes, three alternate water pipeline routes, and the three water well sites. Ground visibility was excellent except during August when cotton plants obscured most of the preferred transmission line route (Pacific Legacy 2001, p. 14).

Pacific Legacy's 2006 updated cultural resources study for the proposed AE included a field survey of a newly proposed additional transmission line route (Pacific Legacy 2006, p. 1). A windshield survey for historic structures and a pedestrian archaeological survey were conducted September 5 and September 6, 2006. Ten-meter transects were used for the pedestrian survey. Two segments of the transmission line were left unsurveyed due to crop-dusting activities. Except for poor visibility on one additional segment, where cotton plants obscured the ground, visibility was good (Pacific Legacy 2006, p. 4).

Pacific Legacy's August, 2007, field survey was limited to the archaeological survey of the two transmission line segments that had not been surveyed in 2006 because of ongoing crop dusting. Pedestrian survey using 10–15-meter transects, with good ground visibility, completed the field work for the cultural resources inventory of all of the proposed AE's potential impact areas (Pacific Legacy 2007, p. 2).

APC's AFC Supplement documented a new windshield survey to identify potentially significant historic structures. The new survey was conducted by Wendy L. Tinsley, a qualified architectural historian, on March 11–12, 2008, covering the proposed AE site, the related linear facilities, and the surrounding area within a one-mile radius. This reconnaissance-level survey was "'a once-over' inspection of an area that is useful for characterizing an area and the resources located within" (AP 2008b, att. C.3, p. 2).

In the course of its review of the current application, staff asked APC about the availability of a geotechnical study of the proposed AE site. APC responded that no geotechnical study had been undertaken yet, but would be done in late 2008 or early 2009 (AP 2008e, Data Response No. 19). Staff has requested that the geotechnical field work be observed by a geoarchaeologist and that he/she submit a report to staff.

Results

This section summarizes the results of the literature and records searches, of inquiries made to local agencies and organizations, of Native American consultation, and of APC's field investigations. Staff provides a description of each identified resource, its historical significance, and the basis for its significance evaluation. Assessments of the project's impacts on significant cultural resources, potential impacts on buried archaeological resources, and proposed mitigation measures for such impacts are presented in a separate section below.

Archaeological Resources Identified and Evaluated for Historical Significance

Identified archaeological resources located within one mile of the proposed AE are listed, and the information concerning them is summarized, in Cultural Resources Table 2. Discussion of these resources follows Table 2.

Cultural Resources Table 2
Identified Prehistoric and Historic-Period Archaeological Resources

Information Source and When Consulted	Prehistoric/ Historic Archaeological Resources Identified (known/new)	Significance	Researcher and Dates of Research or Response	Information Citation
2001, Southern San Joaquin Valley Information Center records (CHRIS)	None	-	Pacific Legacy; no date given	Pacific Legacy 2001, p. 13
2001, Local museum, local library history collection, and Internet research	None	-	Pacific Legacy; no date given	Pacific Legacy 2001, p. 13
2001, NAHC; March 21, 2001	None	-	Pacific Legacy; March 29, 2001	Pacific Legacy 2001, p. 13; app. A
2001, Contacted Native Americans; April 3 and September 11, 2001	None	-	Pacific Legacy; no responses	Pacific Legacy 2001, p. 13
2001, Field survey of proposed AE site, three alternate transmission line routes, two alternate natural gas pipeline routes, three alternate water pipeline routes, and the three water well sites	None	-	Pacific Legacy; April 17 through April 20, 2001, and August 14 through August 15, 2001	Pacific Legacy 2001, p. 15
2006, Southern San Joaquin Valley Information Center records (CHRIS)	None	-	Pacific Legacy ; no date given	Pacific Legacy 2006, p. 3
2006, NAHC, August 18, 2006	None	-	Pacific Legacy September 6, 2006	Pacific Legacy 2006, p. 2

Information Source and When Consulted	Prehistoric/ Historic Archaeological Resources Identified (known/new)	Significance	Researcher and Dates of Research or Response	Information Citation
2006, Contacted Native Americans, September 15 and September 21, 2006	No specific resource identified, but the cultural specialist of the Santa Rosa Rancheria Tachi Yokut Tribe, Lalo Franco, requested a visit to the proposed AE site and expressed concern that cultural features could be found during construction.	-	Pacific Legacy, September 28, 2006	AP 2008a, pp. 6.7-11–6.7-12; app. 6.7-2
2006, Field survey of a newly proposed, 5.1-mile transmission line route, except for two segments	None	-	Pacific Legacy; September 5 and September 6, 2006	Pacific Legacy 2006, p. 5
2007, Field survey of the two transmission line segments not surveyed in 2006	None	-	Pacific Legacy; August, 2007	Pacific Legacy 2007, p. 3
2008, Southern San Joaquin Valley Information Center records (CHRIS)	None	-	Pacific Legacy; March 2008	AP 2008b, p. 3; att. C.1
2008, Local agencies and historical/ archaeological organizations	None	-	Pacific Legacy; March 7, and March 12, 2008.	AP 2008b, p. 3; att. C.2; AP 2008e, Data Response No. 18, p. 17
2008, Contacted Native Americans, June 18, 2008	None	-	Energy Commission staff; no responses	

As shown in Table 2, all of APC's efforts to identify potentially significant archaeological resources through existing records, databases, and informed persons, and by conducting new field surveys, yielded no results for the proposed AE site, the proposed linear facilities, and the surrounding area.

As part of the review of the present application, APC responded to staff Data Request No. 20 regarding geoarchaeological information gleaned from the literature pertinent to the potential for buried archaeological deposits at the proposed AE site. APC noted that former Tulare Lake, with resources that would have attracted Native Americans, did not extend as far as the project area. APC characterized the project area landform as "a broad, featureless, gently sloping alluvial surface extending from the relatively featureless flank of the Kettleman Hills" that probably had little to offer Native Americans in the prehistoric period—no water, no favorable travel routes, and no unique resource areas (AP 2008e, Data Response No. 20). As an indication of the unlikelihood of buried archaeological deposits, APC emphasized the agricultural use of the area and the deep plowing—up to five feet—that reportedly has been going on there for some 50 years but has raised no archaeological artifacts to the surface. APC additionally reviewed the particulars of buried archaeological deposits at known sites in the southern San Joaquin Valley and found no similarities between the geological and prehistoric environmental settings of those sites and the setting pertaining prehistorically at the proposed AE site (AP 2008e, Data Response No. 20).

Built-Environment Resources Identified and Evaluated for Historical Significance

Identified built-environment resources located within one mile of the proposed AE are listed, and the information concerning them is summarized, in Cultural Resources Table 3. Discussion of these resources follows Table 3.

Cultural Resources Table 3
Identified Built-Environment Resources

InformationSource and Date When Consulted	Built-Environment Resources Identified (known/new)	Significance	Researcher and Dates of Research or Response	Information Citation
2001, Southern San Joaquin Valley Information Center records (CHRIS)	None	-	Pacific Legacy ; no date given	Pacific Legacy 2001, p. 13
2001, Local museum, local library history collection, and Internet research	None	-	Pacific Legacy ; no date given	Pacific Legacy 2001, p. 13
2001, Windshield survey of proposed AE site, three alternate transmission line routes, two alternate natural gas pipeline routes, three alternate water pipeline routes, and the three water well sites	Tesla–Midway 230-kV transmission line Avenal Cut-Off Road	Not eligible for CRHR Not eligible for CRHR	Pacific Legacy; April 2, 2001	Pacific Legacy 2001, p. 15
2006, Southern San Joaquin Valley Information Center records (CHRIS)	None	-	Pacific Legacy ; no date given	Pacific Legacy 2006, p. 3
2006, Windshield survey of a newly proposed, 5.1-mile transmission line route, except for two segments	Midway–Tesla 230-kV transmission line (also known as the Gates-Arco-Midway 230-kV transmission line)	Not eligible for CRHR	Pacific Legacy; September 5 and September 6, 2006	Pacific Legacy 2006, p. 5
2008, Southern San Joaquin Valley Information Center records (CHRIS)	None	-	Pacific Legacy; no date given	AP 2008b, p. 3; att. C.1

InformationSource and Date When Consulted	Built-Environment Resources Identified (known/new)	Significance	Researcher and Dates of Research or Response	Information Citation
2008, Local agencies and historical/ archaeological organizations	None	-	Pacific Legacy; March 7, and March 12, 2008.	AP 2008b, p. 3; att. C.2; AP 2008e, Data Response No. 18, p. 17
2008, Windshield survey of historic structures, covering the proposed AE site, the related linear facilities, and the surrounding area within a one-mile radius	Kochergen Farms, residence and outbuildings (approximately 80 years old) Midway–Tesla 230-kV transmission line (portions approximately 60 years old) Gates Substation (approximately 53 years old)	Not eligible for CRHR Not eligible for CRHR Not eligible for CRHR	Wendy L. Tinsley, Urbana Preservation and Planning; March 11–12, 2008	AP 2008b, att. C.3, p. 2
2008, augmented and updated Department of Parks and Recreation (DPR) 523 forms	Midway–Tesla 230-kV transmission line Gates Substation	Not eligible for CRHR Not eligible for CRHR	Wendy L. Tinsley, Urbana Preservation and Planning; May, 2008	AP 2008e, exhibits 17-1 and 17-2
2008, Energy Commission review of Avenal AFC	Kochergen Farms, residence and outbuildings Avenal Cut-Off Road Tesla–Midway 230-kV transmission line Gates Substation	Not eligible for CRHR Not eligible for CRHR Potentially eligible for CRHR Potentially eligible for CRHR	Energy Commission cultural resources staff, July and August, 2008	See text, below

Neither APC nor staff identified any historic districts or cultural landscapes in the vicinity of the proposed AE. With respect to individual built-environment resources, no potentially significant built-environment resources were identified on the proposed AE site or within the impact areas of the project's proposed underground linear facilities, so such resources need not be considered when assessing the direct physical impacts of the project. The only individual built-environment resources identified by APC's architectural historian-consultant as being old enough to be potentially significant and also possibly subject to an impact (from the project's proposed transmission line) are the following three (AP 2008b, att. C.3, pp. 12–13):

- Kochergen Farms Agricultural Complex residence and outbuildings (approximately 80 years old);
- Gates Substation (approximately 53 years old); and
- PG&E's 230-kV transmission line—originally Tesla–Midway, now known as Gates–Arco–Midway (portions approximately 60 years old).

Ms. Tinsley recommended none of these resources as potentially eligible for the CRHR (AP 2008b, att. C.3, pp. 12–13). Staff agrees in this recommendation for the old buildings at Kochergen Farms, but does not agree with Ms. Tinsley in her ineligibility recommendations for the Tesla–Midway 230-kV transmission line and the Gates Substation.

Tesla–Midway 230-kV Transmission Line

APC first considered the potential CRHR-eligibility of the Tesla–Midway 230-kV transmission line during the Energy Commission's review of the 2001 Avenal power plant application. APC's responses to staff Data Request Nos. 35 and 36, made in the course of the Energy Commission's earlier review, provided some historical information on this transmission line. The responses primarily addressed modifications that have been made to the transmission line over time. Put into service in 1948, the line's original length was subdivided several times as new generation facilities came on line and connected to it via new substations. Exact dates were not given for these changes, but early 1950s, mid-1950s, and mid-1960s were indicated. Other modifications were made in the 1970s, including reconductoring, downgrading parts of the line to 115-kV service, merging parts of two original 230-kV circuits to a "parallel" circuit through a single breaker at the Gates Substation, and accepting a "loop-in" from the Arco Substation that subdivided the line into two 230-kV lines, Midway–Arco and Arco–Gates. Additionally, two new 500-kV transmission lines were constructed west of and parallel to the old line in the Tesla–Midway right-of-way at some unspecified date (Duke 2002, pp. 31–32). APC's response to staff's 2008 Data Request No. 17 documented further modifications to the Tesla–Midway 230-kV transmission line made in connection with PG&E's "Path 15" project, completed in late 2004. For Path 15, of the 70 miles of transmission line between the Gates and Midway Substations, 24.4 miles that consisted of one 230-kV and one 115-kV line were reconductored to establish two 230-kV circuits between the two substations (AP 2008e, exhibit 17-1). In 2001, APC did not consider it necessary to evaluate the CRHR eligibility of the Tesla–Midway 230-kV transmission line due to the degree of alteration of the line. APC did not state that the line lacked integrity, but that seemed to be implied (Duke 2002, pp. 31–32). The same discussion was included in abbreviated form in the 2006 cultural resources update (Pacific

Legacy 2006, p. 5). In 2008, Ms. Tinsley elaborated her description of the resource and her rationale for her eligibility recommendations in an updated Department of Parks and Recreation (DPR) 523 “Building, Structure, and Object” form submitted in response to staff Data Request No. 17. She recommended CRHR ineligibility for the Tesla–Midway 230-kV transmission line as not associated with important historical events or persons, not representing innovation in electrical transmission, and not having the potential to yield important information on electrical transmission technology (AP 2008e, DPR 523, exhibit 17-1).

Without having more historical data on the Tesla–Midway 230-kV transmission line, a definitive determination on its eligibility for the CRHR is not possible. But the Tesla–Midway 230-kV transmission line could be potentially significant under CRHR Criterion 1—associated with events that have made a significant contribution to the broad patterns of our history—because, along with the Gates Substation, it appears to be an early and essential component of California’s post-WWII infant electrical grid, with two of the most important 1950s steam turbine power-generating plants, Moss Landing and Morro Bay, distributing their output through this early infrastructure (AP 2008e, Data Response No. 14). The potential Period of Significance for this resource (and for the Gates Substation) would tentatively be the 1950s. Assuming the Tesla–Midway 230-kV transmission line is potentially CRHR-eligible, staff must also consider its integrity, which is what APC was probably indirectly addressing in emphasizing the modifications PG&E has made to the line over time.

The Advisory Council on Historic Preservation[3] has provided some guidance on integrity in transmission lines in signing a Programmatic Agreement regarding the Big Creek Hydroelectric System (Sierra National Forest, California), in which standards for the integrity for transmission line components are specified in the resultant Historic Property Management Plan. The Big Creek guidelines address all aspects of historic transmission line integrity, of which design, materials, and setting are the most pertinent to the Tesla–Midway 230-kV transmission line. For integrity of design, the guidelines identify the towers as the most important expression of the original design and consider tower repair to be not an adverse impact if the materials used are in-kind and substantially mimic original materials. Substantial alteration or replacement of towers, including the insertion of a steel lattice segment of a different geometric design as a means of raising the height of an original tower, however, would be significant adverse impacts to the line’s integrity of design. For integrity of materials, repair and replacement of conductors and insulators would not be an adverse effect if replacement materials are in-kind, in scale, and substantially mimic original materials. For integrity of setting, the guidelines recognize that development around a transmission line’s corridor cannot be controlled by the line’s owner, but conclude that adding new transmission lines of a different design adjacent to an older line that is eligible or potentially eligible for the National Register of Historic Places (NRHP) significantly impairs its integrity of setting and should be avoided by the owner. Transmission lines already built adjacent to

[3] The Advisory Council on Historic Preservation is the federal agency tasked with promoting the preservation, enhancement, and productive use of our nation's historic resources and with advising the President and Congress on national historic preservation policy.

an NRHP-eligible older line, but of an identical or very similar design, also impair the integrity of setting of the older line, but not necessarily to a significant degree (SHPO 2007).

It should be noted that expectations for historical integrity for resources considered potentially eligible for the CRHR on the basis of Criterion 1 are less exacting than those for resources which could qualify on the basis of Criterion 3. This is true because Criterion 3 is concerned with conformity to a style, with accurate representation of historic construction methods or an engineering design, and with masterworks, for all of which a resource's retention of all or most of its physical integrity is crucial if it is to convey its historical significance. For Criterion 1, sufficient integrity to convey historical significance can be as minimal as just not appearing anachronistic. So the expectations for integrity of materials and integrity of design for the Tesla–Midway 230-kV transmission line under CRHR Criterion 1 would not be as stringent as APC appears to believe. It should be noted, as well, that when evaluating any cultural resource, the first consideration is not integrity, as appears to be APC's invariant approach in its discussion of the Tesla–Midway 230-kV transmission line, but rather under which eligibility criterion or criteria the resource could qualify. This is because, as just explained, integrity expectations vary with the applicable eligibility criterion.

APC's catalog of modifications to the Tesla–Midway 230-kV transmission line includes subdivision into shorter runs between substations, reconductoring, and the addition of two new 500-kV transmission lines in the Tesla–Midway right-of-way. The impact of subdivision of a transmission line on its integrity of design is not addressed by the Big Creek guidelines, but staff considers it not a significant impact. Staff believes this to be the case because the substations which subdivide the old line are quite far apart, so the overall appearance of the transmission line, on which the Big Creek guidelines obviously place considerable value, would not be affected, and an observer would not perceive the line as fragmented. As for reconductoring and adding new transmission lines adjacent to the old right-of-way, the guidelines detailed above indicate that the degree of the adverse effect due to these changes on the integrity of design and integrity of materials of the existing structures depends on the compatibility of the new materials and new tower design with the old.

With respect to tower design, both of the two 500-kV transmission lines added within the old Tesla–Midway 230-kV transmission line right-of-way have lattice "H-frame" towers which are both wider and taller than the four-footed "pyramidal" lattice towers of the Tesla–Midway 230-kV transmission line. That there are two lines, and that their towers are larger, cause the 500-kV lines to dominate the Tesla–Midway 230-kV transmission line in the shared right-of-way, thus significantly compromising the old line's integrity of setting.

Gates Substation

APC first mentioned PG&E's Gates Substation in the 2007 cultural resources section of the AFC. It was not identified as a cultural resource; rather, it was noted briefly as an element of the existing built environment located adjacent to the proposed APC transmission line. Its age is the only additional information provided, except for the statement that the potential impact to it that could result from the AE's interconnection was at that time unknown (AP 2008a, p. 6.7-11–6.7-12). Ms. Tinsley's 2008 report

contains the first consideration by APC of the potential CRHR-eligibility of Gates Substation. Originally constructed between 1953 and 1955, it was modified in the 1970s, although Ms. Tinsley was unable to provide details of the changes. An additional recordation and assessment of the Gates Substation was provided to staff in connection with another application for certification. This assessment noted that map comparisons indicated that the substation doubled in size between 1956 and 1971, adding a large parcel of land to the west (Hollins 2008). APC's response to 2008 staff Data Request No. 16 provided information on some modifications made for PG&E's 2004 Path 15 project. These included (AP 2008e, Data Response No. 16):

- installation of two new 500 kV circuit breakers at the existing 500-kV bay position #4;
- relocation of the existing Los Banos-Gates #1 transmission line to the existing bay position #4;
- termination of the new Los Banos-Gates #3 500-kV transmission line at the existing Los Banos #1 500-kV transmission line position;
- installation of two new 500-kV circuit breakers on the existing 500/230-kV transformer Bank 11;
- modification of the 500-kV bus arrangement from a ring bus to a breaker-and-a-half arrangement,
- installation of 225 MVAR of new 230-kV shunt capacitors switched in groups of 75 MVAR each;
- installation of metering and monitoring equipment;
- installation of new 500-kV disconnecting switches, reactors, instrument transformers, and protective relaying, metering, and control equipment; and
- installation of supervisory control and data acquisition equipment, electrical grounding, and underground conduits or trench systems.

APC provided no additional historical information on the Gates Substation and has indicated that they are unable to obtain such information (AP 2008d, p. 3), because Gates Substation is privately owned and because information regarding the nation's electrical infrastructure is considered sensitive in terms of national security. Ms. Tinsley elaborated on her description of the resource and her rationale for her eligibility recommendations for the Gates Substation in an updated DPR 523 "Building, Structure, and Object" form, submitted in response to staff Data Request No. 17. While acknowledging that little historical information was available on which to make a recommendation of significance for the Gates substation, Ms. Tinsley nonetheless recommended the substation as ineligible for the CRHR because it was not known to be associated with important historical events or persons, did not appear to represent innovation in electrical transmission or distinctive style of architecture or engineering designs, and did not appear to have the potential to yield important information on electrical transmission technology (AP 2008e, DPR 523, exhibit 17-2).

Again, without having more historical data on the Gates Substation, a definitive determination on its eligibility for the CRHR is not possible. But the resource could be potentially significant under CRHR Criterion 1—associated with events that have made

a significant contribution to the broad patterns of our history—because it appears to be an early and essential component of California's post-WWII infant electrical grid, with two of the most important 1950s steam turbine power-generating plants, Moss Landing and Morro Bay, distributing their output through this early infrastructure (AP 2008e, Data Response No. 14). The potential Period of Significance for this resource would tentatively be the 1950s. Assuming the resource could be potentially CRHR-eligible, staff must consider its integrity.

From the list of modifications to the Gates Substation provided by APC, the aspects of integrity most likely to be affected would be the integrity of design and integrity of materials. Staff knows of no guidelines for evaluating the integrity of design and integrity of materials of the Gates Substation. The 2004 Path 15 modifications APC was able to document would appear to be mostly at the level of electrical connections and control systems. Such modifications would impair the substation's integrity of design (on the micro scale) and integrity of materials, if staff were considering it CRHR-eligible on the basis of Criterion 3. But staff, instead, has assumed it to be potentially eligible on the basis of Criterion 1, thus requiring less integrity at the level of equipment specifications. It is known, however, that the Gates Substation was modified and expanded in the 1970s, and it is likely that over the 50-plus years of its useful life, it has been altered, probably several times. No historical data are available regarding these gross alterations which could have impaired the substation's integrity of design on the macro scale. It is not known what if anything remains of the original 1950s structures and equipment at the substation. Considering these unknowns and the likelihood of extensive alterations, the Gates Substation probably does not retain sufficient integrity of design and integrity of materials to convey its historical significance (focused on the 1950s—the assigned Period of Significance), even under CRHR Criterion 1. The additional assessment of the substation that staff recently obtained agreed with Ms. Tinsley's evaluation of the substation as not eligible for the CRHR (Hollins 2008). Consequently, staff believes that the Gates Substation does not need to be further considered when assessing the impacts of the project to cultural resources.

Avenal Cut-Off Road

One additional built-environment resource in the proposed AE's impact area is the Avenal Cut-Off Road. The cultural resources study completed for the first Avenal power plant application to the Energy Commission noted the presence of this road near the proposed AE site. The brief 2001 discussion conveyed some of the road's history, starting with its being declared a Kings County public right-of-way in 1936, with the deeds acquired in 1938 and 1939. The county created a graded road surface between 1936 and 1940 and raised and widened the road to its present dimensions between 1962 and 1969 (Pacific Legacy 2001, p. 15). The 2006 updated cultural resources report and the 2007 addendum did not include any new information on the Avenal Cut-Off-Road. The cultural resources section of the AFC, however, identified Avenal Cut-Off Road, not as a cultural resource, but as an element of the existing built environment located adjacent to the proposed AE natural gas pipeline and crossed by the proposed transmission line. Additional information provided included its age and the alterations that have been made to it. APC then states that the road appears to lack integrity, which would keep it from being historically significant (AP 2008a, p. 6.7-11–6.7-12).

Avenal Cut-Off Road is of sufficient age to qualify for the CRHR, but, as for the Tesla–Midway 230-kV transmission line and the Gates Substation, APC fails to consider its potential CRHR eligibility before considering its integrity. Additionally, APC provides almost no historical data on which to evaluate the Avenal Cut-Off Road's eligibility. From the extent of the alterations made to the road, however, staff does not believe this resource is likely to be CRHR-eligible even under the more relaxed integrity evaluations of Criterion 1. Consequently, staff would not have to consider the AE's potential impacts on this resource.

Ethnographic Resources Identified and Evaluated for Historical Significance

In 2001, 2006, 2007, and 2008, neither APC's nor staff's requests to the Native American Heritage Commission or to Native Americans for information on sacred sites and traditional cultural properties located in the vicinity of the proposed AE site elicited any information, so no resources of ethnographic concern were identified.

Summary of Significant Cultural Resources Potentially Subject to Impacts from the Proposed Project

Staff has concluded that the Tesla–Midway 230-kV transmission line and the Gates Substation could both be potentially eligible for the CRHR, but only the Tesla–Midway 230-kV transmission line, despite its impaired integrity of setting, appears to retain sufficient integrity of design, location, materials, workmanship, feeling, and association (the other six essential aspects of integrity) to convey its historical significance. Consequently, staff must assess potential AE impacts to the Tesla–Midway 230-kV transmission line.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Method and Threshold for Determining Significance of Impacts to Historical Resources

Under CEQA, "a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment" (Pub. Resources Code, § 21084.1). Thus, staff analyzes whether a proposed project would cause a substantial adverse change in the significance, that is, the CRHR eligibility, of all historical resources identified in the Cultural Resources Inventory as CRHR-eligible. The degree of significance of an impact depends on:

- The cultural resource impacted;
- The nature of the resource's historical significance;
- How the resource's historical significance is manifested physically and perceptually;
- Appraisals of those aspects of the resource's integrity that figure importantly in the manifestation of the resource's historical significance; and
- How much the impact will change those integrity appraisals.

DIRECT/INDIRECT IMPACTS AND MITIGATION

In the abstract, direct impacts to cultural resources are those associated with project development, construction, and co-existence. Construction usually entails surface and

subsurface disturbance of the ground, and direct impacts to archaeological resources may result from the immediate disturbance of the deposits, whether from vegetation removal, vehicle travel over the surface, earth-moving activities, excavation, or demolition of overlying structures. Construction can have direct impacts on historic built-environment resources when those structures must be removed to make way for new structures or when the vibrations of construction impair the stability of historic structures nearby. New structures can have direct impacts on historic structures when the new structures are stylistically incompatible with their neighbors and the setting, and when the new structures produce something harmful to the materials or structural integrity of the historic structures, such as emissions or vibrations.

Generally speaking, indirect impacts to archaeological resources are those which may result from increased erosion due to site clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource components due to improved accessibility. Similarly, historic structures can suffer indirect impacts when project construction creates improved accessibility and vandalism or greater weather exposure becomes possible.

Ground disturbance accompanying construction at a proposed plant site, along proposed linear facilities, and at a proposed laydown area has the potential to directly impact archaeological resources, unidentified at this time. The potential direct, physical impacts of the proposed construction on unknown archaeological resources are commensurate with the extent of ground disturbance entailed in the particular mode of construction. This varies with each component of the proposed project. Placing the proposed plant into this particular setting could have a direct impact on the integrity of association, setting, and feeling of nearby standing historic structures.

Construction Impacts and Mitigation

Staff has assessed the construction activities of the proposed project and identified the following potential impacts to cultural resources. Most of the anticipated potential impacts are to buried archaeological deposits that could be discovered during construction.

APC expects the soil cutting and filling involved in constructing the proposed plant to balance out, so the project would not need to make use of off-site disposal sites or borrow pits. If the project needed to dispose of on-site soils that are not suitable for structural fill, the materials would be trucked to a licensed landfill (AP 2008e, Data Response No. 13). Thus the project would have no impacts on potential cultural resources located at unlicensed off-site borrow or soil disposal sites.

Identification and Assessment of Direct Impacts on Archaeological Resources and Proposed Mitigation

Impacts

Because almost all of the project impact areas have been under agricultural cultivation for many years, and because soil ripping to a five-foot depth is reported for this area,

staff assumes the presence of disturbed soils down to five feet below the surface. This assumption would not apply to project impact areas that have not been cultivated, such as long-established road beds.

During site preparation at the proposed AE site, grading, leveling, and preparation of drainage features would take place. Storm water surface drainage would be effected by cutting and filling the existing AE site soils to create a plant grade elevation of approximately 340 feet above mean sea level, with gentle slopes away from structures to accomplish drainage by gravity flow. A storm sewer system consisting of ditches, culverts, inlets, and underground pipes would collect storm water runoff and direct it to an on-site storm water holding basin for dissipation via percolation or evaporation (Avenal 2008a, pp. 2-21–2-22, 2-45; vol. II, app. 2.0, pp. 2-1-6–2-1-7). The excavation of ditches, culverts, and trenches for underground drainage pipes at the proposed AE site, however, could directly impact buried archaeological resources, unidentified at this time, to the extent of the area and depth of the excavations, if in excess of five feet.

During construction at the proposed AE site, holes up to 18 feet deep for the reinforced concrete foundations of the power block equipment would be excavated (Avenal 2008a, vol. II, app. 2.0, fig. CD-1-SIV-1). Piles to support these mat foundations might also be driven to greater, but at this time unspecified, depths, depending on final design criteria (Avenal 2008a, vol. II, pp. 2-2-12–2-2-23). These excavations could potentially impact buried archaeological resources, unidentified at this time, to the extent of the area and depth of the ground disturbance in the native soils of the site below five feet.

During construction at the proposed AE site, holes for the reinforced concrete foundations of variously sized aboveground liquid storage tanks would be excavated (Avenal 2008a, vol. II, app. 2.0, fig. CD-1-GT-3). Piles to support these mat foundations might also be driven to greater, but at this time unspecified, depths, depending on final design criteria (Avenal 2008a, vol. II, pp. 2-2-18). These excavations could potentially impact buried archaeological resources, unidentified at this time, to the extent of the area and depth of the ground disturbance in the native soils of the site, if greater than five feet.

Footing holes for 43 new tubular steel monopoles for the 6.4 miles of new 230-kV transmission line would be excavated (Avenal 2008a, pp. 1-7; 2-49; table 2.3-7). This activity could potentially impact buried archaeological resources, unidentified at this time, to the extent that the depth of the excavation for the monopole footings is greater than five feet.

Trenches for three new water pipelines would be excavated to provide water for all project uses (except drinking), including boiler and steam generator make-up water, turbine cooling water, general service water, and water for fire suppression. The primary water supply would come from the City of Avenal's Water Treatment Plant, via an approximately 0.3-mile-long, 4-inch pipeline just north of the proposed AE site. The proposed project's back-up water supply would come from three agricultural wells belonging to Kochergen Farms. Two of these wells (identified as "18-1" and "18-4") are located north of the proposed AE site, and a single 1.1-mile-long, 4-inch pipeline would run south from 18-1 to 18-4 and thence to the proposed AE site along a route paralleling and west of the San Luis Canal. The third 4-inch pipeline would run 1.3 miles from a

well, “25-4,” located to the southwest of the proposed AE site, north to Avenal Cut-Off Road, then parallel and south of the road to the plant site boundary, then south to the new plant access road, then east to the project’s equipment (Avenal 2008a, pp. 2-16-2-20; 2-49; fig. 2.1-3A; exhibit 7-1; TRC 2008c). The two back-up water pipelines total 1.8 miles in length (AP 2008a, table 2.3-7). APC estimates a 25-foot-wide corridor of potential ground disturbance along each of the three trenches (Avenal 2008f, exh. 83-2). The three trench excavations could potentially impact buried archaeological resources, unidentified at this time, to the extent of the area and depth of the trenches in the native soils of the pipeline routes, if greater than five feet.

A trench would be excavated for the installation of the proposed new, approximately 2.5-mile-long, 20-inch-diameter natural gas pipeline connecting the proposed power plant to a PG&E natural gas trunk line at the Kettleman Compressor Station to the west of the proposed AE site (TRC 2008c). Most of this trench would be excavated in the road beds of Avenal Cut-Off Road, 34 ½ Avenue, and Plymouth Avenue, except for some 2,000 linear feet off-site and 2,300 feet on-site, running between the proposed project’s on-site equipment and Avenal Cut-Off Road (Avenal 2008a, pp. 2-33, 2-48; TRC 2009c, Att. 3). The trench excavation not confined to the existing road beds could potentially impact buried archaeological resources, unidentified at this time, to the extent of an area 4,300 feet long and 25 feet wide (Avenal 2008f, exh. 83-2), and to the depth of any ground disturbance in the native soils greater than five feet. The trench excavation confined to existing road beds could potentially impact buried archaeological resources, unidentified at this time, to the extent of the length of the pipeline in the road beds, to the width of the rights-of-way of the roads (80-foot-wide right-of-way for Avenal Cutoff Road and 60-foot-wide right-of-way for Plymouth Avenue) and to the depth of ground disturbance in native soils. (Avenal Cut-Off Road has not been cultivated since at least 1936, so the presumption of five feet of agricultural disturbance cannot be made for the ground beneath the road. Staff assumes the same for 34 ½ Avenue and Plymouth Road.)

A new septic tank and leach field system for sanitary wastewater disposal (Avenal 2008a, p. 2-22) would require excavations that could directly impact buried archaeological resources, unidentified at this time, to the extent of the area (unspecified) and depth of the excavations, if in excess of five feet, and of the ground disturbance to the area surrounding the excavations, if in excess of five feet.

Permanent new access roads and temporary construction access road would entail a construction impact area of 2.9 and 2.4 acres, respectively (TRC 2009c, Att. 3). The ground disturbance involved in constructing these roads could directly impact buried archaeological resources, unidentified at this time, to the extent of the area and depth of the excavations, if in excess of five feet.

Security fencing would be installed surrounding the project site, including the storm water evaporation pond (Avenal 2008e, exhibit 7-2; exhibit 7-3). This activity could potentially impact buried archaeological resources, unidentified at this time, to the extent of the area and depth of the excavations for the fence and gate supports, if greater than five feet.

Mitigation

Neither APC nor staff identified any archaeological resources within or near the proposed project's impact areas, but APC proposed contingency measures to provide for mitigation of project-related impacts to cultural resources discovered during construction. These proposed measures take the form primarily of instructions to workers involved in ground-disturbing activities during construction and include (Avenal 2008a, p. 6.7-13):

- watch for archaeological resources (artifacts);
- follow prescribed procedures to report such discoveries; and
- avoid or minimize impacts to potentially significant cultural resources, if discovered.

To APC's suggested contingency mitigation measures, staff has added additional recommendations or expanded upon APC's suggestions to ensure that all impacts to cultural resources discovered during construction are mitigated to below the level of significance. APC's suggested mitigation measures and staff's additional recommendations are incorporated into the proposed Conditions of Certification **CUL-1** through **CUL-7** (found at the end of this analysis). Staff's proposed mitigation measures for identifying, evaluating, and possibly mitigating impacts to previously unknown archaeological resources discovered during construction include having an archaeologist monitor all excavation activities in excess of five feet on the project site, at the laydown areas, and along the pipeline and transmission line routes; and having a Native American monitor construction activities if prehistoric cultural resources are found.

Identification and Assessment of Direct Impacts on Built-Environment Resources and Proposed Mitigation

APC identified three built-environment resources old enough to be potentially eligible for the CRHR and also possibly subject to impacts from the proposed project: the Kochergen Farms Agricultural Complex residence and outbuildings; PG&E's Gates Substation; and PG&E's Tesla–Midway 230-kV transmission line (AP 2008b, att. C.3, pp. 12–13). APC recommended none of these resources as eligible for the CRHR, assessed the proposed project's potential impacts on them as consequently not significant, and provided no mitigation measures (Avenal 2008a, p. 6.7-14). While agreeing with APC's recommendation that the Kochergen Farms Agricultural Complex is not eligible for the CRHR, staff concluded that both the Gates Substation and the Tesla–Midway 230-kV transmission line could be eligible for the CRHR under Criterion 1 (associated with events making an important contribution to the broad patterns of our history).

Impacts

The project-related modifications proposed at the Gates Substation could impair the substation's integrity of design and integrity of materials by adding new equipment of a later design than what currently is in use at the substation. The substation, however, does not retain sufficient integrity of design and integrity of materials to convey its historical significance, even under Criterion 1, because of probable although

undocumented episodes of expansion over the years since 1960. Consequently, the modifications at the substation necessary to accommodate the proposed project would not be a significant impact.

The potentially significant impacts of the proposed AE project on the Tesla–Midway 230-kV transmission line include:

- The addition of the proposed project's new 230-kV transmission line adjacent to the right-of-way of the potentially CRHR-eligible Tesla–Midway 230-kV transmission line could impair the integrity of setting of the old transmission line by adding monopoles to a corridor currently containing only steel lattice towers; and
- The raising (or lowering) of up to two steel lattice towers of the Tesla–Midway 230-kV transmission line near the substation (Pacific Legacy 2006, p. 5; AP 2008f, Data Response 81) could impact the integrity of materials and integrity of design of two of the original towers of the old transmission line if altering the towers entails the insertion of lattice segments of a geometric design different from the original or the removal of lattice segments.

Although the steel monopole towers of the proposed AE transmission line are quite different in design from both the Tesla–Midway 230-kV steel lattice towers and those of the two 500-kV lines previously added to the Tesla–Midway 230-kV transmission line's right-of-way (AP 2008f, exh. 79-1), staff concluded that the addition of the new monopoles would not be a significant impact on the integrity of setting of the Tesla–Midway 230-kV transmission line because the two previously added 500-kV lines have already impaired the integrity of setting.

Altering the steel lattice towers of the Tesla–Midway 230-kV transmission line would be a significant impact on the integrity of materials and integrity of design of the old line, unless done in a manner compatible with the existing design and materials (see discussion, above, in the "Built-Environment Resources Identified and Evaluated for Historical Significance" subsection).

Mitigation

Staff asked that APC consider the feasibility of altering the height of the equivalent towers of the project's proposed new line instead of raising or lowering the towers of the potentially CRHR-eligible Tesla–Midway 230-kV transmission line. APC indicated that this aspect of the design of the proposed AE's new transmission line would be determined entirely by PG&E, but made a commitment to "suggesting to PG&E that the new AE transmission line towers be made taller or shorter, if needed, in preference to modifying the existing 230-kV line towers" (TRC 2009b, p. 9). APC pointed out that possibly no modifications to the old line would be needed and reiterated that their architectural history consultant, Wendy Tinsley, had concluded that the Tesla–Midway 230-kV transmission line did not appear to be historically significant (that is, did not appear to be eligible for the CRHR). Nonetheless, APC agreed to have a qualified architectural historian document, to a modified Level III Historic American Engineering Record (HAER) standard, any of the Tesla–Midway 230-kV transmission line's towers that would have to be modified, as mitigation for the new transmission line's potential impact on the old line, should that modification prove unavoidable (TRC 2009b, pp. 9-10). To that end, APC proposed an additional condition of certification

(TRC 2009b, pp.10–11), which staff has adapted and included in its recommended conditions of certification, below, as Condition of Certification **CUL-8**.

Identification and Assessment of Direct Impacts on Ethnographic Resources and Proposed Mitigation

No ethnographic resources were identified by APC or staff, so no mitigation measures for proposed project impacts would be required for these kinds of cultural resources.

Indirect Impacts and Proposed Mitigation

Neither the applicant nor staff identified any indirect impacts to any identified cultural resources in the impact area of the proposed project, and so no mitigation measures for indirect impacts would be required for any class of cultural resources.

Summary of Significant Impacts to CRHR-Eligible Cultural Resources Requiring Mitigation

Staff identified only one known potentially significant cultural resource that the proposed project could significantly impact, the Tesla–Midway 230-kV transmission line. If any towers of the Tesla–Midway 230-kV transmission line must be altered to accommodate the AE's proposed new transmission line, it would be a significant impact on the integrity of materials and integrity of design of the old line. Staff therefore recommends condition of certification **CUL-8**, which would provide mitigation in the form of recordation and documentation in the event that these modifications must be made.

Additionally, staff's proposed mitigation measures for identifying, evaluating, and possibly mitigating impacts to previously unknown buried archaeological resources discovered during construction-related excavations (**CUL-1** through **CUL-7**) would ensure that impacts to CRHR-eligible archaeological discoveries would be mitigated to a less-than-significant level.

Operation Impacts and Mitigation

During operation of the proposed power plant, if a leak should develop in the gas or water pipelines supplying the plant, repair of the buried utility could require the excavation of a large hole. Such repairs could impact previously unknown subsurface archaeological resources in areas unaffected by the original trench excavation. The measures proposed for mitigating impacts to previously unknown archaeological resources during the construction of the plant and linear facilities (see "Proposed Conditions of Certification," **CUL-1** through **CUL-7**, below) would also serve to mitigate impacts from repairs occurring during operation of the plant.

Cumulative Impacts and Mitigation

A cumulative impact refers to a proposed project's incremental effects considered over time and together with those of other nearby, past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Pub. Resources Code sec. 21083; Cal. Code Regs., tit. 14, secs. 15064(h), 15065(a)(3), 15130, and 15355). The construction of other projects in the same area as the proposed project could affect unknown subsurface archaeological deposits, both prehistoric and historic.

From consultation with the City of Avenal, Kings County, other nearby cities and counties, and other government agencies, the applicant has identified three future projects near the proposed AE location (Avenal 2008a, p. 6.1-6). These are:

The Panoche Energy Center (PEC) is an Energy-Commission-certified, 400-MW, simple-cycle, natural gas-fired, combustion-turbine, power generation project located approximately 55 miles northwest of Avenal Energy in northwestern Fresno County, now 65% completed. The PEC power plant occupies approximately 12.8 acres of land in an agricultural area.

The Starwood Power-Midway Peaking Project is an Energy-Commission-certified, 120-MW, simple-cycle, natural gas-fired, combustion-turbine, power generation project whose construction is about 90% complete at this time. The Starwood site is located approximately 55 miles northwest of Avenal Energy, adjacent to the PEC site, in northwestern Fresno County. The Starwood power plant will occupy approximately 5.6 acres of land in an agricultural area.

The San Joaquin Solar 1&2 Hybrid Project is a 106.8-MW, solar and biomass, power generation project currently under review for certification by the Energy Commission. The San Joaquin Solar 1&2 site is located about 20 miles northwest of Avenal Energy, in southwestern Fresno County. The San Joaquin Solar 1&2 power plant will occupy approximately 640 acres of land in an agricultural area.

The Great Valley Ethanol Project is a proposed ethanol plant planned for construction in the City of Hanford in Kings County, approximately 27 miles northwest of Avenal Energy. The project is expected to complete construction in 2009. The plant would be located on a 112-acre site in the City of Hanford's Kings Industrial Park on property zoned for industrial use.

Cumulative impacts to cultural resources in the proposed AE vicinity could occur if any, several, or all of these facilities, in conjunction with the proposed AE, had or would have impacts on cultural resources that, considered together, would be significant.

Any impacts to significant cultural resources from the PEC and the Starwood power plant projects have been evaluated and mitigated by conditions of certification imposed by the Energy Commission on their construction and operation. The data regarding impacts to cultural resources from the Great Valley Ethanol Project have not been provided to staff, but proponents of this project and of any future projects in the area can mitigate impacts to as-yet-undiscovered subsurface archaeological sites to less-than-significant levels by requiring construction monitoring, evaluation of resources discovered during monitoring, and avoidance or data recovery for resources evaluated as significant (eligible for the CRHR or NRHP). Impacts to human remains can be mitigated by following the protocols established by state law in Public Resources Code, section 5097.98. The impacts of the proposed AE on significant cultural resources were analyzed by staff in this assessment and found to be not significant, with the implementation of conditions of certification providing for project design changes and for the identification, evaluation, and avoidance or mitigation of impacts to significant archaeological resources discovered during construction.

Since the impacts from the proposed AE would be mitigated to a less-than-significant level by the project's compliance with Conditions of Certification **CUL-1** through **CUL-7**, and since similar protocols can be applied to other projects in the area, staff does not expect any incremental effects of the proposed AE to be cumulatively considerable when viewed in conjunction with other projects.

COMPLIANCE WITH LORS

If the conditions of certification (below) are properly implemented, the proposed AE would result in a less-than-significant impact on known and newly found cultural resources. The project would therefore be in compliance with the applicable state laws, ordinances, regulations, and standards listed in Table 1.

Kings County's General Plan Goal 26 advocates the preservation of significant historical and archaeological sites relevant to Kings County history. Staff's recommended conditions of certification for the proposed AE are consistent with that goal. Consequently, if APC implements these conditions, the AE would be consistent with the general historic preservation goals of the County of Kings, as well.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff received no comments regarding cultural resources from the public or from any agencies.

CONCLUSIONS AND RECOMMENDATIONS

Staff's cultural resources analysis has determined that the proposed Avenal Energy power plant project (AE) would have no impact on known significant archaeological resources, ethnographic resources, historic districts, or cultural landscapes. Construction-related ground disturbance, however, could have a significant adverse impact on as-yet-unknown buried archaeological resources potentially eligible for the California Register of Historical Resources (CRHR). Additionally, the construction of the AE project's new transmission line could have a significant adverse impact on a potentially CRHR-eligible, built-environment resource, the Tesla–Midway 230-kV transmission line, possibly a constituent of the early California electrical grid, dating to the 1950s.

To facilitate the identification and assessment of previously unidentified archaeological resources encountered during construction-related excavation in excess of five feet in depth and to mitigate any significant impacts from the project on any newly found resources assessed as CRHR-eligible, staff recommends that the Commission adopt cultural resources Conditions of Certification **CUL-1** through **CUL-7**. These conditions provide for the hiring of a Cultural Resources Specialist and archaeological monitors, for cultural resources awareness training for construction workers, for the archaeological and Native American monitoring of ground-disturbing activities, for the recovery of data from significant discovered archaeological deposits, for the writing of a technical archaeological report on all archaeological activities and results, and for the curation of recovered artifacts and other data.

In addition, staff recommends that the Commission adopt cultural resources Condition of Certification **CUL-8**, which, in the event that the construction of the AE project's proposed new transmission line unavoidably and significantly impacts the Tesla–Midway 230-kV transmission line, would provide for mitigation for that impact in the form of recordation and documentation.

When properly implemented and enforced, staff believes that cultural resources Conditions of Certification **CUL-1** through **CUL-8** would reduce to less than significant any impacts to known and to previously unidentified cultural resources encountered during construction or operation. Additionally, with the adoption and implementation of these conditions, the proposed AE project would be in conformity with all applicable laws, ordinances, regulations, and standards.

PROPOSED CONDITIONS OF CERTIFICATION

CUL-1 Prior to the start of ground disturbance (includes "preconstruction site mobilization"; "construction ground disturbance"; and "construction grading, boring and trenching," as defined in the General Conditions for this project), the project owner shall obtain the services of a Cultural Resources Specialist (CRS), and one or more alternate CRSs, if alternates are needed. The CRS shall manage all monitoring, mitigation, curation and reporting activities required in accordance with the Conditions of Certification (Conditions). The CRS may elect to obtain the services of Cultural Resources Monitors (CRMs) and other technical specialists, if needed, to assist in monitoring, mitigation, and curation activities. The project owner shall ensure that the CRS makes recommendations regarding the eligibility for listing in the California Register of Historical Resources (CRHR) of any cultural resources that are newly discovered or that may be affected in an unanticipated manner. No ground disturbance shall occur prior to CPM approval of the CRS and alternates, unless such activities are specifically approved by the CPM. Approval of a CRS may be denied or revoked for non-compliance on this or other projects.

CULTURAL RESOURCES SPECIALIST

The resumes for the CRS and alternate(s) shall include information demonstrating to the satisfaction of the CPM that their training and backgrounds conform to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 C.F.R., part 61). In addition, the CRS shall have the following qualifications:

1. The CRS's qualifications shall be appropriate to the needs of the project and shall include a background in anthropology, archaeology, history, architectural history, or a related field;

2. At least three years of archaeological or historical, as appropriate (per nature of predominate cultural resources on the project site), resource mitigation and field experience in California; and

3. At least one year of experience in a decision-making capacity on cultural resources projects in California and the appropriate training and experience to knowledgably make recommendations regarding the significance of cultural resources.

The resumes of the CRS and alternate CRS shall include the names and telephone numbers of contacts familiar with the work of the CRS/alternate CRS on referenced projects and demonstrate to the satisfaction of the CPM that the CRS/alternate CRS has the appropriate training and experience to implement effectively the Conditions.

CULTURAL RESOURCES MONITORS

CRMs shall have the following qualifications:

1. A B.S. or B.A. degree in anthropology, archaeology, historical archaeology or a related field and one year experience monitoring in California; or

2. An AS or AA degree in anthropology, archaeology, historical archaeology or a related field, and four years experience monitoring in California; or

3. Enrollment in upper division classes pursuing a degree in the fields of anthropology, archaeology, historical archaeology or a related field, and two years of monitoring experience in California.

CULTURAL RESOURCES TECHNICAL SPECIALISTS

The resume(s) of any additional technical specialist(s), e.g., historical archaeologist, historian, architectural historian, and/or physical anthropologist, shall be submitted to the CPM for approval.

Verification:

1. At least 45 days prior to the start of ground disturbance, the project owner shall submit the resume for the CRS, and alternate(s) if desired, to the CPM for review and approval.

2. At least 10 days prior to a termination or release of the CRS, or within 10 days after the resignation of a CRS, the project owner shall submit the resume of the proposed new CRS to the CPM for review and approval. At the same time, the project owner shall also provide to the proposed new CRS the AFC and all cultural resources documents, field notes, photographs, and other cultural resources materials generated by the project. If there is no alternate CRS in place to conduct the duties of the CRS, a previously approved monitor may serve in place of a CRS so that project-related ground disturbance may continue up to a maximum of three days without a CRS. If cultural resources are discovered then ground disturbance will remain halted until there is a CRS or alternate CRS to make a recommendation regarding significance.

3. At least 20 days prior to ground disturbance, the CRS shall provide a letter naming anticipated CRMs for the project and stating that the identified CRMs meet the minimum qualifications for cultural resources monitoring required by this Condition. If

additional CRMs are obtained during the project, the CRS shall provide additional letters to the CPM identifying the CRMs and attesting to the qualifications of the CRMs, at least five days prior to the CRMs beginning on-site duties.

4. At least 10 days prior to any technical specialists beginning tasks, the resume(s) of the specialists shall be provided to the CPM for review and approval.

5. At least 10 days prior to the start of ground disturbance, the project owner shall confirm in writing to the CPM that the approved CRS will be available for onsite work and is prepared to implement the cultural resources conditions.

CUL-2 Prior to the start of ground disturbance, if the CRS has not previously worked on the project, the project owner shall provide the CRS with copies of the AFC, data responses, and confidential cultural resources reports for the project. The project owner shall also provide the CRS and the CPM with maps and drawings showing the footprints of the power plant, all linear facilities, all access roads, and all laydown areas. Maps shall include the appropriate USGS quadrangles and a map at an appropriate scale (e.g., 1:2000 or 1" = 200') for plotting cultural features or materials. If the CRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the CRS and CPM. The CPM shall review map submittals and, in consultation with the CRS, approve those that are appropriate for use in cultural resources planning activities. No ground disturbance shall occur prior to CPM approval of maps and drawings, unless such activities are specifically approved by the CPM.

If construction of the project would proceed in phases, maps and drawings not previously provided shall be submitted prior to the start of each phase. Written notification identifying the proposed schedule of each project phase shall be provided to the CRS and CPM.

At a minimum, the CRS shall consult weekly with the project construction manager to confirm area(s) to be worked during the next week, until ground disturbance is completed.

The project owner shall notify the CRS and CPM of any changes to the scheduling of the construction phases.

Verification:

1. At least 40 days prior to the start of ground disturbance, the project owner shall provide the AFC, data responses, and confidential cultural resources documents to the CRS, if needed, and the subject maps and drawings to the CRS and CPM. The CPM will review submittals in consultation with the CRS and approve maps and drawings suitable for cultural resources planning activities.

2. If there are changes to any project-related footprint, revised maps and drawings shall be provided at least 15 days prior to start of ground disturbance for those changes.

3. If project construction is phased, if not previously provided, the project owner shall submit the subject maps and drawings 15 days prior to each phase.

4. On a weekly basis during ground disturbance, a current schedule of anticipated project activity shall be provided to the CRS and CPM by letter, e-mail, or fax.

5. Within five days of identifying changes, the project owner shall provide written notice of any changes to scheduling of construction phase.

CUL-3 Prior to the start of ground disturbance, the project owner shall submit the Cultural Resources Monitoring and Mitigation Plan (CRMMP), as prepared by or under the direction of the CRS, to the CPM for review and approval. The CRMMP shall follow the content and organization of the model CRMMP, provided by the CPM, and the author's name shall appear on the title page of the CRMMP. The CRMMP shall identify general and specific measures to minimize potential impacts to sensitive cultural resources. Implementation of the CRMMP shall be the responsibility of the CRS and the project owner. Copies of the CRMMP shall reside with the CRS, alternate CRS, each CRM, and the project owner's on-site construction manager. No ground disturbance shall occur prior to CPM approval of the CRMMP, unless such activities are specifically approved by the CPM.

The CRMMP shall include, but not be limited to, the following elements and measures:

1. A proposed general research design that includes a discussion of archaeological research questions and testable hypotheses specifically applicable to the project area, and a discussion of artifact collection, retention/disposal, and curation policies as related to the research questions formulated in the research design. The research design will specify that the preferred treatment strategy for any buried archaeological deposits is avoidance. A mitigation plan will be prepared for any CRHR-eligible resource (as determined by the CPM), impacts to which cannot be avoided. A prescriptive treatment plan may be included in the CRMMP for limited data types.

2. The following statement included in the Introduction: "Any discussion, summary, or paraphrasing of the Conditions of Certification in this CRMMP is intended as general guidance and as an aid to the user in understanding the conditions and their implementation. The conditions, as written in the Commission Decision, shall supersede any summarization, description, or interpretation of the conditions in the CRMMP. The Cultural Resources Conditions of Certification from the Commission Decision are contained in Appendix A."

3. Specification of the implementation sequence and the estimated time frames needed to accomplish all project-related tasks during the ground disturbance and post-ground–disturbance analysis phases of the project.

4. Identification of the person(s) expected to perform each of the tasks, their responsibilities, and the reporting relationships between project construction management and the mitigation and monitoring team.

5. A description of the manner in which Native American observers or monitors will be included, the procedures to be used to select them, and their role and responsibilities.

6. A description of all impact-avoidance measures (such as flagging or fencing) to prohibit or otherwise restrict access to sensitive resource areas that are to be avoided during project-related ground disturbance, construction, and/or operation, and identification of areas where these measures are to be implemented. The description shall address how these measures would be implemented prior to the start of ground disturbance and how long they would be needed to protect the resources from project-related effects.

7. A statement that all encountered cultural resources over 50 years old shall be recorded on Department of Parks and Recreation (DPR) 523 forms and mapped and photographed. In addition, all archaeological materials retained as a result of the archaeological investigations (survey, testing, data recovery) shall be curated in accordance with the California State Historical Resources Commission's *Guidelines for the Curation of Archaeological Collections*, into a retrievable storage collection in a public repository or museum.

8. A statement that the project owner will pay all curation fees for artifacts recovered and for related documentation produced during cultural resources investigations conducted for the project. The project owner shall identify three possible curation facilities that could accept cultural resources materials resulting from project activities.

9. A statement that the CRS has access to equipment and supplies necessary for site mapping, photography, and recovery of any cultural resource materials that are encountered during ground disturbance and cannot be treated prescriptively.

10. A description of the contents and format of the final Cultural Resource Report (CRR), which shall be prepared according to ARMR guidelines.

Verification:

1. Upon approval of the CRS proposed by the project owner, the CPM will provide to the CRS an electronic copy of the model CRMMP.

2. At least 30 days prior to the start of ground disturbance, the project owner shall submit the subject CRMMP to the CPM for review and approval. The CPM will provide the project owner with a model CRMMP to adapt for project use.

3. At least 30 days prior to the start of ground disturbance, a letter shall be provided to the CPM indicating that the project owner agrees to pay curation fees for any materials collected as a result of the archaeological investigations (survey, testing, data recovery).

CUL-4 The project owner shall submit the final Cultural Resources Report (CRR) to the CPM for approval. The final CRR shall be written by or under the direction of the CRS and shall be provided in the ARMR format. The final CRR shall report on all field activities including dates, times and locations, findings, samplings, and analyses. All survey reports, DPR 523 forms, data recovery reports, and any additional research reports not previously submitted to the California Historical Resource Information System (CHRIS) and the State Historic Preservation Officer (SHPO) shall be included as appendices to the final CRR.

If the project owner requests a suspension of ground disturbance and/or construction activities, then a draft CRR that covers all cultural resources activities associated with the project shall be prepared by the CRS and submitted to the CPM for review and approval on the same day as the suspension/extension request. The draft CRR shall be retained at the project site in a secure facility until ground disturbance and/or construction resumes or the project is withdrawn. If the project is withdrawn, then a final CRR shall be submitted to the CPM for review and approval at the same time as the withdrawal request.

Verification:

1. Within 90 days after completion of ground disturbance (including landscaping), the project owner shall submit the final CRR to the CPM for review and approval. If any reports have previously been sent to the CHRIS, then receipt letters from the CHRIS or other verification of receipt shall be included in an appendix.

2. Within 90 days after completion of ground disturbance (including landscaping), the project owner shall provide to the CPM a copy of an agreement with, or other written commitment from, a curation facility that meets the standards stated in the California State Historical Resources Commission's *Guidelines for the Curation of Archaeological Collections*, to accept cultural materials, if any, from this project. Any agreements concerning curation will be retained and available for audit for the life of the project.

3. Within 10 days after CPM approval, the project owner shall provide documentation to the CPM confirming that copies of the final CRR have been provided to the SHPO, the CHRIS, the curating institution, if archaeological materials were collected, and to any Native American groups requesting copies of project-related reports.

4. Within 30 days after requesting a suspension of construction activities, the project owner shall submit a draft CRR to the CPM for review and approval.

CUL-5 Prior to and for the duration of ground disturbance, the project owner shall provide Worker Environmental Awareness Program (WEAP) training to all new workers within their first week of employment at the project site, laydown area, and along the linear facilities routes. The training shall be prepared by the CRS, may be conducted by any member of the archaeological team, and may be presented in the form of a video. The CRS shall be available (by telephone or in person) to answer questions posed by employees. The training may be discontinued when ground disturbance is completed or suspended, but must be resumed when ground disturbance, such as landscaping, resumes. The training shall include:

1. A discussion of applicable laws and penalties under the law;

2. Samples or visuals of artifacts that might be found in the project vicinity;

3. Instruction that the CRS, alternate CRS, and CRMs have the authority to halt project-related ground disturbance in the area of a discovery to an extent sufficient to ensure that the resource is protected from further impacts, as determined by the CRS;

4. Instruction that employees are to halt work on their own in the vicinity of a potential cultural resources discovery and shall contact their supervisor and the CRS or CRM, and that redirection of work would be determined by the construction supervisor and the CRS;

5. An informational brochure that identifies reporting procedures in the event of a discovery;

6. An acknowledgement form signed by each worker indicating that they have received the training; and

7. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

No ground disturbance shall occur prior to implementation of the WEAP program, unless such activities are specifically approved by the CPM.

Verification:

1. At least 30 days prior to the beginning of ground disturbance, the CRS shall provide the training program draft text and graphics and the informational brochure to the CPM for review and approval, and the CPM will provide to the project owner a WEAP Training Acknowledgement form for each WEAP-trained worker to sign.

2. On a monthly basis, until ground disturbance is completed, the project owner shall provide in the Monthly Compliance Report (MCR) the WEAP Training Acknowledgement forms of workers at the project site and on the linear facilities who have completed the training in the prior month and a running total of all persons who have completed training to date.

CUL-6 The project owner shall ensure that the CRS, alternate CRS, or CRMs monitor full time all ground disturbance exceeding five feet in depth at the project site, at laydown areas, along linear facilities routes, at pull sites, and in any other ancillary project-related impact areas, and all ground disturbance at any depth along existing paved roads, to ensure there are no impacts to undiscovered resources and to ensure that known resources are not impacted in an unanticipated manner.

Full-time archaeological monitoring for this project shall be the archaeological monitoring of all earth-removing activities on the project site, at the laydown area, along the linear facility routes, and at roads or other ancillary areas for as long as the activities are ongoing. Full-time archaeological monitoring shall require at least one monitor per excavation area where machines are actively removing earth. If an excavation area is too large for one monitor to effectively observe the earth removal, one or more additional monitors shall be retained to observe the area.

In the event that the CRS believes that the current level of monitoring is not appropriate in certain locations, a letter or e-mail detailing the justification for changing the level of monitoring shall be provided to the CPM for review and approval prior to any change in the level of monitoring.

The research design in the CRMMP shall govern the collection, treatment, retention/disposal, and curation of any archaeological materials encountered.

On forms provided by the CPM, CRMs shall keep a daily log of any monitoring and other cultural resources activities and any instances of non-compliance with the Conditions and/or applicable LORS. Copies of the daily monitoring logs shall be provided by the CRS to the CPM, if requested by the CPM. From these logs, the CRS shall compile a monthly monitoring summary report to be included in the MCR. If there are no monitoring activities, the summary report shall specify why monitoring has been suspended. The CRS or alternate CRS shall report daily to the CPM on the status of cultural resources-related activities at the project site, unless reducing or ending daily reporting is requested by the CRS and approved by the CPM.

The CRS, at his or her discretion, or at the request of the CPM, may informally discuss cultural resources monitoring and mitigation activities with Energy Commission technical staff.

Cultural resources monitoring activities are the responsibility of the CRS. Any interference with monitoring activities, removal of a monitor from duties assigned by the CRS, or direction to a monitor to relocate monitoring activities by anyone other than the CRS shall be considered non-compliance with these Conditions.

Upon becoming aware of any incidents of non-compliance with the Conditions and/or applicable LORS, the CRS and/or the project owner shall notify the CPM by telephone or e-mail within 24 hours. The CRS shall also recommend

corrective action to resolve the problem or achieve compliance with the Conditions. When the issue is resolved, the CRS shall write a report describing the issue, the resolution of the issue, and the effectiveness of the resolution measures. This report shall be provided in the next MCR for the review of the CPM.

A Native American monitor shall be obtained to monitor ground disturbance in areas where Native American artifacts are discovered. Contact lists of interested Native Americans and guidelines for monitoring shall be obtained from the Native American Heritage Commission. Preference in selecting a monitor shall be given to Native Americans with traditional ties to the area that shall be monitored. If efforts to obtain the services of a qualified Native American monitor are unsuccessful, the project owner shall immediately inform the CPM. The CPM will either identify potential monitors or will allow ground disturbance to proceed without a Native American monitor.

Verification:

1. At least 30 days prior to the start of ground disturbance, the CPM will provide to the CRS an electronic copy of a form to be used as a daily monitoring log. While monitoring is on-going, the project owner shall include in each MCR a copy of the monthly summary report of cultural resources-related monitoring prepared by the CRS.

2. Daily, as long as no cultural resources are found, the CRS shall provide a statement that “no cultural resources over 50 years of age were discovered” to the CPM as an e-mail, or in some other form acceptable to the CPM. If the CRS concludes that daily reporting is no longer necessary, a letter or e-mail providing a detailed justification for the decision to reduce or end daily reporting shall be provided to the CPM for review and approval at least 24 hours prior to reducing or ending daily reporting.

3. At least 24 hours prior to implementing a proposed change in monitoring level, documentation justifying the change shall be submitted to the CPM for review and approval.

4. No later than 30 days following the discovery of any Native American cultural materials, the project owner shall submit to the CPM copies of the information transmittal letters sent to the Chairperson of the Native American tribes or groups who requested the information. Additionally, the project owner shall submit to the CPM copies of letters of transmittal for all subsequent responses to Native American requests for notification, consultation, and reports and records, and any comments or information provided in response by the Native Americans.

CUL-7 The project owner shall grant authority to halt project-related ground disturbance to the CRS, alternate CRS, and the CRMs in the event of a discovery. Redirection of ground disturbance shall be accomplished under the direction of the construction supervisor in consultation with the CRS.

In the event cultural resources over 50 years of age or, if younger, determined exceptionally significant by the CPM, are found, or impacts to such resources

can be anticipated, ground disturbance shall be halted or redirected in the immediate vicinity of the discovery sufficient to ensure that the resource is protected from further impacts. Monitoring and daily reporting as provided in **CUL-6** shall continue during all ground-disturbing activities elsewhere on the project site. The halting or redirection of ground disturbance shall remain in effect until the CRS has visited the discovery, and all of the following have occurred:

1. The CRS has notified the project owner, and the CPM has been notified within 24 hours of the discovery, or by Monday morning if the cultural resources discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday morning, including a description of the discovery (or changes in character or attributes), informed of the action taken (i.e., work stoppage or redirection), provided a recommendation of CRHR eligibility, and provided recommendations for mitigation of any cultural resources discoveries, whether or not a determination of CRHR eligibility has been made.

2. If the discovery is prehistoric or ethnographic, the CRS has notified all Native American groups that expressed a desire to be notified in the event of such a discovery.

3. The CRS has completed field notes, measurements, and photography for a DPR 523 “Primary” form. The “Description” entry of the DPR 523 “Primary” form shall include a recommendation on the CRHR eligibility of the discovery. The project owner shall submit completed forms to the CPM.

4. The CRS, the project owner, and the CPM have conferred, and the CPM has concurred with the recommended eligibility of the discovery and approved the CRS’s proposed data recovery, if any, including the curation of the artifacts, or other appropriate mitigation; and any necessary data recovery and mitigation have been completed.

Verification:

1. At least 30 days prior to the start of ground disturbance, the project owner shall provide the CPM and CRS with a letter confirming that the CRS, alternate CRS, and CRMs have the authority to halt project-related ground disturbance in the vicinity of a cultural resources discovery, and that the project owner shall ensure that the CRS notifies the CPM within 24 hours of a discovery, or by Monday morning if the cultural resources discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday morning.

2. Within 48 hours of the discovery of an archaeological or ethnographic resource, the project owner shall ensure that the CRS notifies all Native American groups that expressed a desire to be notified in the event of such a discovery.

3. Completed DPR 523 forms for resources newly discovered during ground disturbance shall be submitted to the CPM for review and approval no later than 24

hours following the notification of the CPM, or 48 hours following the completion of data recordation/recovery, whichever the CRS decides is more appropriate for the subject cultural resource.

CUL-8 The project owner shall suggest to PG&E in writing that, if feasible, the Avenal Energy transmission line interconnection to the Gates Substation be designed to avoid changes to the existing Tesla-Midway 230-kV transmission line towers.

If the Facilities Study, or other equivalent study as provided for in the CAISO's Open Access Transmission Tariff, completed by CAISO/PG&E for the project, indicates the need for modifications to any existing Tesla-Midway 230-kV transmission line towers to accommodate AE's new transmission line, then the project owner shall document any towers subject to modification.

The documentation shall be prepared by a qualified architectural historian whose resume demonstrates training and background conforming to the U.S. Secretary of the Interior's Professional Qualifications Standards (36 C.F.R., part 61) and three years' experience in recording twentieth-century industrial structures.

The documentation shall include:

1. Representative photography of the transmission line and of the individual affected towers (all elevations) to be submitted in 5" x 7" or 8" x 10" prints on archival-quality paper;

2. Preparation of a site plan or linear location map of the affected segment(s) and of individual affected towers within the alignment;

3. Technical descriptions of the Tesla-Midway 230-kV transmission line, as available from public and non-confidential sources, including descriptions of each tower type installed; and

4. A narrative history of the Tesla-Midway 230-kV transmission line, drawn from public and non-confidential sources, from the time of its construction to the present, placing it in the context of the development of California's electrical grid in the 1950s.

Once approved by the CPM, this documentation shall be submitted to the Avenal Public Library and the Southern San Joaquin Valley Information Center at California State University, Bakersfield, for inclusion in their respective archives.

Verification:

1. At least 90 days prior to any work on the Tesla-Midway 230-kV transmission line, the project owner shall provide to the CPM copies of written correspondence between the project owner and PG&E documenting the project owner's efforts to persuade

PG&E to design the project interconnection to avoid impacts to the Tesla-Midway 230-kV transmission line towers and providing a copy of any design agreement reached between the project owner and PG&E.

2. At least 60 days prior to any work on the Tesla-Midway 230-kV transmission line, if there will be project impacts to the Tesla-Midway 230-kV transmission line towers, the project owner shall submit the resume of the proposed architectural historian to the CPM for review and approval.

3. At least 30 days prior to any work on the Tesla-Midway 230-kV transmission line, the project owner shall provide a copy of the completed documentation to the CPM for review and approval.

4. Within 90 days after the CPM approves the completed documentation, the project owner shall submit copies of transmittal letters for the submission of copies of the CPM-approved documentation to the Avenal Public Library and the Southern San Joaquin Valley Information Center, California State University, Bakersfield.

CULTURAL RESOURCES ACRONYM GLOSSARY

AVENAL POWER CENTER PROJECT

AFC	Application for Certification
APC	Avenal Power Center, LLC
AE	Avenal Energy, the project
ARMR	Archaeological Resource Management Report
BC	Before the Birth of Christ
AD	After the Birth of Christ
CEQA	California Environmental Quality Act
CHRIS	California Historical Resources Information System
Conditions	Conditions of Certification
CRHR	California Register of Historical Resources
CRM	Cultural Resources Monitor
CRMMP	Cultural Resources Monitoring and Mitigation Plan
CRR	Cultural Resource Report
CRS	Cultural Resources Specialist
DPR 523	Department of Parks and Recreation cultural resource inventory form
FSA	Final Staff Assessment
LORS	Laws, ordinances, regulations, and standards
MCR	Monthly Compliance Report
MLD	Most Likely Descendent
NAHC	Native American Heritage Commission
NRHP	National Register of Historic Places
OHP	Office of Historic Preservation
PSA	Preliminary Staff Assessment
SHPO	State Historic Preservation Officer

SSSVIC	Southern *S*an Joaquin Valley Information Center, part of the CHRIS
Staff	Energy Commission cultural resources technical staff
WEAP	Worker Environmental Awareness Program

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HAZARDOUS MATERIALS MANAGEMENT

Testimony of Alvin Greenberg, Ph.D. and Rick Tyler

SUMMARY OF CONCLUSIONS

Staff's evaluation of the proposed Avenal Energy project (AE), along with staff's proposed mitigation measures, indicates that hazardous materials use at the site would not present a significant impact to the public. With adoption of the proposed conditions of certification, the proposed project will comply with all applicable laws, ordinances, regulations, and standards. In response to Health and Safety Code, section 25531 et seq., Avenal Power Center, LLC (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 the risk management plan be submitted for concurrent review by the Kings County Environmental Health Department and Energy Commission staff. In addition, staff's proposed conditions of certification require that both the Kings County Department of Environmental Health and staff review and approve the risk management plan prior to delivery of any hazardous materials to the AE project site. Other proposed conditions of certification address the issue of the transportation, storage, and use of aqueous ammonia.

INTRODUCTION

The purpose of this hazardous materials management analysis is to determine if the proposed Avenal Energy project (AE) has the potential to cause significant impacts on the public as a result of the use, handling, storage, or transportation of hazardous materials at the proposed site. If significant adverse impacts on the public are identified, Energy Commission staff must also evaluate the potential for facility design alternatives and additional mitigation measures to reduce those impacts to the extent feasible.

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

Aqueous ammonia (19% ammonia in aqueous solution) is the only acutely hazardous material proposed to be either used or stored at the AE project in quantities exceeding the reportable amounts defined in the California Health and Safety Code, section 25532 (j) (Avenal Power 2008b, Table 6.15-1). Aqueous ammonia will be used to control 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 the 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 high 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 result in high

down-wind concentrations. Spills associated with the aqueous form are much easier to contain than those associated with anhydrous ammonia, and emissions from such spills are limited by the slow mass transfer from the surface of the spilled material.

Other hazardous materials, such as mineral and lubricating oils, cleaning detergents, and welding gasses will be present at the proposed AE project. Hazardous materials used during construction would include gasoline, diesel fuel, motor oil, hydraulic fluid, welding gases, lubricants, solvents, paint, and paint thinner. No acutely toxic hazardous materials will be used on site during construction. None of these materials pose significant potential for off-site impacts as a result of the quantities on site, their relative toxicity, their physical state, and/or their environmental mobility. Handling of hazardous materials during construction would comply with all applicable regulations and standards and servicing or fueling of construction equipment would follow standard operating procedures developed to prevent hazardous materials incidents (Avenal Power 2008b, Section 6.15.2.1).

Although no natural gas is stored, the project will also involve the handling of large amounts of natural gas. Natural gas poses some risk of both fire and explosion. The proposed project would connect via a new gas pipeline from an existing PG&E compressor station about 7,000 feet southwest of the proposed site (Avenal Power 2008b, Section 2.1.1). The AE project would also require the transportation of aqueous ammonia to the facility. This document addresses all potential impacts associated with the use and handling of hazardous materials.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

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

Hazardous Materials Management Table 1
Laws, Ordinances, Regulations, and Standards

Applicable 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)	Established a nationwide emergency planning and response program and imposed reporting requirements for businesses that store, handle, or produce significant quantities of extremely hazardous materials.
The CAA section on risk management plans (42 USC §112(r)	Requires states to implement a comprehensive system informing local agencies and the public when a significant quantity of such materials is stored or handled at a facility. The requirements of both SARA Title III and the CAA are reflected in the California Health and Safety Code, section 25531, et seq.
49 CFR 172.800	The U.S. Department of Transportation (DOT) requirement that suppliers of hazardous materials prepare and implement security plans.
49 CFR Part 1572, Subparts A and B	Requires suppliers of hazardous materials to ensure that all their hazardous materials drivers are in compliance with personnel background security checks.
The Clean Water Act (CWA) (40 CFR 112)	Aims to prevent the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Requires a written spill prevention, control, and countermeasures (SPCC) plan to be prepared for facilities that store oil that could leak into navigable waters.
Title 49, Code of Federal Regulations, Part 190	Outlines gas pipeline safety program procedures.
Title 49, Code of Federal Regulations, Part 191	Addresses transportation of natural and other gas by pipeline: annual reports, incident reports, and safety-related condition reports. Requires operators of pipeline systems to notify the DOT of any reportable incident by telephone and then submit a written report within 30 days.
Title 49, Code of Federal Regulations, Part 192	Addresses transportation of natural and other gas by pipeline and minimum federal safety standards, specifies minimum safety requirements for pipelines including material selection, design requirements, and corrosion protection. The safety requirements for pipeline construction vary according to the population density and land use that characterize the surrounding land. This part also contains regulations governing pipeline construction (which must be followed for Class 2 and Class 3 pipelines) and the requirements for preparing a pipeline integrity management program.

Applicable Law	Description
Federal Register (6 CFR Part 27) interim final rule	A regulation of the U.S. Department of Homeland Security that requires facilities that use or store certain hazardous materials to submit information to the department so that a vulnerability assessment can be conducted to determine what certain specified security measures shall be implemented.
State	
Title 8, California Code of Regulations, section 5189	Requires facility owners to develop and implement effective safety management plans that ensure that large quantities of hazardous materials are handled safely. While such requirements primarily provide for the protection of workers, they also indirectly improve public safety and are coordinated with the Risk Management Plan (RMP) process.
Title 8, California Code of Regulations, section 458 and sections 500 to 515	Sets forth requirements for the design, construction, and operation of vessels and equipment used to store and transfer ammonia. These sections generally codify the requirements of several industry codes, including the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, the American National Standards Institute (ANSI) K61.1 and the National Boiler and Pressure Vessel Inspection Code. These codes apply to anhydrous ammonia but are also used to design storage facilities for aqueous ammonia.
California Health and Safety Code, section 25531 to 25543.4	The California Accidental Release Program (CalARP) requires the preparation of a Risk Management Plan (RMP) and off-site consequence analysis (OCA) and submittal to the local Certified Unified Program Agency for approval.
California Health and Safety Code, section 41700	Requires that “No person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property.”
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)	Prevents certain chemicals that cause cancer and reproductive toxicity from being discharged into sources of drinking water.
California Public Utilities Commission General Order 112-E and 58-A	Contains standards for gas piping construction and service.
Local	
None Applicable	

The Certified Unified Program Authority (CUPA) with responsibility to review RMPs and Hazardous Materials Business Plans (HMBPs) is the Kings County Environmental Health Department (Avenal Power 2008b, Table 6.15-4). In regards to seismic safety issues, the site is located in Seismic Risk Zone 4. Construction and design of buildings

and vessels storing hazardous materials will meet the seismic requirements of the California Building Code for Seismic Zone 4 (Avenal Power 2008b, Section 6.3.2.4).

SETTING

Several factors associated with the area in which a project is to be located affect the potential for an accidental release of a hazardous material that could cause public health impacts. These include:

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

METEOROLOGICAL CONDITIONS

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

Recorded wind speeds and directions are described in the **AIR QUALITY** section (6.2) and quarterly wind roses are provided in Figures 6.2-5a through -5y of the Application for Certification (AFC) (Avenal Power 2008b). Staff agrees with the applicant that use of F stability (stagnated air, very little mixing), wind speed of 1.5 meters per second, and a temperature of 111°F are appropriate for conducting the off-site consequence analysis (Avenal Power 2008b, Table 6.15-2).

TERRAIN CHARACTERISTICS

The location of elevated terrain is often an important factor in assessing potential exposure. An emission plume resulting from an accidental release may impact high elevations before impacting lower elevations. The site topography is predominantly flat (about 340 feet above sea level), with a gentle slope. The surrounding area is also mostly flat with the Kettleman Hills rising about three miles southwest of the site (Avenal Power 2008b, Section 6.2.1.1).

LOCATION OF EXPOSED POPULATIONS AND SENSITIVE RECEPTORS

The general population includes many sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding a project site may have a major bearing on health risk. There are no sensitive receptors including schools, day-care facilities, long-term care facilities, parks, churches, or hospitals within six miles of the proposed site. The nearest residence is located about 1.1 miles northeast of the proposed project and the nearest public receptor is a water treatment plant located adjacent to the northeast corner of the site (Avenal Power 2008b, Section 6.15.1).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

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

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

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

Staff reviewed and evaluated the applicant's proposed use of hazardous materials as described by the applicant (Avenal Power 2008b, Section 6.15). Staff's assessment followed the five steps listed below.

- Step 1: Staff reviewed the chemicals and the amounts proposed for on-site use as listed in **Table 6.15-1** of the AFC and determined the need and appropriateness of their use.
- Step 2: Those chemicals proposed for use in small amounts or whose physical state is such that there is virtually no chance that a spill would migrate off site and impact the public were removed from further assessment.
- Step 3: Measures proposed by the applicant to prevent spills were reviewed and evaluated. These included engineering controls such as automatic shut-off valves and different-sized transfer-hose couplings and administrative controls such as worker training and safety management programs.

- Step 4: Measures proposed by the applicant to respond to accidents were reviewed and evaluated. These measures also included engineering controls such as catchment basins and methods to keep vapors from spreading and administrative controls such as training emergency response crews.
- Step 5: Staff analyzed the theoretical impacts on the public of a worst-case spill of hazardous materials, as reduced by the mitigation measures proposed by the applicant. When mitigation methods proposed by the applicant are sufficient, no further mitigation is recommended. If the proposed mitigation is not sufficient to reduce the potential for adverse impacts to an insignificant level, staff 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 facility be allowed to use hazardous materials.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Small Quantity Hazardous Materials

Hazardous chemicals such as mineral and lubricating oils, cleaning detergents, welding gasses, and other various chemicals would be used and stored in relatively small amounts. (See **HAZARDOUS MATERIALS APPENDIX B** for a list of all chemicals proposed for use and storage at AE). In conducting the analysis, staff determined in Steps 1 and 2 that these materials, although present at the proposed facility, pose a minimal potential for off-site impacts since they will be stored in small quantities, have low mobility/volatility, or have low levels of toxicity. These hazardous materials are eliminated from further consideration.

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 and aqueous ammonia. However, the project will be limited to using, storing, and transporting only those hazardous materials listed in Appendix B of this document as per staff's proposed condition **HAZ-1**.

Large Quantity Hazardous Materials

Natural Gas

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

While natural gas would be used in significant quantities, it would not be stored on site. It would be delivered via a new 20-inch diameter, 2.8-mile pipeline connecting the

proposed site to PG&E's gas line at the Kettleman compressor station (Avenal Power 2008b, Sections 2.3.14.1 and 6.15.2.2.1). The proposed pipeline route would travel southwest from the AE site along Avenal Cutoff Road and then east along Plymouth Avenue to the compressor station near Interstate-5 (Avenal Power 2008b, Section 2.3.14.2 and Figure 2.1-1A). The proposed route travels through farmlands and no residences or public receptors are present along the route (Avenal Power 2008b, Section 6.15.2.2.1).

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) code 85A requires both 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, thereby precluding the presence of an explosive mixture. The safety management plan proposed by the applicant would address the handling and use of natural gas and would significantly reduce the potential for equipment failure because of either improper maintenance or human error.

Since the proposed facility will require the installation of a new gas pipeline off-site, impacts from this pipeline need to be evaluated. The design of the natural gas pipeline is governed by laws and regulations discussed here. These LORS require use of high quality arc welding techniques by certified welders and inspection of welds. Many failures of older natural gas lines have been associated with poor quality welds, or corrosion. Current codes address corrosion failures by requiring use of corrosion resistant coatings and cathodic corrosion protection. Another major cause of pipeline failure is damage resulting from excavation activities near pipelines. Current codes address this mode of failure by requiring clear marking of the pipeline route. An additional mode of failure is damage caused by earthquake. Existing codes also address seismic hazard in design criteria (see discussion below). Evaluation of pipeline performance in recent earthquakes indicates that pipelines designed to modern codes perform well in seismic events while older lines frequently fail. Staff believes that existing regulatory requirements are sufficient to reduce the risk of accidental release from the pipeline to insignificant levels.

Failures of gas pipelines, according to data from the U.S. Department of Transportation (the National Transportation Safety Board) from the period 1984 – 1991 and data from the National Response Center for the period 1990 - 2004, occur as a result of pipeline corrosion, pipeline construction or materials defects, rupture by heavy equipment excavating in the area such as bulldozers and backhoes, weather effects, and earthquakes. Given the gas line failures which occurred in the Marina District of San Francisco during the 1989 Loma Prieta earthquake, the January 1994 Northridge earthquake in Southern California, the January 1995 gas pipeline failures in Kobe, Japan, the January 19, 1995 gas explosion in San Francisco, the pipeline explosion in Belgium in July 2004, and the natural gas storage fire in Texas in August 2004, the safety of the gas pipeline is of paramount importance. However, it must be noted that those pipelines which failed in 1989 to 1995 were older and not manufactured nor installed to modern code requirements. The February 2001 Nisqually Earthquake near Olympia Washington caused no damage to natural gas mains and there was only one

reported gas line leak due to a separation of a service line going into a mobile home park. The Belgium gas pipeline explosion was due to construction equipment rupturing the line, not due to earthquake or structural failure.

If loss of containment occurs as a result of pipe, valve, or other mechanical failure or external forces, significant quantities of compressed natural gas could be released rapidly. Such a release can result in a significant fire and/or explosion hazard, which could cause loss of life and/or significant property damage in the vicinity of the pipeline route. However, the probability of such an event is extremely low if the pipeline is constructed according to present standards.

According to DOT statistics, the frequency of reportable incidents is about 0.25 for all pipeline incidents per 1,000 miles per year or 2.5×10^{-4} incidents per mile per year. DOT has also evaluated and categorized the major causes of pipeline failure. To summarize, the four major causes of accidental releases from natural gas pipelines are: Outside Forces - 43%, Corrosion -18%, Construction/Material Defects -13%, and Other - 26%.

Outside forces are the primary causes of incidents. Damage from outside forces includes damage caused by use of heavy mechanical equipment near pipelines (e.g., bulldozers and backhoes used in excavation activities), weather effects, vandalism, and earthquake-caused rupture as seen in the Marina District of San Francisco during the 1989 Loma Prieta Quake and in Kobe, Japan in January 1995.

The fourth category, “Other” includes equipment component failure, compressor station failures, operator errors and sabotage. The average annual service incident frequency for natural gas transmission systems varies with age, the diameter of the pipeline, and the amount of corrosion.

Older pipelines have a significantly higher frequency of incidents. This results from the lack of corrosion protection and use of less corrosion resistant materials compared to modern pipelines, limited use of modern inspection techniques, and higher frequency of incidents involving outside forces. The increased incident rate due to outside forces is the result of the use of a larger number of smaller diameter pipelines in older systems, which are generally more easily damaged and the uncertainty regarding the locations of older pipelines.

The safety requirements for pipeline construction vary according to the population density and land use, which characterize the surrounding land. The pipeline classes are defined as follows (Title 49, Code of Federal Regulations, Part 192):

- Class 1: Pipelines in locations within 220 yards of ten or fewer buildings intended for human occupancy in any 1-mile segment.
- Class 2: Pipelines in locations within 220 yards of more than ten but fewer than 46 buildings intended for human occupancy in any 1-mile segment. This class also includes drainage ditches of public roads and railroad crossings.
- Class 3: Pipelines in locations within 220 yards of more than 46 buildings intended for human occupancy in any 1-mile segment, or where the pipeline is within 100

yards of any building or small well-defined outside area occupied by 20 or more people on at least 5 days a week for 10 weeks in any 12 month period (the days and weeks need not be consecutive).

- Class 4: Pipelines in locations within 220 yards of buildings with four or more stories above ground in any 1-mile segment.

In the United States, extensive federal and state pipeline codes and safety enforcement minimize the risk of severe accidents related to natural gas pipelines. In November 2000, the DOT Office of Pipeline Safety proposed a program requiring the preparation of risk management plans for gas pipelines throughout the United States. These risk management plans will include the use of diagnostic techniques to detect internal and external corrosion or cracks in pipelines and to perform preventive maintenance. The pipeline owner will be required to develop and implement these plans as per the regulation adopted May 2004 (49 CFR Part 192). The regulations prescribe minimum requirements for a pipeline Integrity Management Program to be prepared and followed by every operator of a pipeline segment located in a high consequence area. A high consequence area is defined as any location where the pipeline traverses a Class 3 or 4 area (see above) or other areas under specified circumstances. The integrity management program must contain the required elements as described in section 192.911 including an identification of all high consequence areas, a baseline assessment plan including methods of assessing pipeline integrity and a schedule for completing the assessment, an identification of threats to each pipeline segment including a risk assessment, an evaluation of mitigation measures, implementation procedures, and monitoring procedures. The regulations also include requirements for reassessment intervals, which range from 7 to 20 years depending on the type of reassessment and the operating percentage of the pipeline.

The following safety features will be incorporated into the design and operation of the natural gas pipeline (as required by current federal and state codes): (1) while the pipeline will be designed, constructed, and tested to carry natural gas at a certain pressure, the working pressure will be less than the design pressure; (2) butt welds will be X-rayed and the pipeline will be tested with water prior to the introduction of natural gas into the line; (3) the pipeline will be surveyed for leakage annually (4) the pipeline will be marked to prevent rupture by heavy equipment excavating in the area; and (5) valves at the meter will be installed to isolate the line if a leak occurs. These requirements will be administered by the federal government and the CPUC.

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.

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 AE project. The accidental release of aqueous

ammonia without proper mitigation can result in significant down-wind concentrations of ammonia gas. AE would store 19% aqueous ammonia solution in two above-ground ammonia tanks with a maximum capacity of 27,000 gallons each (Avenal Power 2008b, Section 6.15.2.2.2). A secondary containment basin would be constructed surrounding each storage tank containing floating plastic balls designed to reduce ammonia evaporation from the surface of a spill. Both secondary containment structures would be equipped with a 24-inch drain connected to a single underground tertiary containment vault capable of holding the full contents of one tank plus the rainfall associated with a 24-hour, 25-year storm.

Based on staff's analysis described above, aqueous ammonia is the only hazardous material that may pose a significant risk of off-site impact. The use of aqueous ammonia can result in the release of ammonia vapor in the event of a spill. This is a result of its moderate vapor pressure and the large amounts of aqueous ammonia that will be used and stored on site. However, the use of aqueous ammonia poses far less risk than the use of the far more hazardous anhydrous ammonia (ammonia that is not diluted with water).

To assess the potential impacts associated with an accidental release of aqueous ammonia, staff uses four benchmark exposure levels of ammonia gas occurring off site. These include:

- the lowest concentration posing a risk of lethality, 2,000 parts per million (ppm);
- the concentration immediately dangerous to life and health level of 300 ppm;
- the emergency response planning guideline level 2 of 150 ppm, which is also the RMP level 1 criterion used by U.S. Environmental Protection Agency (EPA) and California; and
- the level considered by the Energy Commission staff to be without serious adverse effects on the public for a one-time exposure of 75 ppm.

If the potential exposure associated with a potential release exceeds 75 ppm at any public receptor, staff will also assess the probability of occurrence of the release, the severity of the consequences, and the nature of the potentially exposed population in determining whether the likelihood and extent of potential exposure are sufficient to support a finding of potentially significant impact. A detailed discussion of the exposure criteria considered by staff, as well as their applicability to different populations and exposure-specific conditions, is provided in **HAZARDOUS MATERIALS APPENDIX A**.

Section 6.15.2.2 and Appendix 6.15-1 of the AFC (Avenal Power 2008b) describe the modeling parameters used for the worst-case and alternative accidental releases of aqueous ammonia in the applicant's off-site consequence analysis (OCA). Pursuant to the California Accidental Release Program (CalARP) regulations (federal risk management plan regulations do not apply to sources that store or use aqueous ammonia solutions below 20%), the OCA was performed for the worst-case release scenario, which involved the failure and complete discharge of one of the storage tanks, as well as an alternative release scenario involving a spill during truck unloading which would drain from the sloped truck unloading area through a 10-inch pipe into the underground containment vault beneath the storage tanks. Ammonia emissions from the two potential release scenarios were calculated following methods provided in the

RMP off-site consequence analysis guidance, U.S. EPA, April 1999. The maximum temperature recorded during one hour in the area between the years 1992 and 1997 (111°F), a wind speed of 1.5 meters per second, and atmospheric stability class F were used for emission and dispersion calculations for the worst-case scenario. The arithmetic mean temperature recorded in the area between 1992 and 1997 (64°F), a wind speed of 2.5 meters per second, and atmospheric stability class D were used for calculations for the more feasible, alternative scenario. Potential off-site ammonia concentrations were estimated using the DEGADIS numerical dispersion model.

Hazardous Materials Management Table 2 shows the applicant's modeled distance to two benchmark criteria concentrations.

Hazardous Materials Management Table 2
Distance to Selected Toxic Endpoints

Scenario	Distance in Feet to AIHA's ERPG-2 (200 ppm)	Distance in Feet to Energy Commission level (75 ppm)
Worst Case	420	839
Alternative	512	859

Source: Figures 6.15-4 and 6.15-5, Avenal Power 2008b.

Figures 6.15-4 and 6.15-5 of the AFC (Avenal Power 2008b) show how far each benchmark concentration would reach from the ammonia tank site. Ammonia concentrations exceeding 200 ppm would not occur off-site. Ammonia concentrations exceeding 75 ppm would extend approximately 200 feet beyond the facility fence line to the east for either the worst-case or alternative scenarios. No residences or public receptors are located in this area; only agricultural fields exist there.

Mitigation

The potential for accidents resulting in the release of hazardous materials is greatly reduced through implementation of a safety management program that would include the use of both engineering and administrative controls. Elements of both facility controls and the safety management plan are summarized below.

Engineering Controls

Engineering controls help to prevent accidents and releases (spills) from moving off site and affecting communities by incorporating engineering safety design criteria in the design of the project. The engineered safety features proposed by the applicant for use at the AE project include:

- storage of petroleum-containing materials in their original containers which are designed to resist impacts and prevent releases;
- construction of secondary containment areas surrounding each of the hazardous materials storage areas designed to contain accidental releases that might happen during storage or delivery plus the volume of rainfall associated with a 24-hour, 25-year storm event;

- physical separation of stored chemicals in isolated containment areas in order to prevent accidental mixing of incompatible materials, which could result in the evolution and release of toxic gases or fumes;
- installation of both an automatic sprinkler system and an exhaust system for indoor hazardous materials storage areas;
- construction of secondary containment areas surrounding each of the aqueous ammonia storage tanks with 24-inch drains leading into an underground vault capable of holding the contents of one tank plus the volume of rainfall associated with a 24-hour, 25-year storm event;
- a sloped pad beneath the aqueous ammonia truck unloading area that drains into the underground vault beneath the storage tanks through a 10-inch opening;
- use of floating high density polyethylene (HDPE) balls (about 1.5 to 3 inches in diameter) in the secondary containment areas surrounding each ammonia tank to reduce the surface area of evaporating liquid to a tenth of the total surface area; and
- process protective systems including continuous tank level monitors, temperature and pressure monitors, alarms, excess flow and emergency isolation valves, and a concrete containment structure surrounding the ammonia tanks and piping system.

Administrative Controls

Administrative controls also help prevent accidents and releases (spills) from moving off site and affecting neighboring communities by establishing worker training programs, process safety management programs, and complying with all applicable health and safety laws, ordinances, and standards.

A worker health and safety program will be prepared by the applicant and include (but not be limited to) the following elements (see the **WORKER SAFETY AND FIRE PROTECTION** section for specific regulatory requirements):

- worker training regarding chemical hazards, health and safety issues, and hazard communication;
- procedures to ensure the proper use of personal protective equipment;
- safety operating procedures for the operation and maintenance of systems utilizing hazardous materials;
- fire safety and prevention; and
- emergency response actions including facility evacuation, hazardous material spill clean-up, and fire prevention.

At the facility, the project owner will be required to designate an individual with the responsibility and authority to ensure a safe and healthful work place. The project health and safety official will oversee the health and safety program and have the authority to halt any action or modify any work practice to protect the workers, facility, and the surrounding community in the event of a violation of the health and safety program.

The applicant will also prepare a risk management plan for aqueous ammonia, as required by both CalARP regulations and Condition of Certification **HAZ-2**. This

condition also includes the requirement for a program for the prevention of accidental releases and responses to an accidental release of aqueous ammonia. A hazardous materials business plan will also be prepared by the applicant that would incorporate state requirements for the handling of hazardous materials (Avenal Power 2008b, Section 6.15.2.2.10). Other administrative controls would be required in proposed Conditions of Certification **HAZ-1** (limitations on the use and storage of hazardous materials and their strength and volume) and **HAZ-3** (development of a safety management plan).

On-Site Spill Response

In order to address the issue of spill response, the facility will prepare and implement an emergency response plan that includes information on hazardous materials contingency and emergency response procedures, spill containment and prevention systems, personnel training, spill notification, on-site spill containment, and prevention equipment and capabilities, as well as other elements. Emergency procedures will be established which include evacuation, spill cleanup, hazard prevention, and emergency response (Avenal Power 2008b, Section 6.15.2.2.11).

The Kings County Fire Department (KCFD) would be the first responder for hazardous materials incidents. All firefighters at the KCFD are trained to the level of hazardous materials specialists and they would be able to arrive on site within 15 minutes. In the event of a large spill, backup support would be provided by the City of Hanford Hazardous Materials Response Team. This is a Regional State Type II Hazmat team and they could respond to the AE site in about 30 minutes (KCFD 2008). In addition, the applicant has identified two licensed contractors that could be called upon for clean-up in the event of a hazardous materials spill (Avenal Power 2008f Data Response #21). Staff finds that the available hazmat teams are capable of responding to a hazardous materials emergency call from AE with an adequate response time.

Transportation of Hazardous Materials

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

Ammonia can be released during a transportation accident and the extent of impact in the event of such a release would depend upon the location of the accident and the rate of dispersion of ammonia vapor from the surface of the aqueous ammonia pool. The likelihood of an accidental release during transport is dependent upon three factors:

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

To address this concern, staff evaluated the risk of an accidental transportation release in the project area. Staff's analysis focused on the project area after the delivery vehicle leaves the main highway, I-5. Staff believes it is appropriate to rely upon the extensive regulatory program that applies to the shipment of hazardous materials on California

highways to ensure safe handling in general transportation (see Federal Hazardous Materials Transportation Law 49 USC §5101 et seq, DOT regulations 49 CFR subpart H, §172–700, and California Department of Motor Vehicles (DMV) regulations on hazardous cargo). These regulations also address the issue of driver competence. See AFC section 6.11 for additional information on regulations governing the transport of hazardous materials.

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

To address the issue of accident rates, staff reviewed the technical and scientific literature on hazardous materials transportation (including tanker trucks) accident rates in the United States and California. Staff relied on six references and three federal government databases to assess the risk of a hazardous materials transportation accident.

Staff used the data from the Davies and Lees (1992) article, which references both the 1990 Harwood et al. and 1993 Harwood studies, to determine that the frequency of release for the transportation of hazardous materials in the U.S. is between 0.06 and 0.19 releases per 1,000,000 miles traveled on well-designed roads and highways. The maximum use of aqueous ammonia each year of the operation of the proposed AE project would require about four tanker truck deliveries of aqueous ammonia per month (a total of about 48 deliveries per year), each delivering 8,000 gallons. Each delivery will travel approximately 2.0 miles from I-5 along Avenal Cutoff Road to the facility (Avenal Power 2008b, Table 6.11-6).

This would result in about 96 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. Data from the U.S. DOT show that the actual risk of a fatality over the past five years from all modes of hazardous material transportation (rail, air, boat, and truck) is approximately 0.1 in 1,000,000.

In addition, staff used a transportation risk assessment model (developed by staff) in order to calculate the probability of an accident resulting in a release of a hazardous material due to delivery from the freeway to the facility along Avenal Cutoff Road. Results show a risk of 0.26 in 1,000,000 for one trip and a total annual risk of 12.8 in 1,000,000. This risk was calculated using accident rates on various types of roads (in this case, rural multilane undivided and two-lane) with distances traveled on each type of road computed separately. Although it is an extremely conservative model in that it includes risk of accidental release from all modes of hazardous materials transportation and does not distinguish between a high-integrity steel tanker truck and other less secure modes, the results still show that the risk of a transportation accident is insignificant.

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

In order to further ensure that the risk of an accident involving the transport of aqueous ammonia to the power plant is insignificant, staff proposes an additional administrative control in proposed Condition of Certification **HAZ-6** that would require the use of only one specific route to the site, that being the shortest route from an interstate (I-5 to east on Avenal Cutoff Road).

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

Seismic Issues

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

Information obtained after the January 1994 Northridge earthquake showed that some damage was caused both to several large storage tanks and to smaller tanks associated with the water treatment system of a cogeneration facility. The tanks with the greatest damage, including seam leakage, were older tanks, while the newer tanks sustained displacements and failures of attached lines. Therefore, staff conducted an analysis of the codes and standards which should be followed when designing and building storage tanks and containment areas to withstand a large earthquake. Staff 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 failed as a result of that earthquake. Referring to the sections on **GEOLOGIC HAZARDS AND RESOURCES** and **FACILITY SAFETY DESIGN** in the AFC, staff notes that the proposed facility will be designed and constructed to the standards of the California Building Code for Seismic Zone 4 (Avenal Power 2008b, Section 6.3.2.4). Therefore, on the basis of what occurred in 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 probable and do not represent a significant risk to the public.

Site Security

The applicant proposes to use hazardous materials identified by the U.S. EPA as requiring the development and implementation of special site security measures to prevent unauthorized access. The U.S. EPA published a Chemical Accident Prevention Alert regarding site security (EPA 2000a), the U.S. Department of Justice published a special report entitled *Chemical Facility Vulnerability Assessment Methodology* (US DOJ 2002), the North American Electric Reliability Council published *Security Guidelines for the Electricity Sector* in 2002 (NERC 2002), and the U.S. Department of Energy (DOE) published the draft *Vulnerability Assessment Methodology for Electric Power Infrastructure* in 2002 (DOE 2002). The energy generation sector is one of 14 areas of critical infrastructure listed by the U.S. Department of Homeland Security. On April 9, 2007, the U.S Department of Homeland Security published in the Federal Register (6 CFR Part 27) an interim final rule requiring that facilities that use or store certain hazardous materials conduct vulnerability assessments and implement certain specified security measures. This rule was implemented with the publication of Appendix A, the list of chemicals, on November 2, 2007. While the rule applies to aqueous ammonia solutions of 20% or greater and this proposed facility plans to utilize a 19% aqueous ammonia solution, staff still believes that all power plants under the jurisdiction of the Energy Commission should implement a minimum level of security consistent with the guidelines listed here.

In order to ensure that neither this project nor a shipment of hazardous material is the target of unauthorized access, staff's proposed Conditions of Certification **HAZ-7** and **HAZ-8** require the applicant to prepare both construction security and operation security plans. These plans would require implementation of site security measures consistent with the above-referenced documents. The goal of these conditions of certification is to provide for the minimum level of security for power plants necessary for the protection of California's electrical infrastructure from malicious mischief, vandalism, or domestic/foreign terrorist attacks. The level of security needed for the AE project is dependent upon the threat imposed, the likelihood of an adversarial attack, the likelihood of success in causing a catastrophic event, and the severity of the consequences of that event. The results of the off-site consequence analysis prepared as part of the RMP will be used, in part, to determine the severity of consequences of a catastrophic event.

In order to determine the level of security, the Energy Commission staff used an internal vulnerability assessment decision matrix modeled after the U.S. Department of Justice Chemical Vulnerability Assessment Methodology (July 2002), the North American Electric Reliability Council's (NERC) 2002 guidelines, the U.S. DOE VAM-CF model, and the U.S. Department of Homeland Security regulations published in the Federal Register (Interim Final Rule 6 CFR Part 27). Staff determined that this project would fall into the category of low vulnerability due to the rural setting and absence of close sensitive receptors. Staff therefore proposes that certain security measures be implemented but does not propose that the project owner conduct its own vulnerability assessment.

These security measures include perimeter fencing and breach detectors, alarms, site access procedures for employees and vendors, site personnel background checks, and

law enforcement contacts in the event of a security breach. Site access for vendors shall 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 fleet and employ only properly licensed and trained drivers. The project owner will be required, through the use of contractual language with vendors, to ensure that vendors supplying hazardous materials strictly adhere to the U.S. DOT requirements for hazardous materials vendors to prepare and implement security plans (as per 49 CFR 172.800) and to ensure that all hazardous materials drivers are in compliance through personnel background security checks (as per 49 CFR Part 1572, Subparts A and B). The compliance project manager (CPM) may authorize modifications to these measures or may require additional measures in response to additional guidance provided by the U.S. Department of Homeland Security, the U.S. DOE, or the NERC, after consultation with both appropriate law enforcement agencies and the applicant.

CUMULATIVE IMPACTS AND MITIGATION

Staff analyzed the potential for the existence of cumulative impacts. A significant cumulative hazardous materials impact is defined as the simultaneous uncontrolled release of hazardous materials from multiple locations in a form (gas or liquid) that could cause a significant impact where the release of one hazardous material alone would not cause a significant impact. Existing locations that use or store gaseous or liquid hazardous materials, or locations where such facilities might likely be built, were both considered. Staff believes that while cumulative impacts are theoretically possible, they are not probable because of the many safeguards implemented to both prevent and control an uncontrolled release. The chances of one uncontrolled release occurring are remote. The chance of two or more occurring simultaneously, with resulting airborne plumes mingling to create a significant impact, are even more remote. Staff believes the risk to the public is insignificant.

The applicant provided a list of existing or planned projects that may result in a cumulative impact and a figure depicting their locations (Avenal Power 2008b Table 6.1-1 and Figure 6.1-1). The nearest project identified by the applicant is the Great Valley Ethanol Project which would be located 27 miles away. At this distance there is no potential for a hazardous materials cumulative impact. Also, the Chemical Waste Management Hazardous Waste Facility is located a significant distance away (estimated by staff as more than 7 air-miles) in the hills southwest of Kettleman City along SR-41. There are no facilities within a one-mile radius of the AE site that have the potential to cause cumulative hazardous materials impacts. The only facility located in the vicinity of the AE site is the Avenal water treatment plant which is adjacent to the site but does not store or use ammonia or other materials with potential off-site impacts (Avenal Power 2008b, Section 6.15.2.3).

The applicant will develop and implement a hazardous materials handling program for AE 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. Therefore, staff concludes that the facility would not contribute to a significant hazardous materials-related cumulative impact.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

One written comment has been received from the Center on Race, Poverty, and the Environment (CRPE) and several verbal comments regarding hazardous materials-related issues at the PSA workshop. These comments generally fall into three categories:

1. The expansion/PCB issues regarding the Chemical Waste Management Hazardous Waste Facility

2. An explosion in Kettleman City approximately six months ago

3. How the Cities of Huron and Kettleman City may be impacted by the project.

Response:

Staff is knowledgeable about the Chem Waste facility and has even toured the site many years ago and investigated the safety programs in place. While not commenting specifically on the proposed expansion of the Class III landfill, the renewal of the PCB permit, and the monitoring of PCBs recently required by Region 9 U.S. EPA, staff is aware that the U.S. EPA has permitted the hazardous waste part of the facility under the federal Resource Conservation and Recovery Act (termed a RCRA Part B Permit), the Superfund Act (CERCLA), and the Toxics Substances Control Act (TSCA) and that Cal-EPA DTSC recently approved an expansion of the Class III area of the facility. Both EPA and DTSC are heavily involved in ensuring that any expansion will be under the most stringent requirements to protect public health, worker safety, and the environment. In regards to any cumulative impact to the public from the Chem Waste site and the Avenal Energy project, staff believes that any cumulative risk or hazard posed by the operation of Avenal Energy will not pose a significant risk to the public. Staff has found no evidence that the Kettleman Hills Facility presents a significant public health risk from exposure to hazardous waste. The proposed Avenal power plant will not cause this insignificant risk to become significant incrementally or cumulatively because the risk posed by the AE project would be well below the level of significance and the distance between the Waste Management facility and the proposed AE is too great.

Staff is aware of the concerns about the safety of any facility that uses natural gas. The explosion in Kettleman City did not involve natural gas but rather propane which is much more explosive than natural gas. As discussed above in the FSA section on Natural Gas, numerous engineering and administrative controls will be required to reduce the risk of impacts to insignificance. Also, while there will be propane-fueled fork lifts on site, the hazard posed by these fork lifts is far below the level of significance and indeed, fork lifts have been using propane fuel for decades without significant risk of fire or explosion due to the precautions taken in an industrial environment.

Staff considered the potential for impacts on the Cities of Huron and Kettleman City in its analysis. However, staff believes that the chances of a major release of hazardous

materials at the Avenal Energy would be insignificant and if it did occur, would not pose a significant impact to the public located in Huron and Kettleman City due to the following factors:

1. The presence of many on-site automated and manual engineering controls and administrative controls to prevent, detect, and contain accidental releases;

2. The requirements of the eight Conditions of Certification; and

3. The distance between the cities and the proposed power plant.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Staff concludes that construction and operation of the AE project would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS) regarding long-term and short-term project impacts in the area of hazardous materials management.

CONCLUSIONS

Staff's evaluation of the proposed project (with proposed mitigation measures) indicates that hazardous material use will pose no significant impact to 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 a Risk Management Plan (RMP). To ensure the adequacy of the RMP, staff's proposed conditions of certification require that the RMP be submitted for concurrent review by the Kings County Environmental Health Department and by Energy Commission staff. In addition, staff's proposed conditions of certification require the review and approval of the RMP by staff prior to the delivery of any hazardous materials to the facility. Other proposed conditions of certification address the issue of the transportation, storage, and use of aqueous ammonia, in addition to site security matters.

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

Staff proposes eight conditions of certification mentioned throughout the text (above), and listed below. Condition of Certification **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in **APPENDIX B** of the staff assessment, unless there is prior approval by the Energy Commission compliance project manager. Condition of Certification **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**) requiring 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 addressing the delivery of all liquid hazardous materials during construction, commissioning, and operations will further reduce the risk of any accidental release not addressed by the proposed spill-prevention mitigation measures and the required RMP. This plan would additionally prevent the mixing of incompatible materials that could result in toxic vapors. Condition of Certification **HAZ-4** requires that the aqueous ammonia storage tank be designed to certain rigid specifications. The transportation of hazardous materials is addressed in Conditions of Certification **HAZ-5** and **HAZ-6**. Site security during both the construction and operations phases is addressed in Conditions of Certification **HAZ-7** and **HAZ-8.**

PROPOSED CONDITIONS OF CERTIFICATION

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

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

HAZ-2 The project owner shall concurrently provide a Business Plan and a Risk Management Plan (RMP) prepared pursuant to the California Accidental Release Program (CalARP) to the Kings County Environmental Health Department (KCEHD) and the CPM for review. After receiving comments from the KCEHD 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 KCEHD for information and to the CPM for approval.

Verification: At least thirty (30) days prior to receiving any hazardous material on the site for commissioning or operations, the project owner shall provide a copy of a final Business Plan to the CPM for approval. At least thirty (30) days prior to delivery of aqueous ammonia to the site, the project owner shall provide the final RMP to the Certified Unified Program Agency 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 thirty (30) days prior to the delivery of any liquid hazardous material to the facility, the project owner shall provide a Safety Management Plan as described above to the CPM for review and approval.

HAZ-4 The aqueous ammonia storage 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 thirty (30) days prior to receipt of aqueous ammonia on site, the project owner shall submit copies of the notification letter to supply vendors indicating the transport vehicle specifications to the CPM for review and approval.

HAZ-6 At least thirty (30) days prior to receipt of any hazardous materials on site, the project owner shall direct all vendors delivering any hazardous material to the site to use only the route approved by the CPM. Trucks will travel on I-5 to the Avenal Cutoff Road to the plant site. The project owner shall obtain approval of the CPM if an alternate route is desired.

Verification: At least thirty (30) days prior to receipt of any hazardous materials on site, the project owner shall submit to the CPM for review and approval copies of notices to hazardous materials vendors describing the required transportation route.

HAZ-7 Prior to commencing construction, a site-specific Construction Site Security Plan for the construction phase shall be prepared and made available to the CPM for review and approval. The Construction Security Plan shall include the following:

1. perimeter security consisting of fencing enclosing the construction area;
2. security guards;
3. site access control consisting of a check-in procedure or tag system for construction personnel and visitors;
4. written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on site or off site;

5. protocol for contacting law enforcement and the CPM in the event of suspicious activity 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-8 The project owner shall also prepare a site-specific security plan for the commissioning and operational phases that will be available to the CPM for review and approval. The project owner shall implement site security measures that address physical site security and hazardous materials storage. The level of security to be implemented shall not be less than that described below (as per NERC 2002).

The Operation Security Plan shall include the following:

1. permanent full perimeter fence or wall, at least eight feet high;

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

3. evacuation procedures;

4. protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency;

5. written standard procedures for employees, contractors, and vendors when encountering suspicious objects or packages on site or off site;

6. A. a statement (refer to sample, **Attachment A**), signed by the project owner certifying that background investigations have been conducted on all project personnel. Background investigations shall be restricted to determine the accuracy of employee identity and employment history and shall be conducted in accordance with state and federal laws regarding security and privacy;

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

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 compliance with 49 CFR 172.880, and that they have conducted employee background investigations in accordance with 49 CFR Part 1572, subparts A and B;

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(s) present 24 hours per day, 7 days per week; **<u>or</u>**

    B. power plant personnel on site 24 hours per day, 7 days per week, and **all** of the following:

        1. the CCTV monitoring system required in item 9, above, shall include cameras able to pan, tilt, and zoom; that have low-light capability, are recordable, and are able to view 100% of the 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. 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 those security plans. The CPM may authorize modifications to these measures, or may require additional measures such as protective barriers for critical power plant components—transformers, gas lines, and compressors—depending upon circumstances unique to the facility or in response to industry-related standards, security concerns, or additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or the North American Electrical Reliability Council, after consultation with both appropriate law enforcement agencies and the applicant.

<u>Verification:</u> At least thirty (30) days prior to the initial receipt of hazardous materials on site, the project owner shall notify the CPM that a site-specific operations site security plan is available for review and approval. In the annual compliance report, the project owner shall include a statement that all current project employee and appropriate contractor background investigations have been performed, and that updated certification statements have been appended to the operations security plan. In the annual compliance report, the project owner shall include a statement that the operations security plan includes all current hazardous materials transport vendor certifications for security plans and employee background investigations.

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 Parts Per Million Ammonia Exposure Criteria

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BASIS FOR STAFF'S USE OF 75 PARTS PER MILLION AMMONIA EXPOSURE CRITERIA

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

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

Hazardous Materials Appendix A Table-1
Acute Ammonia Exposure Guidelines

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

1) (EPA 1987) 2) (NIOSH 1994) 3) (NRC 1985) 4) (NRC 1972) 5) (AIHA 1989)
* The (NRC 1979), (WHO 1986), and (Henderson and Haggard 1943) all conclude that available data confirm the direct relationship to increases in effect with both increased exposure and increased exposure duration.
** The (NRC 1979) describes a study involving young animals, which suggests greater sensitivity to acute exposure in young animals. The WHO (1986) warned that the young, elderly, asthmatics, those with bronchitis, and those that exercise should also be considered at increased risk based on their demonstrated greater susceptibility to other non-specific irritants.

REFERENCES FOR HAZARDOUS MATERIALS APPENDIX A, TABLE 1

AIHA. 1989. American Industrial Hygienists Association, Emergency Response Planning Guideline, Ammonia, (and Preface) AIHA, Akron, OH.

EPA. 1987. U.S. Environmental Protection Agency, Technical Guidance for Hazards Analysis, EPA, Washington, D.C.

NRC. 1985. National Research Council, Criteria and Methods for Preparing Emergency Exposure Guidance Levels (EEGL), Short-Term Public Emergency Guidance Level (SPEGL), and Continuous Exposure Guidance Level (CEGL) documents, NRC, Washington, D.C.

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

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HAZARDOUS MATERIALS
APPENDIX B

Hazardous Materials Proposed for Use at the AE

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Hazardous Materials Appendix B
Hazardous Materials Proposed for Use at the AE

Material	CAS No.	Application	Hazardous Characteristics	Maximum Quantity On Site	Federal RMP Threshold Quantity
Acetylene	47-86-2	Welding	Health: hazardous if inhaled Physical: combustible, flammable	25 pounds	10,000 pounds
Aqueous Ammonia 19% Solution	7664-41-7	NO_X emissions control in SCR	Health: irritation to permanent damage from inhalation, ingestion, and skin contact Physical: reactive, vapor is combustible	122,500 pounds (24,000 gallons)	20,000pounds (for <20% ammonia)
Carbon Dioxide	124-38-9	Generator Purging Dissolved	Health: asphyxiant Physical: pressure	2,920 pounds (25,200 scf)	NA
Carbon Dioxide	124-38-9	Fire Suppression	Health: asphyxiant Physical: pressure	24,000 pounds	NA
Carbon Dioxide	124-38-9	HRSG Cleaning	Health: asphyxiant Physical: pressure	Not stored on-site (cleaning performed by contractor)	NA
Carbonic Dihydrazide	497-18-7	Boiler Feed Water Dissolved Oxygen Control	Health: Irritant Physical: none	3,400 pounds (400 gallons)	NA
Cyclohexylamine	108-91-8	Boiler Feed Water Corrosion Control	Health: skin irritant, corrosive toxicity Physical: flammable	450 pounds (55 gallons)	NA
Diesel Fuel	68476-34-6	Firewater Pump Engine	Health: none Physical: flammable	1,060 pounds (150 gallons)	NA
Ethylene Glycol	107-21-1	Antifreeze for Closed Cooling Water System and in Inlet Air Chillers	Health: chronic toxicity Physical: moderate flammability, explosive	12,550 pounds (1,458 gallons)	NA
Hydrogen	1333-74-0	Generating Cooling Steam Turbine	Health: none Physical: flammable, pressure, explosive	75 pounds (14,200 scf)	10,000 pounds
Light Petroleum Distillers	8002-05-9	Solvent For Cleaning	Health: none Physical: flammable	310 pounds	
Lubrication Oil	None	Mechanical Equipment	Health: hazardous if ingested Physical: may be flammable/combustible	97,000 pounds (6,200 gallons)	42 gallons
Mineral Insulating Oil	None	Electrical Transformers	Health: hazardous if ingested Physical: may be flammable/combustible	412,830 pounds (15,000 gallons)	42 gallons

Material	CAS No.	Application	Hazardous Characteristics	Maximum Quantity On Site	Federal RMP Threshold Quantity
Morpholine	110-91-8	Boiler Feed Water pH Control	Health: acute toxicity, corrosive skin irritant Physical: flammable	450 pounds (55 gallons)	NA
Natural Gas	None	Gas Turbine Generator and Duct Cleaning Fuel	Health: none Physical: flammable, pressure	1,300 pounds	NA
Nitrogen	7727-37-9	Blanketing	Health: none Physical: pressure	200 scf	
Propane	74-98-6	Forklift Fuel	Health: none Physical: flammable, pressure, explosive	50 pounds	10,000 pounds
Sodium Sulfite	7757-83-7	Auxiliary Boiler Treatment, Oxygen Scavenging	Health: acute and chronic toxicity Physical: reactive irritant	570 pounds (55 gallons)	NA
Sulfuric Acid 29.5%	7664-93-9	Station and Gas Turbine Batteries	Health: acute and chronic toxicity Physical: reactive and corrosive	17,640 pounds (1,500 gallons)	NA

Source: Avenal Power 2008b Table 6.15-1

LAND USE

Testimony of David Flores

SUMMARY OF CONCLUSIONS

As provided in this land use analysis, the proposed project is consistent with the City of Avenal's General Plan and zoning designation. Staff has provided conclusions of conformity and conditions of certification that would bring the Avenal Energy project in conformity with the City of Avenal municipal code.

Energy Commission staff concludes that the Avenal Energy project would not:

- Result in any impacts to existing agricultural operations or future use in the area;
- Physically disrupt or divide an established community;
- Conflict with any applicable habitat conservation plan or natural community conservation plan; or
- Result in unmitigated project-related impacts on surrounding land uses.

INTRODUCTION

The land use analysis of the Avenal Energy project focuses on the project's consistency with land use plans, ordinances, regulations, and policies, and the project's compatibility with existing or reasonably foreseeable[1] land uses. In addition, a power plant and its related facilities generally have the potential to create impacts in the areas of air quality, noise, dust, public health, traffic and transportation, and visual resources. These individual resource areas are discussed in detail in separate sections of this document.

[1] "Reasonably foreseeable" is defined in the California Environmental Quality Act (CEQA) as approved projects under construction; approved related projects not yet under construction; unapproved (planned) projects, with related impacts, currently under environmental review; and projects under review by the Lead Agency or other relevant public agencies. Planned developments, such as those identified in an airport Master Plan, may also be considered, provided there is evidence that measures are actually being taken to implement the plans. The analysis must also take into consideration the most probable development patterns and future activities that are a reasonably foreseeable consequence of the initial project.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

The following table contains all land use LORS applicable to the proposed project.

Land Use Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	None
State	None
Local	
City of Avenal	
General Plan	The California Government Code (Section 65302a) mandates a land use element designating the proposed general distribution, general location and extent of uses of the land. State requirements are implemented through the Avenal General Plan and Avenal Municipal Zoning Ordinance. The Avenal Energy project site is designated Industrial by the General Plan.
Municipal Code	The 148-acre site is zoned Heavy Industrial (M-2) by the Avenal Municipal Code (AMC). Zoning Ordinance Section 9.31 specifies uses permitted in an industrial district, subject to the approval of a conditional use permit (CUP). A Site Plan Review is required of all CUP applications, following Zoning Ordinance Chapter 27 procedures. The Project would require a CUP and Site Plan Review under the Zoning Ordinance, except that state law provides for certification of power plant sites by the Energy Commission in lieu of any local requirements. City of Avenal property development standards are defined in Chapter 17 of the Zoning Ordinance. Standards for street improvements, off-street parking, trash enclosures, utilities, landscaping, fencing, and sign standards for industrial areas are identified Zoning Ordinance Sections 17.02, 17.03, 17.04, 17.05, 17.06, 17.07, 17.08 and 17.09.
Fresno County	
Land Use Policies	The Fresno County General Plan policies, guidelines and standards apply to land use development within unincorporated areas of Fresno County. The Project would include approximately 200 feet of water pipeline in Fresno County that would connect an existing well to the site for standby water supply. Under the Fresno County General Plan, non-agricultural uses in areas zoned for agricultural uses are permitted so long as those uses do not diminish agricultural production capacity, economic viability, or detrimentally impact surrounding agricultural operations to the extent that further losses in production may occur. (Fresno County General Plan, 1988, Sec. 204-02.).

Applicable Law	Description
King County	
Land Use Policies	The Kings County General Plan policies, guidelines and standards apply only to land use and development within the unincorporated territory of the County. They do not apply to development within the City of Avenal. The City and the County work together to develop complementary planning documents. However, the County does not have land use authority in the City. The only project land use that would occur on unincorporated lands is the 1.6-mile water pipeline from the existing ground water wells located north of the site along the San Luis canal.

SETTING

The site is located within the city limits of Avenal, on the west side of the San Joaquin Valley, approximately two miles east of Interstate 5 (see **Land Use Figure 1-Regional Map**). Avenal is located in Kings County, just southwest of the Fresno County line. The region is predominantly rural. East of Interstate 5, agriculture is the primary land use. West of Interstate 5, the Kettleman Hills and other uplands are primarily open space with grazing and oil/gas development. The region overall has a low population density. Lands throughout the region have been extensively disturbed by agriculture east of Interstate 5, and by oil exploration/production, grazing and other activities west of Interstate 5.

The Avenal Energy project site is located on industrially zoned lands that are physically separated from the residential and business districts of the City of Avenal by a distance of approximately six miles, and the intervening topography of the Kettleman Hills. The industrial zone extends from the Kettleman compressor station near Interstate 5 to the city's water treatment plant at the northeast corner of the city. The city zoned these lands “Industrial”, in part to take advantage of the bulk natural gas supply available from the compressor station and the access from Interstate 5. In addition, the city's industrial area is also beneficially located from the perspective of proximity to an electrical transmission corridor to the west of the site, and ready transportation to San Francisco or Los Angeles. Therefore, the Avenal Energy project is consistent with the city’s general plan and zoning requirements in developing in an industrial area that provides the city with a tax and employment base that is remote from the city residential and business districts. While the site is designated and zoned “Industrial”, it is currently in use for production of row crops. It has been farmed for approximately 50 years.

The applicant negotiated a purchase of 148 acres of a 608-acre parcel with the landowner. The recordation of a parcel split, pursuant to the Subdivision Map Act was completed on October 2, 2007. The Avenal Energy project would be built on approximately 34.8 acres of a 148 acre parcel. An additional approximately 39.3 acres onsite would be temporarily used for construction laydown.

Once construction is completed, the portions of the parcel outside the permanent disturbance footprint would be returned to row crops in accordance with the conceptual landscape plan (see the **VISUAL RESOURCES** section of this FSA). Orchard trees would be planted along the site access road to the northwest of the power plant. Ornamental trees are planned north of the power block and at the site entrance gate.

GENERAL PLAN LAND USE DESIGNATIONS AND ZONING WITHIN THE ONE-MILE RADIUS OF THE PROJECT STUDY AREA

The Avenal Energy project plant site and construction laydown location, and all linear facilities are located within the Avenal General Plan Area boundaries and zoned Industrial, with a General Plan land use designation of Industrial "I", as defined in the City of Avenal General Plan.

Land Use Tables 2 and **3** and **Land Use Figures 2 and 3** show the general plan and zoning designations within a one-mile radius of the proposed project site, excluding the transmission line corridor.

Land Use Table 2
General Plan Land Use Designations within the One-Mile Radius Project Study Area

Direction	Jurisdiction	Designation
North	Kings County	General Agricultural
South	City of Avenal	Industrial
East	Kings County	General Agricultural
West	City of Avenal	Industrial

Source: AEP2008a, AFC pg. 6.9.3

Land Use Table 3
Zoning Designations within the One-Mile Radius Project Study Area

Direction	Jurisdiction	Designation
North	Kings County	General Agricultural
South	City of Avenal	Heavy Industrial
East	Kings County	General Agriculture
West	City of Avenal	Heavy Industrial

Source: AEP 2008a, AFC pg. 6.9.3

The proposed interconnection with the existing PG&E transmission grid would consist of constructing a new transmission line from the onsite switchyard to the Gates Substation. This line would consist of approximately 6.4 miles of new single–circuit 230- kV line that would follow the route shown on **Land Use Figure 4**. The new transmission line would be located within a 120-foot wide right-of-way. The electrical transmission line interconnection is located partially within the City of Avenal on industrial zoned lands and partially in Fresno County on lands zoned Agricultural. Electrical transmission lines are a permitted use in agricultural lands in the Fresno Zoning regulations.

On April 3, 2009, the applicant indicated by letter that the Gates Substation will be expanded outside the fence line to accommodate Avenal's 230kV interconnection. The surrounding land uses around the perimeter of the substation are zoned agriculture. Within the agricultural zones, substations are an allowable use; therefore the expansion of the substation will not be in conflict with surrounding General Plan and Zoning requirements.

The proposed 20-inch natural gas line would be 2.5 miles in length, and installed underground. The line would be from the existing PG&E Lines 300 A/B to the PG&E Kettleman compressor station located southwest of the project site (See **Land Use Figure 2** for proposed natural gas route).

Water for the project would be secured through an agreement with the City of Avenal to convey water via their existing turnout on the San Luis Canal located adjacent to the Avenal Energy project site.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Energy Commission staff has analyzed the information provided in the AFC and acquired from other sources to determine consistency of Avenal Energy with applicable local laws, ordinances, regulations, and standards related to land use and the potential for the Avenal Energy project to have significant adverse land use-related impacts. Staff has also assessed mitigation measures proposed by the applicant and conditions developed by staff to reduce any potential impacts to a less than significant level, as well as the feasibility and enforceability of those proposed mitigation measures and recommended conditions of certification.

METHOD AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

State/CEQA

Significance criteria used in this document are based on the CEQA Guidelines and LORS utilized by other governmental agencies. Land use impacts may be considered significant if the project would:

- Conversion of Farmland
  - Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.
  - Conflict with existing zoning for agricultural use or a Williamson Act contract.
  - Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural uses.
- Physically disrupt or divide an established community.
- Conflict with any applicable habitat conservation plan or natural community conservation plan.
- Preclude, interfere with, or unduly restrict existing or future permitted uses.

- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction, or that would normally have jurisdiction, over the project. This includes, but is not limited to, a General Plan, community or specific plan, local coastal program, airport land use compatibility plan, or zoning ordinance.
- Have individual environmental effects which, when considered with other impacts from the same project or in conjunction with impacts from other closely related past, present, and reasonably foreseeable future projects, are considerable, compound, or increase other environmental impacts.

In general, a power plant and its related facilities may also be incompatible with existing or planned land uses, resulting in potentially significant impacts, if it creates unmitigated noise, dust, or a public health or safety hazard or nuisance; or results in adverse traffic or visual impacts. Please see other sections of this document, as noted, for a detailed discussion of any additional potential project impacts, recommended mitigation, and conditions of certification.

The **CONFLICT WITH ANY APPLICABLE LAND USE PLAN, POLICY, OR REGULATION** section provides a summary of the consistency of the Avenal Energy project with the applicable land use LORS adopted by the City of Avenal, Kings County, and Fresno County as identified in **Land Use Table 1**. Conditions of certification have been proposed to make the project consistent with the LORS, where necessary.

Based on Energy Commission staff's independent review of the AFC and local Municipal Code, staff has determined that the project would comply with all land use LORS for the City of Avenal, Kings County and Fresno County. Energy Commission staff has proposed Condition of Certification **LAND-1** as a means of verifying that the project, if certified, would be built, in accordance with the city's minimum Industrial Zoning District standards.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Power Plant Site

The City of Avenal Planning Department prepared and adopted the 1992 and 2005 General Plan that increased the industrial planning area that extends from the Kettleman compressor station near Interstate 5 to the City's water treatment plant at the northeast corner of the city. The City also zoned these lands industrial in part to take advantage of the bulk natural gas supply available from the compressor station and the access from Interstate 5.

The proposed project would be erected on a site that is currently being used for agricultural purposes. The proposed Avenal Energy project site has no potential to physically divide the existing community. The site is located in a designated industrial area in the City of Avenal. The power plant would be located entirely on private property and neither the size nor nature of the project would result in a physical division of an established community. No new physical barriers would be created by the project (public access across the site is not currently allowed) and no existing roadways or

pathways would be blocked. Given its location, the project would not alter existing residential, recreational, commercial, institutional, and other industrial land use patterns in the area.

The proposed Avenal Energy project site would comply with the City of Avenal's LORS. The proposed project is appropriately sited in an area designated for industrial development in the General Plan. The city's General Plan policies concerning the industrial corridor are generally supportive of new industrial projects for economic development reasons, rather than restrictive or prohibitive. Staff has concluded that the proposed project does not conflict with any of the relevant land use policies contained in the Avenal General Plan.

Power plants are not specifically listed as a permitted use in the Heavy Industrial "M-2" District, and this zoning district is the City's intensive industrial zoning category, permitting a range of light and heavy industrial uses, including public utility facilities. See the **COMPLIANCE WITH LORS** section of this analysis on the city's interpretation of this matter. The project complies with all of the applicable development standards (lot, and yard requirements) set forth in the Zoning Ordinance for the "M-2" District.

The proposed project represents further development of a site which already includes general industrial facilities in the area

The construction laydown area for Avenal Energy project is immediately west of the project site, which is part of the existing power plant site, and would not conflict with existing or planned land uses in this industrialized area. Temporary construction-related impacts at the project site, such as increased noise and dust, may affect adjacent land uses. With applicant and staff proposed mitigation, these construction impacts are not expected to be significant. Please see the **AIR QUALITY** and **NOISE** sections of this Preliminary Staff Assessment (PSA) for discussions of impacts and mitigation. Staff has found that operation of the Avenal Energy project would not cause significant, unmitigated adverse noise, dust, public health hazard or nuisance, or traffic impacts on nearby land uses.

Agricultural Resources

The City of Avenal prepared an update to the Avenal General Plan in 1992 and a subsequent update in 2005. The 1992 General Plan update authorized the conversion of 510 acres of agricultural land, which were designated as prime farmland from agricultural land to urban (non-agricultural uses). The Avenal Energy project site is located within the area that was converted from agricultural to non-agricultural use by the 1992 General Plan Update;

Prior to adopting the General Plan Update, the City of Avenal prepared, pursuant to CEQA, a Notice of Preparation, Draft EIR and an Environmental Assessment circulated for public review. The Draft and Final EIR, together with the Master Environmental Assessment, contain a detailed discussion of the impacts of the proposed conversion of 510 acres of land from agricultural to urban use.

The project would permanently occupy approximately 34.8 acres of land onsite that is designated as prime farmland by CDC and is currently used for agricultural production;

however the project is consistent with current industrial land use and zoning designations. Conversion of 766 acres of prime and non-prime farmland to industrial uses as a result of planned growth, including the proposed site for the project, had been considered by the city as a result of adoption of its 1992 General Plan Update. The City identified in the EIR the loss of prime agricultural land as significant and unavoidable, and as a result, a Statement of Overriding Considerations was adopted by the Avenal City Council in conjunction with certification of the EIR.

The Avenal City Council actions with respect to the General Plan Update, Final EIR, and Statement of Overriding Considerations, were supported by substantial evidence in the record, including relevant public testimony received at public meetings and workshops. However, because the City Council's action finding mitigation infeasible involved substantially more land then is being analyzed here, staff believes it is appropriate to determine whether physical conversion of farmland proposed by this development should be mitigated. Pursuant to staff's request the applicant has agreed to offset the impact by preserving prime farmland at a 1:1 ratio for the project's permanent disturbed acreage. This mitigation would be implemented via the adoption of staff's proposed condition of certification **LAND-2**.

There are properties adjacent to the Avenal Energy project site that is mapped as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance by the California Department of Conservation's Farmland Mapping and Monitoring Program (FMMP). The Avenal Energy project would require off-site linear facilities, but they would not bring about any changes in the environment that could result in the conversion of farmland to nonagricultural use. Therefore, the proposed project off-site linear facilities would not result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to a nonagricultural use or conflict with existing agricultural zoning or Williamson Act contracts. The project's linear facilities would have no impact with respect to farmland conversion.

Conversion of Prime Farmland

CEQA guidelines allow a lead agency the option of using the Important Farmland Maps prepared by California Department of Conservation (CDC) or the LESA (California Agricultural Land Evaluation and Site Assessment Model) to determine the level of significance for agricultural environmental impact when a CEQA analysis for farmland conversion is required. Energy Commission staff consulted CDC Important Farmland Maps as a means to identify whether the proposed project would impact important farmlands. The power plant and related facilities would be located on lands designated as Prime Farmland by CDC.

Since the proposed project site is designated as Prime Farmland by CDC maps, Energy Commission staff used the LESA Model to help determine the agricultural value of resources potentially impacted by the proposed project. The LESA Model was developed to provide lead agencies with an optional evaluation method to ensure that potentially significant effects of agricultural land conversions are quantitatively and consistently considered in the environmental review process (Public Resources Code, section 21095).

The LESA Model is composed of six different factors. Two “Land Evaluation” factors are based upon measures of soil resource quality. Four “Site Assessment” factors provide measures of a given project’s size, water resource availability, surrounding agricultural lands, and surrounding protected resource lands. For a given project, each of these factors is separately rated on a 100 point scale. The factors are then weighted relative to one another and combined, resulting in a single numeric score for a given project, with a maximum attainable score of 100 points. It is this project score that becomes the basis for making a determination of a project’s potential significance, based upon a range of established scoring thresholds. As reflected in the LESA model’s scoring thresholds table, 0 to 39 points is not considered significant, 40 to 79 points can be significant based on certain criteria on the final threshold scoring table, and 80 to 100 points is considered significant.

Staff completed a LESA Model worksheet for the 34.8 acres which constitutes the project site and permanent facilities (see **APPENDIX LU-1**) to evaluate the agricultural value or resources impacted by project facilities. To conduct analysis of impacts, the following governmental resources were consulted or used to complete the LESA Model Worksheet:

1. United States Department of Agriculture (USDA), Natural Resources Conservation Service Web Soil Survey, 2008 (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx)

   The Web Soil Survey mapped the types of soils for the site;

2. USDA Soil Survey for Kings County, California, 2008

   The Soil Survey report was consulted to determine the land capability level and Storie Index. The storie index is a method of soil rating and is based on soil characteristics that govern the land’s potential utilization and productive capacity and;

3. California Department of Conservation (CDC), Farmland Mapping and Monitoring Program and the Important Farmland Map for Kings County that designates the subject parcels as Farmland of Local Importance.

The LESA Model score generated for the project’s potential conversion of 34.8 acres was over 85.25 points. A score of over 80 points is considered significant as shown on Table 9 California Agricultural LESA Model, Instruction Manual, Section IV Scoring Thresholds. The following criteria from the LESA model was used to determine the final model score of 85.25 points:

- land capability classification;
- the soil’s Storie index rating;
- project size;
- water resources availability;
- surrounding agricultural land; and
- surrounding protected resource land.

The proposed project site is zoned industrial, by the City of Avenal. The project site is surrounded by property zoned industrial as well as General Agricultural and agricultural preserved zoned lands **(see Land Use Table 2**).

As indicated in this analysis, the Avenal Energy Project does comply with the applicable zoning designation, but would result in the physical conversion of approximately 34.8 acres of land that is` designated as "Prime Farmland" by the California Department of Conservation. The project site, switch yard and storm water evaporative/percolation basin are currently being used for agricultural crops. These areas of land for the project site and evaporative ponds meet the Department of Conservation's criteria for prime farmland, in that it has been farmed and currently is being farmed and irrigated within the last five years, and has the required productive soil characteristics. The applicant has agreed to offset this impact to agriculture by preserving prime farmland at a 1:1 ratio for the projects permanent disturbed acreage. Proposed Condition of Certification **LAND-2** will implement this mitigation.

Physical Division of an Existing Community

The proposed Avenal Energy project site is located in the northeastern corner of the City of Avenal. The power plant would be located entirely on private property, on an existing parcel. The proposed project site is designated for development in the Avenal General Plan as an Industrial area. The power plant facilities and adjacent construction parking and laydown areas would take access from existing roadways or roads planned for construction in conjunction with the power plant and other nearby projects. No existing roadways or pathways would be blocked or removed from service. Reclaimed and back-up water supply, wastewater disposal line and natural gas pipeline connections would be undergrounded within the City of Avenal's road right-of-way. Neither the transmission nor utility lines would present a new physical barrier within the community as they would be installed within established transmission corridors. Arrival and departure of construction personnel and delivery of materials and supplies would occur along existing roadways and would not significantly contribute to existing traffic congestion (see Condition of Certification **TRANS-1** in the **TRAFFIC AND TRANSPORTATION** section of this staff assessment).

Staff does not expect temporary construction related effects, such as dust and noise, to impact adjacent land uses. Please see the **AIR QUALITY** and **NOISE AND VIBRATION** sections of this document for a complete discussion of construction impacts and mitigation. Therefore, implementation of the proposed project would have a less than significant impact on community transportation or interaction and would not divide the community.

Conflict with any Applicable Habitat or Natural Community Conservation Plan

The proposed project site is not subject to any Habitat or Natural Community Conservation Plan or located within the boundaries of any wildlife preserve or critical habitat area.

Conflict with any Applicable Land Use Plan, Policy or Regulation

As required by California Code of Regulations, Title 20, section 1744, Energy Commission staff evaluates the information provided by the applicant in the AFC to determine if elements of the proposed project would conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project, or that would normally have jurisdiction over the project except for the Energy Commission's exclusive authority. This includes all applicable federal, state, and local laws, ordinances, regulations, and standards, including those adopted by the City of Avenal and Kings County. From a CEQA perspective, the analysis places particular emphasis on any environmental effect that may be avoided or mitigated by conformity with the applicable LORS.

City of Avenal General Plan

Except for a portion of the transmission line and a short segment of water pipeline, all properties that Avenal Energy facilities would occupy, would be within the City of Avenal jurisdictional boundaries and would, therefore, be subject to the current City of Avenal LORS, including the City of Avenal General Plan (2005), Municipal (Zoning) Code, and permitting requirements, except for the Energy Commission's exclusive jurisdiction.

The Avenal General Plan contains the seven required elements, identified in Government Code, section 65302, including Land Use, Circulation, Conservation, Open Space, Noise and Safety. It also contains three non-mandatory elements, including the Scenic Highway and Historic Preservation Elements. The City of Avenal General Plan is the basis for determining acceptable land uses and related park, road, and other infrastructure needs within the City of Avenal. The Land Use Element designates the general distribution, location and extent of various land uses, such as housing, business, industry, open space, agriculture, natural resources, recreation, and enjoyment of scenic beauty, education, public buildings and grounds, solid and liquid waste disposal facilities, and other public and private uses of land. It also includes a statement of population density and building intensity for the various land use districts and identifies areas covered by the plan which are subject to flooding.

The general land use goals for the Avenal community are intended to guide the development of the city as a balanced community, with residential, commercial, and industrial development; a diversified economic base; adequate city services and infrastructure; and development standards which result in an aesthetically pleasing environment that reflects community needs.

Project Compliance: The Avenal Energy project site is zoned as Heavy Industrial "M-2", as provided in the Avenal Zoning and "I" in the General Plan. The Avenal Energy project site is located in an area that is industrialized with various types of industrial uses (i.e., Kettleman compressor station, regional transmission line corridor, and the City of Avenal potable water treatment plant). This area allows "public utility" uses, which the city has determined includes power plants. The project would meet the necessary requirements under the zoning and general plan as it relates to setback, landscaping, and development standards. Therefore the Avenal Energy project is consistent with

Policies and Goals in that the project would meet the appropriate setback requirements for the industrial zone, and security fencing would be appropriate in providing security to the Avenal Energy project facility.

City of Avenal Municipal Code – Planning and Zoning

Chapter 9 of the Avenal Municipal Code contains ordinances that deal with planning and zoning standards, requirements, and restrictions. Article 1 of this chapter, also known as the Avenal Zoning Ordinance, specifically provides regulations that implement the goals, objectives, and policies of the Avenal General Plan, pursuant to the mandated provisions of the State Planning and Zoning Law, CEQA, and other applicable state and local requirements. While the proposed project is subject to all applicable Avenal Municipal Code requirements, the sections of the Avenal Zoning Ordinance that apply specifically to the land use aspects of the proposed project are discussed below. Additional City of Avenal code requirements are addressed in other technical sections of this staff assessment.

Section 9 Specific Zoning Requirements:

This section of the municipal code has no building height restrictions.

Title 18.10 Maximum Lot coverage

This title of the zoning code requires a maximum Floor Area Requirement (FAR) of 0.35 to 0.50. This corresponds to maximum lot coverage for a one story building of 50%. The Avenal Energy project site will comply with the required density.

Industrial Zoning District “I”

Areas designated for industrial development within the Avenal General plan boundaries are identified as Industrial “I”. The Heavy Industrial “M-2” designation is intended to accommodate a broad range of industrial activities and development consistent with the uses and regulations set forth in Chapter 18 of the Avenal Municipal Code.

The proposed project site is designated Industrial “I”, which is consistent with the Industrial General Plan Land Use designation. Section 6 of the Avenal Municipal Code (AMC) identifies the uses allowed, development standards and restrictions, and minimum design and performance standards for projects within the Industrial Zoning District. This section also states that buildings in the industrial zone have a height limitation of 100 feet unless permitted under a conditional use permit. The Northeast Specific Plan designates the project site as industrial, but indicates that land uses are implemented consistent with the city’s requirements for “M-2” districts.

Kings County

The only project land use that would occur on unincorporated land is the water pipe from the existing ground water wells located north of the site. This use is consistent with the Kings County General Agriculture land use designation and with the existing agricultural land uses surrounding the site, as this use would not harm long-term agricultural use as directed by the Land Use Element of the Kings County General Plan (Kings Co. General Plan, 1993, LU-10 & 11).

Kings County has implemented a good neighbor policy between agricultural and nonagricultural property owners. (Kings County General Plan- LU-9.) Essentially, this principle allows for nonagricultural industrial types of uses, which are not inconsistent with the continued viability of the farmland conducted on land zoned as General Agricultural. Because the proposed pipeline would not interfere with the surrounding farming activity, that pipeline is consistent with the General Agricultural designation.

Fresno County

The Avenal Energy project would include approximately 200 feet of water pipeline in Fresno County that would connect an existing well to the site for standby water supply. The short segment of subsurface water pipe would not detrimentally affect the agricultural uses surrounding the site, and therefore, the pipeline is permitted in Fresno County. The pipeline may be subject to additional regulations with regard to its proximity to the San Luis Canal. These would not be applicable to land use, and are discussed in detail in the **SOILS AND WATER RESOURCES** section of this Final Staff Assessment (FSA).

Even though local permits are not needed for projects under Energy Commission jurisdiction, in June 2001, the Avenal Planning Commission and City Council approved a Conditional Use Permit (CUP) and a variance (Avenal Energy AFC Appendix 6.9-1) under Zoning Ordinance Section 28 that allowed the original Avenal Project to be constructed with structures up to 200 feet in height. The CUP has since expired.

The applicant discussed the use permitting requirements with the City of Avenal planning staff. City of Avenal planning staff indicated that in evaluating the project, they would review the proposed use, the surrounding land uses, and any deviations to the development standards of the zone district. The following use permit findings are required in order to approve any deviations to adopted development standards:

1. The proposed use is desirable for the public convenience or welfare;

   Project Conformance: As discussed in this analysis, The Avenal Energy project would be consistent with the intent of the Avenal General Plan to promote an orderly development and establish a balanced and functional mix of land uses consistent with the goals and objectives of the specific plan. The project would provide an additional source of energy supply to the community of Avenal and immediate surrounding communities.

2. The proposed use will not impair the character and integrity of the zoning district and surrounding area;

   Project Conformance: The project site is located in an industrial setting and does not currently adjoin an existing residential, interim residential, recreation, agricultural residential, interim agricultural zones, office-residential mix, commercial, or an office zone.

   *Staff has proposed Condition of Certification **LAND-1** to ensure compliance with the remaining property development regulations within the "I" Industrial Zone (i.e, signage requirements, landscaping, loading; fencing; parking requirements - Sec.9.31) of the City of Avenal regulations.*

3. The proposed use will not be detrimental to the public health, safety, or general welfare of the citizens of the City of Avenal;

   Project Conformance: The public health analysis indicates that the construction and operation of the project is not expected to generate a significant adverse cancer or short- or long-term non-cancer health effects from project toxic emissions. Staff's analysis of potential health impacts from the proposed project 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 project would not contribute significantly to morbidity or mortality in any age or ethnic group residing in the project area. For a more detailed discussion, see the ***PUBLIC HEALTH*** *section of this staff assessment.*

   The purpose of the Energy Commission's conditions of certification is to prevent adverse affects that a project may generate to the public health, safety and welfare. The proposed project has conditions of certification from approximately twenty technical areas. In addition to the ***PUBLIC HEALTH*** *section, also see the* ***AIR QUALITY, SOIL AND WATER RESOURCES****, and* ***NOISE AND VIBRATION*** *sections of this staff assessment.*

4. That the size and shape of the site proposed for the use is adequate to allow the full development of the proposed use, and will not impair the integrity or character of the area or be detrimental to the public health, safety or general welfare;

   Project Conformance: The purpose of the Energy Commission's conditions of certification on a project is to prevent adverse effects to the public health, safety and welfare. The project's parcel size and shape is adequate to provide sufficient development of the project components, and would provide agricultural buffers to protect surrounding agricultural uses. Staff does not expect any significant adverse public health impacts from the operation of the project (please refer to the ***PUBLIC HEALTH*** *section of the PSA). Staff has also found that the project would not cause any significant unmitigated impacts as a result of the handling (including transportation) of hazardous materials, (please refer to the* ***HAZARDOUS MATERIAL HANDLING*** *section of the PSA).*

Operation of the power plant would generate an insignificant amount of vehicle traffic and would not adversely affect the levels-of-service on roadways in the vicinity of the project. Please see the **TRAFFIC AND TRANSPORTATION** section of the PSA.

Conditions of certification are basically comprised of two components; mitigation measures required by CEQA and requirements that the project comply with state or local LORS. For this project, Energy Commission staff reviewed city LORS for applicability to the project and proposed conditions of certification on the project to make the project comply or conform accordingly to the identified city LORS.

Chapter 18.60 Off-Street Parking Ordinance

As provided in this chapter, public utility facilities, including electrical substations must provide one parking space for each employee during the shift of maximum employees

plus additional parking spaces as prescribed by the Community Development Agency. The applicant would comply with the off-street parking ordinance by providing sufficient parking for approximately 25 permanent employees. Staff has proposed condition of certification **LAND-1** to ensure compliance with the off-street parking ordinance (Chapter 9).

Land Use Compatibility

The project and related appurtenances would be located within the City of Avenal, Kings and Fresno County boundaries, in an area that supports industrial activities (see **Land Use Figure 2**). The proposed project site has a General Plan land use designation of "I" Industrial. The project is consistent with other uses currently permitted within that land use designation, provided all requirements for a conditional use permit are met. Surrounding properties are proposed primarily related industrial. As noted in the discussion above, the primary purpose of the Industrial Zoning District "I" designation is to identify and encourage industrial development in areas suitable for this type of use.

When a jurisdictional authority, such as the City of Avenal, establishes zoning districts, it is that agency's responsibility to ensure the compatibility of adjacent zoning districts and permitted uses, and incorporate conditions and restrictions that ensure those uses would not result in a significant adverse impact ("minimum of detriment") to surrounding properties. Therefore, staff assumes that permitted industrial uses or those deemed equivalent to a permitted use sited on properties zoned "I" are compatible with surrounding uses and zoning districts. Those uses operating under a valid use permit would also be considered compatible.

Energy Commission staff has determined that, as discussed in other sections of this document, the Avenal Energy project would not result in unmitigated project-related impacts to surrounding properties. (See the **AIR QUALITY, HAZARDOUS MATERIALS, NOISE, PUBLIC HEALTH, TRAFFIC AND TRANSPORTATION,** and **VISUAL RESOURCES** sections of this document for a complete discussion of noise, dust, public health hazards or nuisance; and adverse traffic or visual impacts.)

Sensitive Receptors

A proposed siting location may be considered inappropriate if a new source of pollution or hazard is located within close proximity to a sensitive receptor. From a land use perspective, sensitive receptor sites are those locations where people who would be more adversely affected by pollutants, toxins, noise, dust, or other project-related consequence or activity are likely to live or gather. Children, those who are ill or immune-compromised, or the elderly are generally considered more at risk from environmental pollutants. Therefore, schools, along with day-care facilities, hospitals, nursing homes, and residential areas, are considered to be sensitive receptor sites for the purposes of determining a potentially significant environmental impact. Depending on the applicable code, close proximity is defined as "within 1000 feet" of a school (California Health & Safety Code, section 42301.6-9) or within 0.25 mile of a sensitive receptor, under CEQA. Proximity is not necessarily the deciding factor for a potentially significant impact, but is the threshold generally used to require further evaluation.

There are no schools, childcare, hospitals, or medical facilities, or residences within a one-mile radius of the Avenal Energy project site. Residences are not a permitted use in the M-2 Zoning District, except for on-site living quarters for security personnel. In addition, staff has concluded that the Avenal Energy project would not pose a significant public health hazard to sensitive receptors in the general vicinity of the project site (please see the **PUBLIC HEALTH** section).

CUMULATIVE IMPACTS AND MITIGATION

A cumulative impact consists of an impact that is created as a result of the combination of the proposed project together with other projects causing related impacts. When the proposed project is viewed together with the effects of other projects in the area, cumulative impacts may be significant. Currently, there are no trends in zoning changes or proposals for future developments in and around the project site.

RESPONSE TO AGENCY COMMENTS

DEPARTMENT OF CONSERVATION

As discussed earlier in this analysis, the Department of Conservation submitted a letter dated April 4, 2008 responding to the AFC for the Avenal Energy project. In their response letter, they requested a discussion of the location and extent of prime farmland in and adjacent to the project area. They also requested a discussion of current and past agricultural use of the project area, and data on the types of crops grown, and crop yields and farmgate sales values. The Department also requested that a Land Evaluation and Site Assessment (LESA) be prepared to determine environmental significance of project specific impacts on farmland. See staff response to their request in the Conversion of Prime Farmland section of this analysis.

PUBLIC COMMENTS

At the February 18, 2009 Preliminary Staff Assessment workshop, public comments regarding the potential impact of the project on area residents were discussed. From a land use perspective, the City of Avenal has effectively zoned the industrial area where the project will be located to minimize impacts on residents. The City's designated Industrial Zone is located in the unpopulated northeast corner of the City, several miles from City's population center and separated from it by the intervening topography of the Kettleman Hills. Surrounding lands outside the City limits are unincorporated farmland with the closest population centers in addition to Avenal being Huron approximately eight miles to the north and Kettleman City approximately 10 miles to the south. Land zoning and current land uses effectively isolate the site from any population centers."

CONCLUSIONS AND RECOMMENDATIONS

The City of Avenal's General Plan Land Use Element establishes the area that includes the Avenal Energy project site as an area planned for industrial uses. The City of Avenal

General Plan emphasizes the importance of industrial uses over other uses to improve the economic base of the city. Furthermore, the Avenal Energy project meets the following criterion:

- The Avenal Energy project would not physically disrupt or divide an established community or conflict with any applicable habitat conservation plan or natural community conservation plan or conflict with existing agricultural zoning or Williamson Act contracts.
- The applicant has agreed to providing a mitigation that will result in permanent conservation of an equal amount of prime farmland. This agreement would be implemented under Condition of Certification **LAND-2**.
- The proposed project is consistent with the applicable 2005 General Plan policies strategies and the project's proposed location is zoned Specific Plan-Industrial, which is consistent with the industrial land use designation.
- The project is consistent with the City of Avenal, Counties of Fresno and Kings Comprehensive General Plans, Zoning Ordinances and Municipal Codes.
- The City of Avenal reviewed staff's recommended conditions of certification in the land use analysis, and no additional land use conditions of certification are required of the Avenal Energy project.
- Staff has evaluated the Avenal Energy project for compliance with the conditional use permit (CUP) requirements, and concluded the CUP could be granted.
- Full implementation of Condition of Certification **LAND-1** and **LAND-2** would make the project consistent with applicable LORS.

Staff recommends that the Commission adopt the following conditions of certification if it approves the project.

PROPOSED CONDITION(S) OF CERTIFICATION

LAND-1 The project owner shall design and construct the project in accordance to the standards found in the I Zone ("Industrial") of the Avenal Municipal Code (Chapter 9.31) which includes the following:

- Meet the setback requirements;
- Off-street parking and loading spaces shall be provided as stipulated;
- Signage requirements;
- Loading requirements;
- Landscaping requirements;
- Lighting requirements; and
- Fencing requirements.

Verification: At least 90 calendar days prior to the start of construction, including any grading or site remediation on the power plant project site or its associated easements, the project owner shall submit the proposed development plan to the City of Avenal

Planning Department for review and comment and to the CPM for review and approval. The project owner shall also provide the CPM with a copy of the transmittal letter to the City of Avenal.

At least 30 calendar days prior to the start of construction, the project owner shall provide copies of any comment letters received from the City of Avenal, along with any changes to the proposed development plan, to the CPM for review and approval.

LAND-2 The project owner shall mitigate at a one to one ratio for the conversion of 34 acres of prime farmland as classified by the California Department of Conservation, to a non-agricultural use, for the construction of the power generation facility, switchyard, and the storm water evaporative/percolation basin. The mitigation shall consist of one of the following:

1. a mitigation fee payment to a City of Avenal or Kings County agricultural land trust or the American Farmland Trust consistent with a prepared Farmlands Mitigation Agreement. The payment amount shall be determined by contacting the local assessor's office to determine the assessed value for 34 acres of prime agricultural land; or by a real estate appraiser selected by the project owner and approved by the CPM.

2. securing the acquisition of an agricultural easement or otherwise causing the creation of an agricultural easement for other farmland in the vicinity. Easements for prime farmland would be acquired based on the California Department of Conservation's Important Farmland Classification Map, but in no case shall be less than a 1:1 ratio.

Verification: Sixty (60) days prior to start of commercial operation, the project owner shall provide documentation to the CPM demonstrating compliance with one of these options. For option 1, documentation shall consist of proof of mitigation fee payment and a discussion of any land and/or easements purchased to date by the trust with the mitigation fee money provided, and the provisions to guarantee that the land managed by the trust will be preserved for farming in perpetuity. If the total required acreage has not been purchased by this time, then this discussion shall include the schedule for purchasing any additional required acres of prime farmland and/or easements within one year of the start of commercial operations. For option 2, the project owner shall provide to the CPM sixty (60) days prior to the start of commercial operations a copy of the deed restriction or other documentation demonstrating to the satisfaction of the CPM that the project owner has caused the creation of an in-perpetuity agricultural easement for the total required acreage.

REFERENCES

Avenal Power 2008b – Application for Certification for the Avenal Energy project, Volumes 1 and 2. Submitted to the California Energy Commission, February 21, 2008.

Avenal Power 2008c – Supplement to the Application for Certification for the Avenal Energy project. Submitted to the California Energy Commission, March 27, 2008.

Avenal Power 2008f – Response to California Energy Commission Data Request 1 through 74, submitted to the California Energy Commission, June 20, 2008.

City of Avenal General Plan. 1992 and 2005

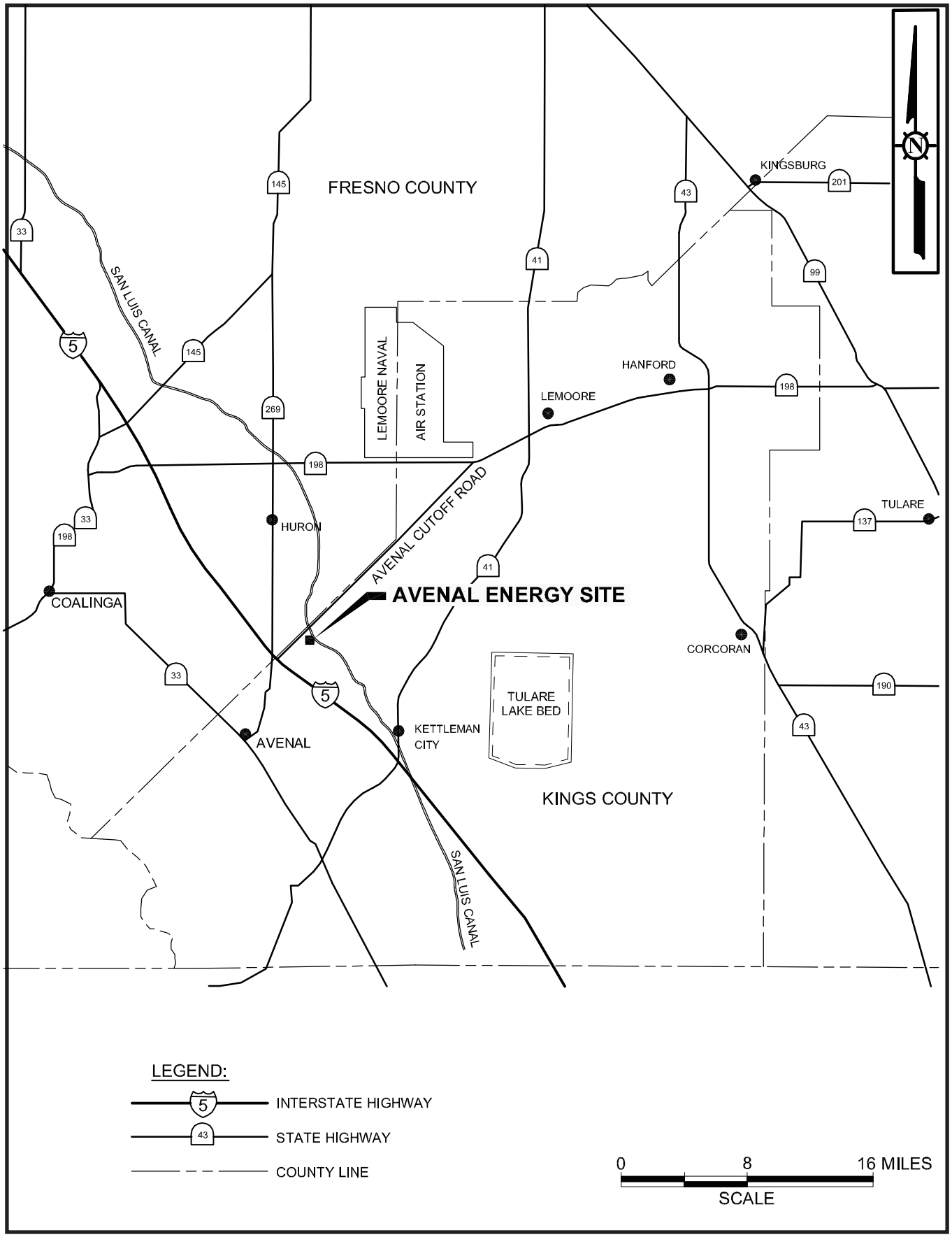
City of Avenal Zoning Ordinance

Department of Conservation, 2008- Review of the Avenal Power AFC.

Fresno County. General Plan. Public Review Draft Policy Document. 2000.

Kings County. General Plan. 1993.

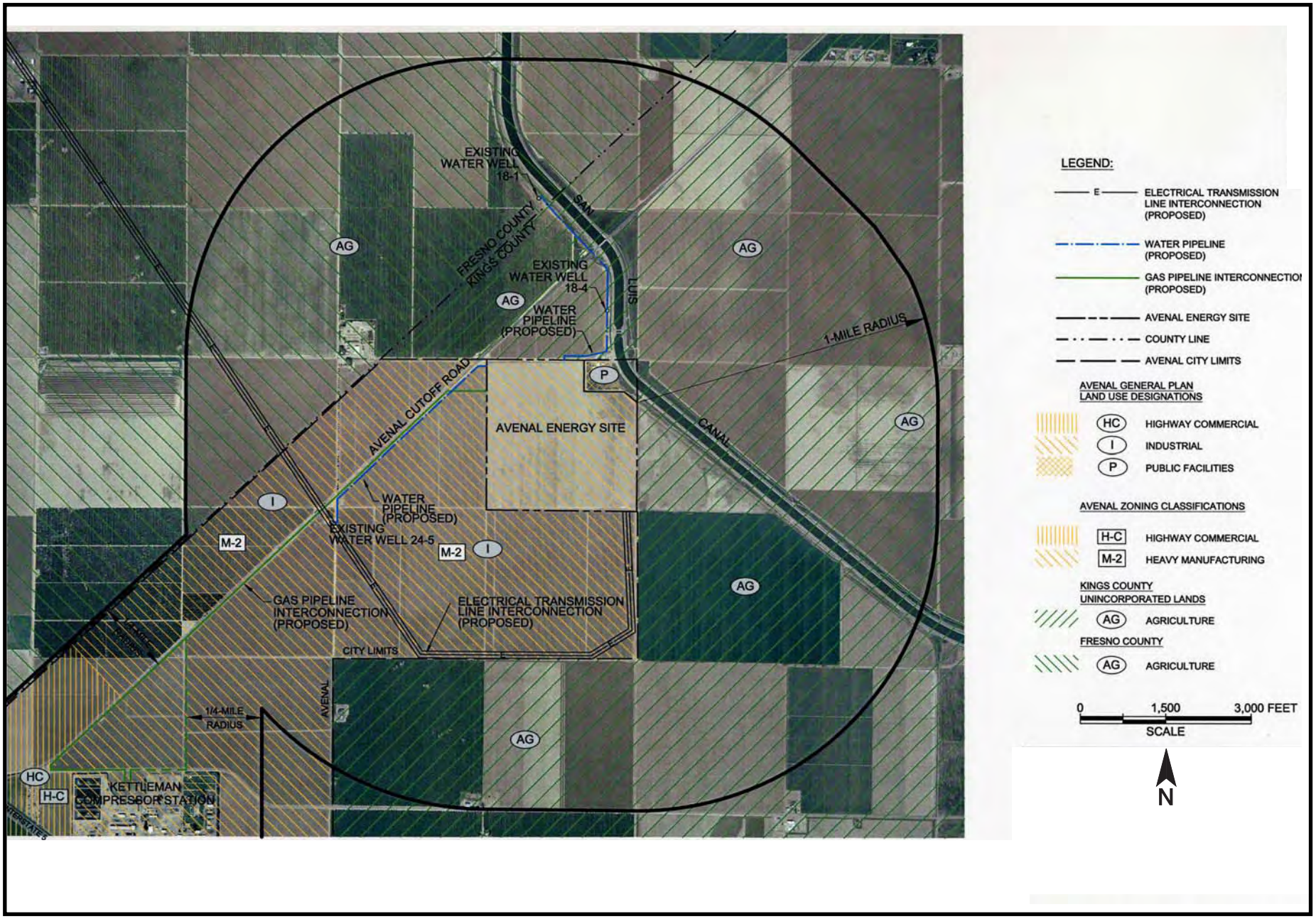
LAND USE - FIGURE 1
Avenal Energy - Regional Map



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2009
SOURCE: AFC Figure 6.9-1

LAND USE - FIGURE 2

Avenal Energy - General Plan Zoning Map

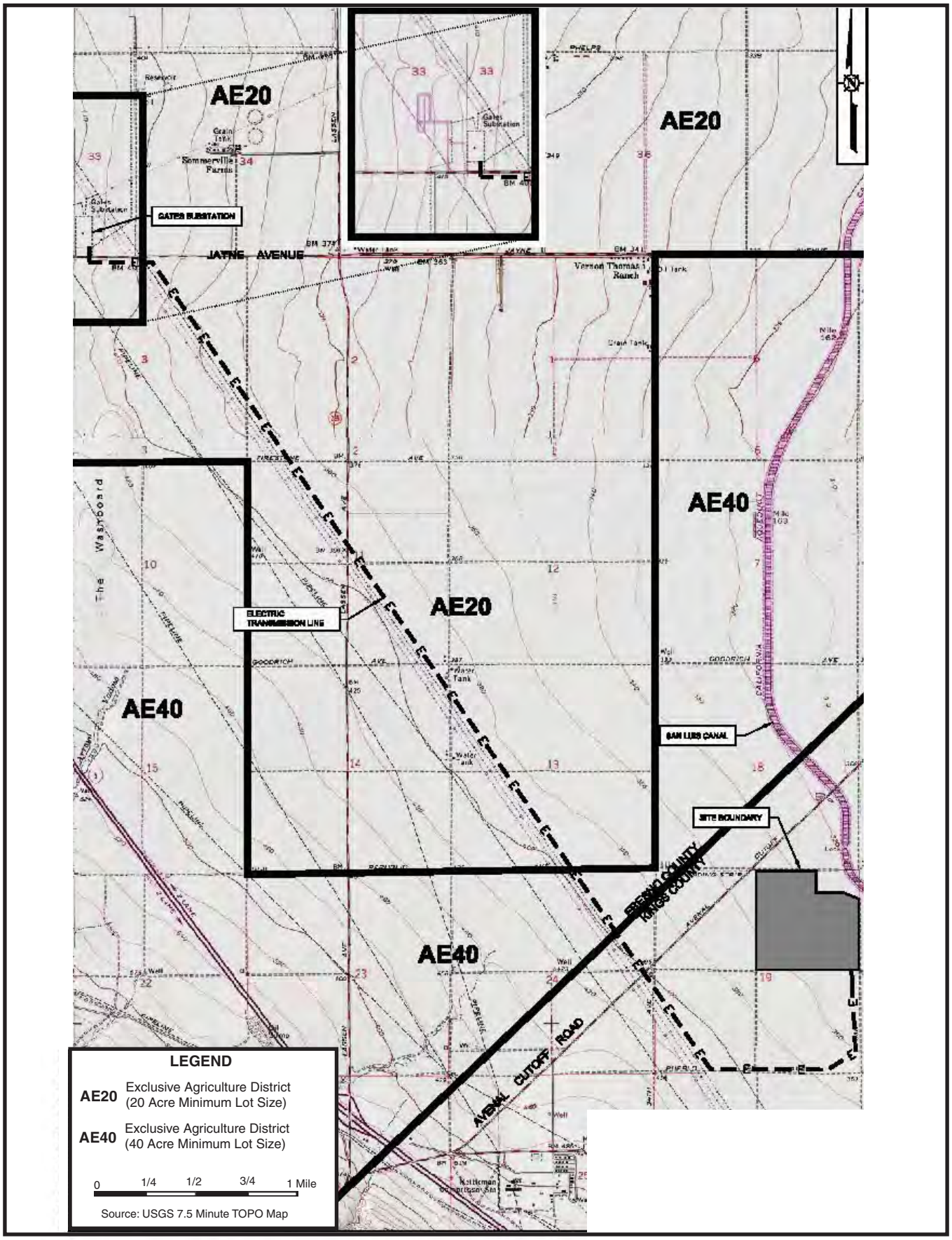


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2009

SOURCE: AFC Figure 6.9-3A

LAND USE - FIGURE 3

Avenal Energy - Outlying County Zoning Map



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

SOURCE: AFC Figure 6.9-3B

LAND USE - FIGURE 4

Avenal Energy - Transmission Line Corridor

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

SOURCE: AFC Figure 6.9-2B

NOISE AND VIBRATION

Testimony of Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

Avenal Energy, if built and operated in conformance with the proposed conditions of certification below, would comply with all applicable noise and vibration laws, ordinances, regulations and standards, and would produce no significant adverse noise impacts on people within the affected area, directly, indirectly, or cumulatively. The applicant has proposed appropriate mitigation, in the form of good design practice and selection of appropriate project equipment that would avoid any significant adverse impacts.

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 all 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 ground-borne 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 Avenal Energy, 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). For an explanation of technical terms used 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	
Occupational Safety & Health Act (OSHA): 29 U.S.C. § 651 et seq.	Protects workers from the effects of occupational noise exposure
U.S. Environmental Protection Agency (USEPA)	Assists state and local government entities in development of state and local LORS for noise
State	
California Occupational Safety & Health Act (Cal-OSHA): 29 U.S.C. § 651 et seq., Cal. Code Regs., tit. 8, §§ 5095-5099	Protects workers from the effects of occupational noise exposure
Local	
City of Avenal General Plan, Noise Element	Discourages creation of noise levels above 65 dBA CNEL (Community Noise Equivalent Level) at the property line of noise-sensitive land uses
Kings County General Plan, Noise Element	Limits noise levels to 65 dBA L_{dn} at the property line of noise-sensitive land uses.

FEDERAL

Under the Occupational Safety and Health Act of 1970 (OSHA) (29 U.S.C. § 651 et seq.), the Department of Labor, Occupational Safety and Health Administration, (OSHA) adopted regulations (29 C.F.R. § 1910.95) designed to protect workers against the effects of occupational noise exposure. These regulations list permissible noise exposure levels as a function of the amount of time during which the worker is exposed (see **Noise Appendix A, 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.

Guidelines are available from the U.S. Environmental Protection Agency (USEPA) to assist state and local government entities in developing state and local LORS for noise.

Because there are existing local LORS that apply to this project, the USEPA guidelines are not applicable.

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

The Federal Transit Administration (FTA) has published guidelines for assessing the impacts of ground-borne vibration associated with construction of rail projects, which have been applied by other jurisdictions to other types of projects. The FTA-recommended vibration standards are expressed in terms of the "vibration level," which is calculated from the peak particle velocity measured from ground-borne vibration. The FTA measure of the threshold of perception is 65 vibrational decibel (VdB), 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 State of California, Office of Noise Control, prepared the Model Community Noise Control Ordinance, which provides guidance for acceptable noise levels in the absence of local noise standards. This model also defines a simple tone, or "pure tone," as one-third octave band sound pressure levels that can be used to determine whether a noise source contains annoying tonal components. The Model Community Noise Control Ordinance further recommends that, when a pure tone is present, the applicable noise standard should be lowered (made more stringent) by five A-weighted decibels (dBA).

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 federal OSHA standards (see **Noise Appendix A, Table A4**).

LOCAL

City of Avenal General Plan

The project is located within the City of Avenal. The "City of Avenal General Plan," Noise Element (City of Avenal 2005) applies to this project.

Community noise controls are specifically addressed in the Noise Element. Noise Standard 3 of the Noise Element states that industrial, commercial or other noise generating land uses should be discouraged if resulting noise levels will exceed 65 dBA CNEL at the boundaries of planned or existing noise-sensitive land uses.

Kings County General Plan

Although the Avenal Energy site is within the City of Avenal, the City–County boundary is adjacent to the northern and eastern site boundaries. Therefore, the Kings County General Plan, Noise element (Kings County 1993) also applies to the project.

The Kings County Noise Element establishes compatibility for various land use categories with respect to exterior community noise levels. The noise level ranges are described as *acceptable*, *conditionally acceptable*, and *unacceptable*, for each land use category. The land use category that applies to the Avenal Energy's nearest residential receptors is residential. The exterior noise exposure allowances for residential land uses, as specified in the Kings County Noise Element, Appendix 8, Table 18, are summarized in **Noise Table 2**, below.

Noise Table 2
Kings County Exterior Noise Exposure Allowances (L_{dn})

Land Use Category	<65 dBA	65-70 dBA	>70
Residential	Acceptable	Conditionally Acceptable	Unacceptable

Source: Kings County 1993, Appendix 8, Table 18; AFC §6.12.3.4, Table 6.12-3

SETTING

The proposed Avenal Energy site is located on an approximately 148-acre parcel in the northeast corner of the City of Avenal, Kings County, California. The land use designation of the project site is industrial (see **Noise Figure 1**). The immediate project area consists of primarily agricultural uses. Sources of noise in the area include vehicle traffic on Avenal Cutoff Road, farm operations, City of Avenal Water Treatment Plant, distant traffic on Interstate 5, occasional aircraft over flights, and natural sounds (birds and insects) (Avenal Power 2008b, AFC §6.12.4.1).

Sensitive noise receptors[1] in the vicinity of the project include a farmhouse located approximately 1.3 miles northeast of the project site, and a farmhouse located approximately 1.8 miles southwest of the project site.

For purposes of evaluating the project's operational impacts on residential uses, the project noise is compared with measured nighttime ambient noise levels, when residents are trying to sleep.

[1] A sensitive noise receptor, also referred to as a noise-sensitive receptor, is a receptor at which there is a reasonable degree of sensitivity to noise (such as residences, schools, hospitals, elder care facilities, libraries, cemeteries, and places of worship).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

California Environmental Quality Act

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

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

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

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

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

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 represent the area's minority population.

Staff has concluded that an increase in background noise levels up to 5 dBA in a residential setting is insignificant; an increase of more than 10 dBA, however, is clearly significant. An increase of between 5 and 10 dBA should be considered adverse, but could be either significant or insignificant, depending upon the particular circumstances of a particular case.

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

1. the resulting noise level;[2]

2. the duration and frequency of the noise;

3. the number of people affected; and

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

4. the land use designation of the affected receptor sites.

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

- the construction activity is temporary; and
- the use of heavy equipment and noisy[3] activities is limited to daytime hours.

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

Ambient Noise Monitoring

In order to establish a baseline for the comparison of predicted project noise with existing ambient noise, the applicant has presented the results of an ambient noise survey (Avenal Power 2008b, AFC §6.12.4.2, Table 6.12-4, Figures 6.12-2, 6.12-3, 6.12-4). This survey was performed from Thursday, April 19 through Friday, April 20, 2001, using acceptable equipment and techniques. This survey was performed for Avenal Energy under a prior Energy Commission licensing case. The applicant states that since that time, there has been no known change in the project area that would be expected to affect the ambient noise (Avenal Power 2008b, AFC §6.12.4.2.1). Therefore, staff uses the results of this survey to evaluate the project's noise impacts. The survey monitored existing noise levels at the following five locations, shown in **Noise Figure 2**:

1. Location 1 (ML1): Eastern boundary. The eastern boundary of the project site was monitored continuously from 10:49 a.m. on April 19 through 12:15 p.m. on April 20, 2001.

2. Location 2 (ML2): Southern boundary. The southern boundary of the project site was monitored continuously from 11:14 a.m. on April 19 through 12:30 p.m. on April 20, 2001.

3. Location 3 (ML3): Western boundary. The western boundary of the project site was monitored continuously from 11:36 a.m. on April 19 through 13:06 p.m. on April 20, 2001.

4. Location 4 (ML4): Nearest residence (farmhouse) to the northeast of the project site. This residence is located approximately 1.3 miles from the project site, at the intersection of Avenal Cutoff Road and Orange Avenue. Short-term monitoring was conducted several times during the daytime and nighttime periods at the front yard of this residence.

5. Location 5 (ML5): Nearest residence (farmhouse) to the southwest of the project site. This residence is located approximately 1.8 miles from the project site, at the intersection of Avenal Cutoff Road and Plymouth Avenue, near Interstate 5. Short-term monitoring was conducted several times during the daytime and nighttime periods at the front yard of this residence.

[3] Noise that draws legitimate complaint.

As explained above, the noise environment in the vicinity of the project site is dominated by transportation-related and agricultural sources.

NOISE Table 3 summarizes the ambient noise measurements at the nearest residential receptors (Avenal Power 2008b, AFC §6.12.4.2, Table 6.12-4, Figures 6.12-2, 6.12-3, 6.12-4).

Noise Table 3
Summary of Measured Noise Levels

Measurement Site	Measured Noise Levels, dBA	
	Nighttime Hours L_{90}	Average During Daytime Hours L_{eq}
ML4, Residence 1.3 Miles Northeast of the Site	35	42-46[1]
ML5, Residence 1.8 Miles Southwest of the Site, Near Interstate 5	60	≥60[2]

Source: Avenal Power 2008b, AFC §6.12.4.2, Table 6.12-4, Figures 6.12-2, 6.12-3, 6.12-4
[1.] The daytime ambient L_{eq} levels at this location are not included in the AFC. However, the daytime L_{eq} levels at the project site boundaries are given in the AFC. Because the noise environments at ML4 and the project site are similar, staff estimates the above range of ambient noise levels at ML4 based on its calculation of the average daytime L_{eq} levels at the project site boundaries.
[2.] The daytime ambient L_{eq} levels at this location are not included in the AFC. Staff estimates this value based on the nighttime L_{90} level of 60 dBA (above) and the staff's assumption that the average daytime noise level is likely equal or higher than the average nighttime level at this location.

DIRECT IMPACTS AND MITIGATION

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

Construction Impacts and Mitigation

Construction noise is usually a temporary phenomenon. Construction of Avenal Energy is expected to be typical of similar projects in terms of schedule, equipment used, and other types of activities (Avenal Power 2008b, AFC §6.12.5.3).

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 applicant has predicted that construction noise levels would not exceed 40 dBA at ML4 and 37 dBA at ML5. They are summarized here in **Noise Table 4**.

Noise Table 4
Predicted Construction Noise Levels

Receptor	Highest Construction Noise Level (dBA) [1]	Existing Ambient, Average Daytime L_{eq} (dBA) [2]	Cumulative, Using Lowest Ambient Noise Level	Change in Ambient
ML4	40	42	44	+2
ML5	37	60	60	0

Sources: [1] Avenal Power 2008b, AFC §6.12.5.3
[2] For conservatism, staff uses the lowest ambient noise levels from NOISE Table 3, above.

The applicable local noise LORS do not limit the loudness of construction noise, but staff compares the projected noise levels with ambient levels (please see the following discussion under **CEQA Impacts**).

The applicable local noise LORS limit noisy construction to daytime hours. Noisy construction work would be allowed only during the daytime hours of 7:00 a.m. to 7:00 p.m. on weekdays and 9:00 a.m. to 6:00 p.m. on Saturdays, with no construction allowed on Sundays. To ensure that these hours are, in fact, enforced, staff proposes Condition of Certification **NOISE-6**.

Therefore, the noise impacts of Avenal Energy construction activities would comply with the noise LORS.

CEQA Impacts

Since construction noise typically varies with time, it is most appropriately measured by, and compared with, the L_{eq} (energy average) metric. As seen in **Noise Table 4** above, last column, the highest increase in the ambient noise levels at the project's noise-sensitive receptors would be 2 dBA. An increase of 2 dBA is barely noticeable and should not cause annoyance. Therefore, the noise effects of plant construction are considered to be less than significant at the above receptors.

To ensure the project construction would create less than significant adverse impacts at the most noise-sensitive receptors, in addition to Condition of Certification **NOISE-6**, staff proposes Conditions of Certification **NOISE-1** and **NOISE-2**, which would establish a noise complaint process to resolve any complaints regarding construction noise.

In light of the following proposed conditions of certification, the noise impacts of Avenal Energy construction activities would be less than significant.

Steam Blows

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

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

High pressure steam blows, if not silenced, can typically produce noise levels as high as 129 dBA at a distance of 50 feet; this would amount to roughly 60 dBA at ML4 and roughly 63 dBA at ML5, with consideration for distance and ground attenuation effects. These noise levels could be annoying at these locations, depending on the frequency, duration, and noise intensity of venting. With a temporary silencer installed on the steam blow piping, the above noise levels can be attenuated by 20 to 30 dBA. Therefore, staff proposes Condition of Certification **NOISE-7** below, which would require the steam blow piping to be equipped with a temporary silencer. This condition would also require that steam blows be conducted only during the daytime hours.

Linear Facilities

New offsite linear facilities would include an approximately 2.5-mile long natural gas pipeline, a raw water pipeline that would be connected to the City of Avenal's turnout on the San Luis Canal, two separate well water pipelines totaling less than 1.4-miles, and an approximately 6.4-mile long electric transmission line (Avenal Power 2008b, AFC §§1.5.3, 1.5.4, 1.5.5, Figures 1.5-3A, 1.5-3B).

Construction of linear facilities typically moves along at a rapid pace, thus not subjecting any one receptor to noise impacts for more than two or three days. Further, construction activities would be limited to daytime hours. To ensure that these hours are, in fact, adhered to, in compliance with the LORS, staff proposes Condition of Certification **NOISE-6**.

Vibration

The only construction operation likely to produce vibration that could be perceived off site would be pile driving. The applicant anticipates that pile driving would be required for construction of Avenal Energy (Avenal Power 2008b, AFC §6.12.5.3.4). However, given the relatively long distances for ground-borne vibration to propagate to the nearest residential receptors (ML4 and ML5), staff believes that no significant vibration impacts would be expected.

Worker Effects

The applicant has acknowledged the need to protect construction workers from noise hazards and has recognized the applicable LORS that would protect construction workers (Avenal Power 2008b, AFC §§6.12.3.2, 6.12.5.3). 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 Avenal Energy include engine generators and their exhaust stacks, combustion air inlets, electric transformers, and various pumps and fans. Staff compares the projected project noise with applicable LORS, in this case the City of Avenal and the Kings County 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.

Proposed noise mitigation measures include the following (Avenal Power 2008b, AFC §6.12.6, Figure 6.12-10):

- stack silencing;
- generator exhaust silencing;
- inlet air silencing;
- turbine enclosure; and
- auxiliary skid enclosure.

In addition, the project would avoid the creation of annoying tonal (pure-tone) noises by balancing the noise emissions of various power plant features during plant design (Avenal Power 2008b, AFC §6.12.5.3.7).

Compliance with LORS

The applicant performed noise modeling to determine the project's noise impacts on sensitive receptors (Avenal Power 2008b, AFC §6.12.5.3.7, Tables 6.12-7, 6.12-8, 6.12-9, 6.12-10). The applicant has predicted operational noise levels; they are summarized in **Noise Table 5** and **Noise Table 6** below.

Noise Table 5
Predicted Operational Noise Levels and Noise LORS

Receptor	Project Alone Operational Noise Level (dBA) [1]	City of Avenal Noise Standard CNEL (dBA)	Kings County Noise Standard L_{dn} (dBA) [2]
ML4	33	65	65
ML5	28	65	65

Sources: [1] Avenal Power 2008b, AFC Table 6.12-7
[2] NOISE Table 2, above

ML5 is located within the City of Avenal. Therefore, the City of Avenal Noise Element applies to this location. Although ML4 is not located within the City of Avenal, for conservatism, staff evaluates the project's operational noise impact at this location with respect to the City's noise LORS. As explained above, Noise Standard 3 of the City's Noise Element limits the exterior noise levels at any residential property to 65 dBA CNEL. As seen in **Noise Table 5**, the project's operational noise level at ML4 would be

33 dBA (hourly average). The CNEL scale is the average noise level during a 24-hour day, obtained after addition of 4.8 decibels to levels in the evening from 7 p.m. to 10 p.m., and after addition of 10 decibels to sound levels in the night between 10 p.m. and 7 a.m. It accounts for the higher sensitivity to noise in the nighttime, when people are generally sleeping. For a constant noise source, such as a power plant, the hourly average level of 33 dBA is equivalent to 40 dBA CNEL. This is 25 decibels below the 65 dBA CNEL noise limit. Also as seen in **Noise Table 5**, the project's operational noise level at ML5 would be 28 dBA (hourly average). This is equivalent to 35 dBA CNEL, 30 decibels below the 65 dBA CNEL noise limit. Therefore, the project's operational noise impacts at ML4 and ML5 comply with the City of Avenal's noise LORS. To ensure compliance, staff proposes Condition of Certification **NOISE-4.**

ML4 and ML5 are located within Kings County. Therefore, staff evaluates the project's operational noise levels at these locations with respect to the Kings County Noise Element. As explained above, the Kings County Noise Element's *acceptable* noise limit at these locations is 65 dBA L_{dn}. The L_{dn} scale is the average noise level during a 24-hour day, obtained after addition of 10 decibels to sound levels in the night between 10 p.m. and 7 a.m. Similar to the CNEL scale, it accounts for the higher sensitivity to noise in the nighttime, when people are generally sleeping. The project's operational noise level at ML4 would be 33 dBA (hourly average). For a constant noise source, such as a power plant, this is equivalent to 39 dBA L_{dn}, 26 decibels below the 65 dBA L_{dn} noise limit. The project's operational noise level at ML5 would be 28 dBA (hourly average). This is equivalent to 34 dBA L_{dn}, 31 decibels below the 65 dBA L_{dn} noise limit. Therefore, the project's operational noise impacts at ML4 and ML5 comply with the Kings County's noise LORS. To ensure compliance, staff proposes Condition of Certification **NOISE-4**.

With implementation of the following conditions of certification, noise due to the operation of Avenal Energy would be in compliance with the applicable LORS.

CEQA Impacts

Power plant noise is unique. A power plant operates as, essentially, a steady, continuous, broadband noise source, unlike the intermittent sounds that make up most of the noise environment. Power plant noise therefore contributes to, and becomes a part of, background noise levels, or the sound heard when most intermittent noises stop. Where power plant noise is audible, it tends to define the background noise level. For this reason, staff typically compares projected power plant noise to existing ambient background (L_{90}) noise levels at affected sensitive receptors. If this comparison identifies a significant adverse impact, then feasible mitigation must be applied to the project to either reduce or remove that impact.

For residential receptors, staff evaluates project noise emissions by comparing them with nighttime ambient background levels; this evaluation assumes that the potential for public annoyance from power plant noise is greatest at night when residents are trying to sleep. Nighttime ambient noise levels are typically lower than daytime levels; differences in background noise levels of 5 to 10 dBA are common. Staff believes it is prudent to average the lowest nighttime hourly background noise levels to arrive at a reasonable baseline for comparison with the project's predicted noise level.

Adverse impacts on residential receptors can be identified by comparing predicted power plant noise levels with the nighttime ambient background noise levels at the nearest sensitive residential receptors.

The applicant has predicted operational noise levels; they are summarized here in **Noise Table 6**.

Noise Table 6
Predicted Operational Noise Levels and CEQA Guidelines

Receptor	Project Alone Operational Noise Level (dBA) [1]	Measured Existing Ambient, Average Nighttime L_{90} (dBA) [2]	Project Plus Ambient L_{90} (dBA)	Change in Ambient Level
ML4	33	35	37	+2
ML5	28	60	60	0

Sources: [1] Avenal Power 2008b, AFC Table 6.12-7
[2] NOISE Table 3, above

Combining the ambient noise level of 35 dBA L_{90} (**Noise Table 6**, above) with the project noise level of 33 dBA at ML4 would result in 37 dBA L_{90}, 2 dBA above the ambient. As described above (in **METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE**), staff regards an increase of up to 5 dBA as a less-than-significant impact. Therefore, staff considers the above noise impact at ML4 to be less than significant.

Combining the ambient noise level of 60 dBA L_{90} (**Noise Table 6**) with the project noise level of 28 dBA at ML5 would result in 60 dBA L_{90}. The project would not be heard at ML5 and thus, it would have no adverse noise impact at this location.

Staff proposes Condition of Certification **NOISE-4** to ensure that the noise levels due to the project operation would not create significant noise impacts at these locations.

Tonal Noises

One possible source of annoyance could be strong tonal noises. Tonal noises are individual sounds (such as pure tones) which, while not louder than permissible levels, stand out in sound quality. The applicant plans to address overall noise in project design, and to take appropriate measures, as needed, to eliminate tonal noises as possible sources of annoyance (Avenal Power 2008b, AFC §6.12.5.3.7). To ensure that tonal noises do not cause public annoyance, staff proposes Condition of Certification **NOISE-4**.

Linear Facilities

All water pipes and gas pipes would be underground and therefore silent during plant operation. Noise effects from electrical interconnection lines typically do not extend beyond the lines' right-of-way easements and would be inaudible to receptors.

Vibration

Vibration from an operating power plant could be transmitted through two primary means: ground (ground-borne vibration), and air (airborne vibration).

The operating components of a combined cycle power plant consist of high-speed gas turbines, steam turbines, 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. Gas turbine generator facilities using the General Electric Frame 7F machine have not resulted in ground-borne or airborne vibration impacts. Energy Commission staff agrees with the applicant that ground-borne vibration from Avenal Energy will be undetectable by any likely receptor.

Airborne vibration (low frequency noise) can rattle windows and objects on shelves, and can rattle the walls of lightweight structures. The Avenal Energy's chief source of airborne vibration would be the gas turbines' exhaust. In a power plant such as Avenal Energy, however, the exhaust must pass through the heat recovery steam generators (HRSGs) and the stack silencers before it reaches the atmosphere. The HRSGs act as efficient mufflers. The combination of HRSGs and stack silencers makes it highly unlikely that Avenal Energy would cause perceptible airborne vibration effects.

Worker Effects

The applicant acknowledges the need to protect plant operating and maintenance workers from noise hazards and commits to compliance with all applicable LORS (Avenal Power 2008b, AFC §§6.12.3.2, 6.12.6). Signs would be posted in areas of the plant with noise levels exceeding 85 dBA (the level that OSHA recognizes as a threat to workers' hearing), and hearing protection would be required and provided. To ensure that plant operation and maintenance workers are adequately protected, 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, compound or increase other environmental impacts. CEQA guidelines require that this discussion reflect the severity of the impacts and the likelihood of their occurrence, but do not need to provide as much detail as the discussion of impacts solely attributable to the project.

The Chemical Waste Management Hazardous Waste facility in Kettleman Hills, referred to as the Chemways facility, is several miles away from the project site. The noise from the activities associated with the expansion and operation of this facility would not result in cumulative impacts when combined with the noise created by the construction and operation of Avenal Energy.

Staff is not aware of any other projects which, when combined with Avenal Energy, would create direct cumulative noise impact in the project area. Therefore, the project's cumulative noise impact is considered to be insignificant.

FACILITY CLOSURE

All operational noise from the project would cease when Avenal Energy closes, and no further adverse noise impact from its operation would be possible. The remaining potential temporary noise source would be the dismantling of the project structures and equipment, as well as any site restoration work that may be performed. Since this noise would be similar to that caused by the original construction, it could be similarly treated - that is, noisy work could be performed during daytime hours with machinery and equipment that are properly equipped with mufflers. Any noise LORS in existence at that time would apply. Unless modified, applicable conditions of certification included in the Energy Commission decision would also apply.

RESPONSES TO AGENCY AND PUBLIC COMMENTS

At the PSA workshop, members of the public asked how the cities of Huron and Kettleman City would be impacted by the project. Because these cities are several miles away from the proposed project site, there would be no noise and vibration impacts from the project at these locations.

At the PSA workshop, members of the public also asked staff to consider the potential cumulative environmental impacts of Avenal Energy and the Chemways facility. The Chemways facility is several miles away from the project site. The noise from the activities associated with the expansion and operation of this facility would not result in cumulative impacts when combined with the noise created by the construction and operation of Avenal Energy.

No other comments affecting **NOISE AND VIBRATION** have been received.

CONCLUSIONS

Staff concludes that Avenal Energy, if built and operated in conformance with the proposed conditions of certification below, would comply with all applicable noise and vibration LORS and would produce no significant adverse noise impacts on people within the project area, including the minority population, 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 two miles of the project site and one-half mile of the linear facilities, by mail or by other effective means, of the commencement of project construction. At the same time, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction and operation of the project. If the telephone is not staffed 24 hours a day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This telephone number shall be posted at the project site during construction where it is

visible to passersby. This telephone number shall be maintained until the project has been operational for at least one year.

Verification: Prior to ground disturbance, the project owner shall transmit to the compliance project manager (CPM) a statement, signed by the project owner's project manager, stating that the above notification has been performed, and describing the method of that notification. This communication shall also verify that the telephone number has been established and posted at the site, and shall provide that telephone number.

NOISE COMPLAINT PROCESS

NOISE-2 Throughout the construction and operation of the project, 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, or by 5:00 p.m. Monday if the complaint is received on the preceding Friday, Saturday, or Sunday;
- conduct an investigation to determine the source of noise in the complaint;
- if the noise is project related, take all feasible measures to reduce the source of the noise; and
- submit a report documenting the complaint and actions taken. The report shall include: a complaint summary, including the final results of noise reduction efforts and, if obtainable, a signed statement by the complainant stating that the noise problem has been resolved to the complainant's satisfaction.

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

NOISE-3 The project owner shall submit to the CPM for review and approval a noise control program. The noise control program shall be used to reduce employee exposure to high (above permissible) noise levels during construction in accordance with the applicable OSHA and Cal-OSHA standards.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit the noise control program to the CPM. The project owner shall make the program available to Cal-OSHA upon request.

NOISE RESTRICTIONS

NOISE-4 The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that the noise levels due to operation of the project alone will not exceed an hourly average of 33 dBA, during the four quietest consecutive hours of the nighttime, measured at or near monitoring location ML4 (approximately 1.3 miles northeast of the project site boundary), and an hourly average of 28 dBA, during the four quietest consecutive hours of the nighttime, measured at or near monitoring location ML5 (approximately 1.8 miles southwest of the project site boundary).

No new pure-tone components shall be caused by the project. No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints.

A. When the project first achieves a sustained output of 85% or greater of rated capacity, the project owner shall conduct a 25-hour community noise survey at monitoring location ML4, or at a closer location acceptable to the CPM. This survey during the power plant's full-load operation shall also include measurement of one-third octave band sound pressure levels to ensure that no new pure-tone noise components have been caused by the project.

   During the period of this survey, the project owner shall conduct a short-term survey of noise at monitoring location ML5, or at a closer location acceptable to the CPM. The short-term noise measurements at this location shall be conducted during the nighttime hours of 10:00 p.m. to 7:00 a.m.

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

B. If the results from the noise survey indicate that the power plant noise at the affected receptor sites exceeds the above values during the four quietest consecutive hours of the nighttime, mitigation measures shall be implemented to reduce noise to a level of compliance with these limits.

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

Verification: The survey shall take place within 60 days of the project first achieving a sustained output of 85% or greater of rated capacity. Within 30 days after completing the survey, the project owner shall submit a summary report of the survey to the CPM. Included in the survey report shall be a description of any additional mitigation

measures necessary to achieve compliance with the above listed noise limit, and a schedule, subject to CPM approval, for implementing these measures. When these measures are in place, the project owner shall repeat the noise survey.

Within 30 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 attainment of a sustained output of 85% or greater of its rated capacity, the project owner shall conduct an occupational noise survey to identify any 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 (Article 105) and Title 29, Code of Federal Regulations, section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure.

The project owner shall prepare a report of the survey results and, if necessary, identify proposed mitigation measures to be employed in order to comply with the 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 RESTRICTIONS

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

Mondays through Fridays:	7:00 a.m. to 7:00 p.m.
Saturdays:	9:00 a.m. to 6:00 p.m.
Sundays:	No Noisy Construction Allowed

Haul trucks and other engine-powered equipment shall be equipped with adequate mufflers. 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 The project owner shall equip the steam blow piping with a temporary silencer. The project owner shall conduct steam blows only during the hours of 7:00 a.m. to 10:00 p.m.

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

EXHIBIT 1 - NOISE COMPLAINT RESOLUTION FORM

Avenal Energy Project
(08-AFC-1)

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 three feet from noise source _____dBA Date: _____

Initial noise levels at complainant's property: _____ dBA Date: _____

Final noise levels at three 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

Avenal Power 2008b – Application for Certification for the Avenal Energy project, Volumes 1 and 2. Submitted to the California Energy Commission, February 21, 2008.

City of Avenal 2005 – City of Avenal General Plan, Noise Element, Dated 2005.

Kings County 1993 – Kings County General Plan, Noise Element, Dated December 1993.

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, they nevertheless are considered to be levels of noise adverse to public health.

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

In order to help the reader understand the concept of noise in decibels (dBA), **Noise Table A2** has been provided to illustrate common noises and their associated sound levels, in dBA.

Noise Table A1
Definition of Some Technical Terms Related to Noise

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

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

Noise Table A2
Typical Environmental and Industry Sound Levels

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

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

Subjective Response to Noise

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

- Subjective effects of annoyance, nuisance, dissatisfaction.
- Interference with activities such as speech, sleep, and learning.
- Physiological effects such as anxiety or hearing loss.

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

One way to determine a person's subjective reaction to a new noise is to compare the level of the existing (background) noise, to which one has become accustomed, with the level of the new noise. In general, the more the level or the tonal variations of a new

noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

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

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

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

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

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

Combination of Sound Levels

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

Noise Table A3
Addition of Decibel Values

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

Source: Architectural Acoustics, M. David Egan, 1988

Sound and Distance

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

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

Worker Protection

OSHA noise regulations are designed to protect workers against the effects of noise exposure, and list permissible noise level exposure as a function of the amount of time to which the worker is exposed:

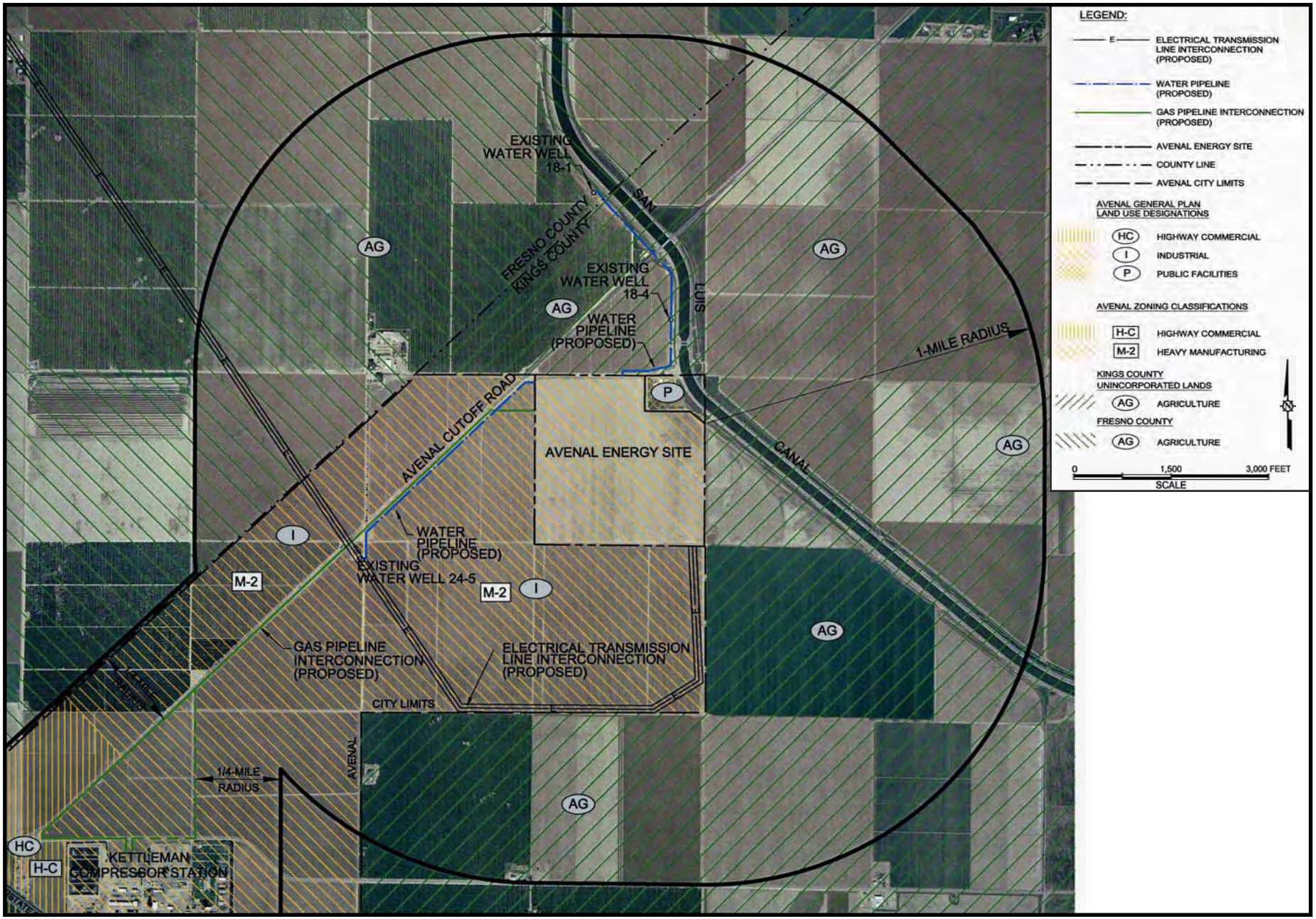
Noise Table A4
OSHA Worker Noise Exposure Standards

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

Source: 29 C.F.R. § 1910.

NOISE AND VIBRATION - FIGURE 1

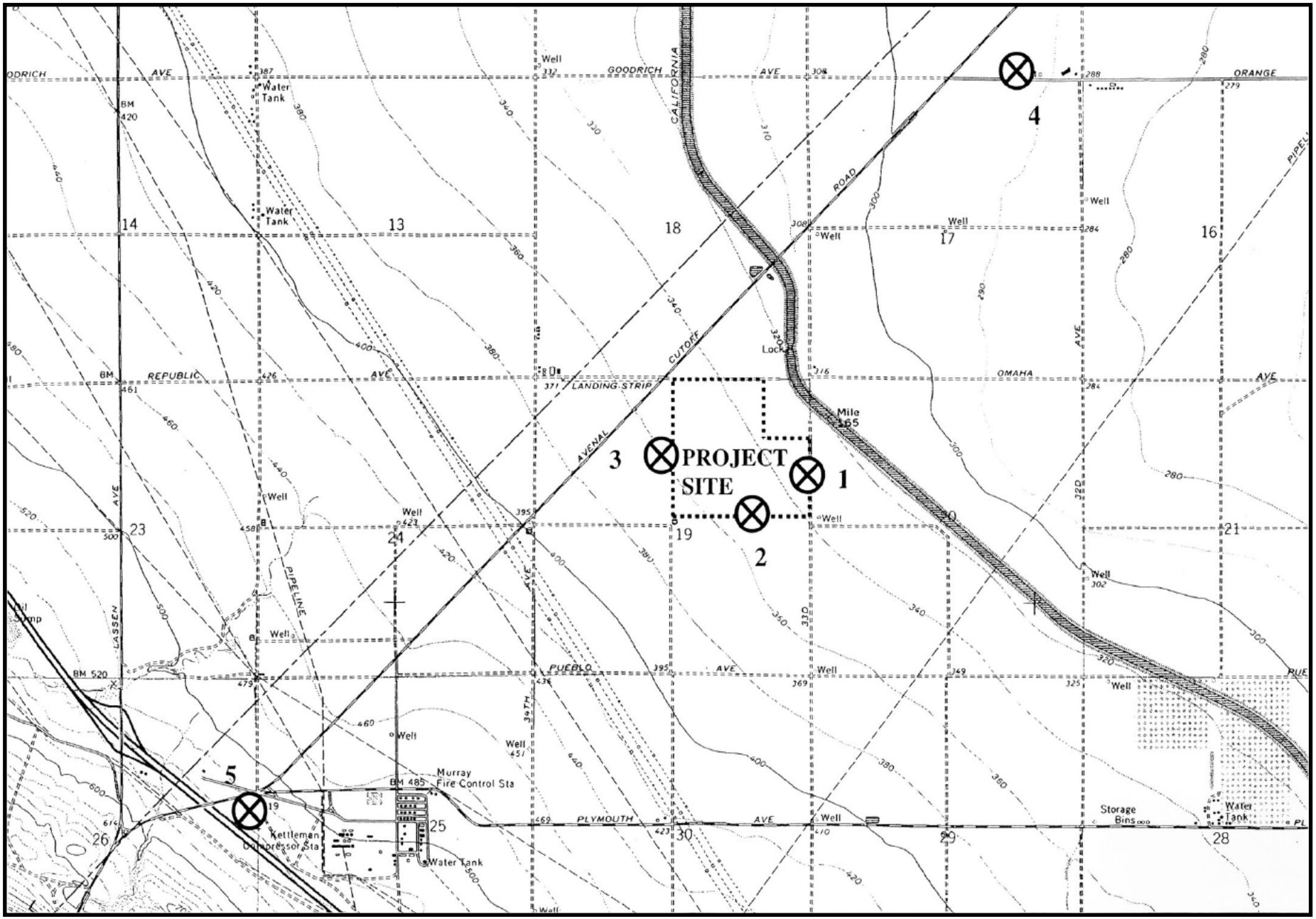
Avenal Energy - Land Use Designations and Zoning



SOURCE: AFC Figure 6.9-3A

NOISE AND VIBRATION - FIGURE 2

Avenal Energy - Location of the Noise Measurements



SOURCE: AFC Figure 6.12-1

PUBLIC HEALTH

Testimony of Obed Odoemelam, Ph.D.

SUMMARY AND CONCLUSIONS

Staff has analyzed the potential public health risks from the toxic air pollutants associated with construction and operation of the proposed Avenal Energy project and does not expect that there would be any significant adverse cancer or short- or long-term health effects. The toxic pollutants (noncriteria pollutants) considered in this analysis are pollutants for which there are no established air quality standards. The potential for significant public health impacts from emission of the other group of pollutants for which there are specific air quality standards (criteria pollutants) is discussed in the **AIR QUALITY** section with particular regard to those for which existing area levels exceed their respective air quality standards.

INTRODUCTION

The purpose of this **PUBLIC HEALTH** analysis is to determine if toxic emissions from the proposed Avenal Energy project would have the potential to cause significant adverse public health impacts or violate standards for public health protection in the project area. Toxic pollutants (or noncriteria pollutants) are pollutants for which there are no specific air quality standards. The other pollutants for which there are such air quality standards are known as criteria pollutants. If potentially significant health impacts are identified for the noncriteria pollutants considered in this analysis, staff would evaluate mitigation measures to reduce such impacts to less-than-significant levels.

Although the emission and exposure levels for criteria air pollutants are addressed in the **AIR QUALITY** section, staff has included **ATTACHMENT A** at the end of this **PUBLIC HEALTH** section to provide specific information on the nature of their respective health effects. The discussion in the **AIR QUALITY** section mainly focuses on the potential for exposure above the applicable standards and the regulatory measures necessary to mitigate such exposures with particular emphasis on carbon monoxide, ozone, and particulate matter for which existing area levels exceed their respective air quality standards. The impacts on public and worker health from accidental releases of hazardous materials are examined in the **HAZARDOUS MATERIALS MANAGEMENT** section while the health and safety impacts from electric and magnetic fields are addressed in the **TRANSMISSION LINE SAFETY AND NUISANCE** section. Pollutants released from the project in wastewater streams are discussed in the **SOILS AND WATER RESOURCES** section. Facility releases in the form of hazardous and non-hazardous wastes are addressed in the **WASTE MANAGEMENT** section.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

Public Health Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Clean Air Act section 112 (42 U.S. Code section 7412)	Requires new sources which emit more than ten 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 (MACT).
State	
California Health and Safety Code sections 39650 et seq.	These sections mandated the California Air Resources Board (CARB) and the Department of Health Services to establish safe exposure limits for toxic air pollutants and identify pertinent best available control technologies. They also required that the new source review rule for each air pollution control district include regulations that require new or modified procedures for controlling the emission of toxic air contaminants.
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 re-circulating water to minimize the growth of Legionella and other micro-organisms.
Local	
San Joaquin Valley Unified Air Pollution Control District Rule 2201	Requires safe exposure limits for Toxic Air Pollutants (TACs), use of best Available Control Technology (BACT) and New Sources Review (NSR).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section describes staff's method of analyzing the potential health impacts of toxic pollutants together with the criteria used to determine their significance.

METHOD OF ANALYSIS

The toxic emissions addressed in this **PUBLIC HEALTH** section are those to which the public could be exposed during project construction and routine operation. If such toxic contaminants are released into the air or water, people may come in contact with them through inhalation, dermal contact, or ingestion via contaminated food or water.

The ambient air quality standards for the criteria pollutants such as ozone, carbon monoxide, sulfur dioxide, or nitrogen dioxide, are set to ensure the safety of everyone including those with heightened sensitivity to the effects of environmental pollution in general. Since noncriteria pollutants do not have such standards, a process known as a health risk assessment is used to determine if people might be exposed to them at unhealthy levels. The risk assessment procedure consists of the following steps:

- Identification of the types and amounts of hazardous substances that a source could emit into the environment;
- Estimation of worst-case concentrations of project emissions into the environment using dispersion modeling;
- Estimation of the amounts of pollutants to which people could be exposed through inhalation, ingestion, and dermal contact; and
- Characterization of the potential health risks by comparing worst-case exposures to safety standards based on known health effects.

For Avenal Energy and other sources, a screening-level risk assessment is initially performed using simplified assumptions intentionally biased toward protecting public health. That is, an analysis is designed that overestimates public health impacts from exposure to the emissions. In reality, it is likely that the actual risks from the project would be much lower than the risks estimated by the screening-level assessment. This overestimation is accomplished by identifying conditions that would lead to the highest, or worst-case risks, and then assuming them in the study. The process involves the following:

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

A screening-level risk assessment would, at a minimum, include the potential health effects from inhaling hazardous substances. Some facilities may also emit certain

substances, which could present a health hazard from non-inhalation pathways of exposure (see California Air Pollution Control Officers Association (CAPCOA) 1993, Table III-5). When these substances are present in facility emissions, the screening level analysis is conducted to include the following additional exposure pathways: soil ingestion, dermal exposure, and mother's milk (CAPCOA 1993, p. III-19).

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 result from long-term exposure to lower concentrations of pollutants. The exposure period is considered to be approximately from ten to one hundred percent of a lifetime (from seven to seventy years). 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 (CAPCOA 1993, p. III-36). This means that such exposure limits would serve to protect such sensitive individuals as infants, school pupils, the aged, and people suffering from illnesses or diseases, which make them more susceptible to the effects of toxic substance exposure. The RELs are based on the most sensitive adverse health effects reported in the medical and toxicological literature, and include specific margins of safety, which address the uncertainties associated with inconclusive scientific and technical information available at the time of standard setting. They are, therefore, intended to provide a reasonable degree of protection against hazards that research has not yet identified. Each margin of safety is designed to prevent pollution levels that have been demonstrated to be harmful, as well as to prevent lower pollutant exposures that may pose an unacceptable risk of harm, even if the risk is not precisely identified as to nature or degree. Health protection can be expected if the estimated worst-case exposure is below the relevant reference exposure level. In such a case, an adequate margin of safety is assumed to exist between the predicted exposure and the estimated threshold 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 conformance with CAPCOA guidelines, the health risk assessment assumes that the effects of the individual substances are additive for a given organ system (CAPCOA 1993, p. III-37). In those cases where the actions may be synergistic (that is where the effects are greater than the sum), this approach may underestimate the health impact in question.

For carcinogenic substances, the health assessment considers the risk of developing cancer and conservatively includes the previously noted assumption that the individual would be continuously exposed 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 terms of chances per million of developing cancer and is a function of the maximum expected pollutant concentration, the probability that a particular pollutant will cause cancer (known as “potency factor”, and established by the California Office of Environmental Health Hazard Assessment), and the length of the exposure period. Cancer risks for individual carcinogens are added together to yield the total cancer risk from the source being considered. The conservative nature of the screening assumptions used means that actual cancer risks are likely to be considerably lower than those estimated.

The screening-level analysis is performed to assess worst-case public health risks associated with the proposed project. If the screening analysis were to predict a risk of no significance, no further analysis would be necessary. However, if the risk were to be above the significance level, further analysis, using more realistic site-specific assumptions would be performed to obtain a more accurate estimate of the public health risk in question.

SIGNIFICANCE CRITERIA

Commission staff assesses the health effects of exposure to toxic emissions by first considering the impacts on the maximally exposed individual. This individual is the person hypothetically exposed to project emissions at a location where the highest ambient impacts were calculated using worst-case assumptions, as described above. If the potential risk to this individual is below established levels of significance, staff would consider the potential risk as also less than significant anywhere else in the project area. 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 potential significance of project health impacts is determined separately for each of the three categories of health effects.

Acute and Chronic Noncancer Health Effects

Staff assesses the significance of noncancer health effects by calculating a “hazard index” for the exposure being considered. A hazard index is a ratio obtained by comparing exposure from facility emissions to the reference (safe) exposure level for the toxicant. A ratio of less than one would signify a worst-case exposure below the safe level. The hazard indices for all toxic substances with the same types of health effect are added together to yield a total hazard index for the source being evaluated. This total hazard index is calculated separately for acute and chronic effects. A total hazard index of less than one indicates that the cumulative worst-case exposure would be within safe levels. Under these conditions, health protection would be assumed even for sensitive members of the population. In such a case, staff would assume that there would be no significant non-cancer public health impacts from project operations.

Cancer Risk

Staff relies upon regulations implementing the provisions of Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986 (Health & Safety Code, §§ 25249.5 et seq.) for guidance in establishing the level of significance for its assessed cancer

risks. Title 22, California Code of Regulations, section 12703(b) states in this regard, 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 risk level is equivalent to a cancer risk of ten in one million, or $10x10^{-6}$. An important distinction from the provisions in Proposition 65 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 from the source in question. Thus, the manner in which the significance level is applied by staff is more conservative (health-protective) than with Proposition 65.

As noted earlier, the initial risk analysis for a project is normally performed at a screening level, which is designed to overstate actual risks, so that health protection can be ensured. When a screening analysis shows the cancer risks to be above the significance level, refined assumptions would likely result in a lower, more realistic risk estimate. If facility risk, based on refined assumptions, were to exceed the significance level of ten in one million, staff would require appropriate measures to reduce risk to less than significant. If, after all risk reduction measures have been considered, a refined analysis still identifies a cancer risk of greater than ten in one million, staff would deem such risk to be significant, and would not recommend project approval.

SETTING

This section describes the environment in the vicinity of the proposed project site from the public health perspective. Features of the natural environment, such as meteorology and terrain, affect the project’s potential for causing impacts on public health. An emission plume from a facility may affect elevated areas before lower terrain areas, because of 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 influences population density and, therefore, the number of individuals potentially exposed to the project’s emissions. Additional factors affecting potential public health impacts include existing air quality and environmental site contamination.

SITE AND VICINITY DESCRIPTION

According to the information from the applicant, Avenal Power Center LLC, (Avenal Power 2008b pp. 1-1, through 1-4, 1-14 through 1-19, and 2-3), the proposed project site is on a portion of a 148-acre land parcel in the northeast corner of the city of Avenal. The site is zoned for industrial use and is approximately six miles from the nearest residential and commercial districts of the city. The surrounding area is agricultural land with few rural residences the nearest of which is more than one mile to the northeast. The City of Huron is located eight miles to the north and the City of Coalinga approximately six miles to the southwest.

The applicant, (Avenal Power 2008b, p. 6.16-4 Figure 6.16-1) provided specific information showing that there are no sensitive receptor locations within a three-mile radius of the site or located within six miles of the site. Sensitive receptor locations are those housing sensitive individuals such as the elderly, school pupils and individuals with respiratory diseases who, as previously noted, are usually more sensitive to the

effects of environmental pollutants than the general public. In most cases these locations would include schools, pre-schools, daycare centers, nursing homes, medical centers, hospitals, and colleges. The nearest to this project site are located in the main part of the City of Avenal. Only nine residences were identified within this three-mile study area. Staff holds all projects to the same health standards, whether proposed for a major population center, with many sensitive receptors, or a sparsely populated area (as with the proposed project) with relatively few.

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 increase.

The proposed project site is in an area of hot summers, mild winters, and relatively low precipitation, as it is separated from the rainier and cooler coastal regions by the Diablo and Coastal mountain ranges to the northwest, southeast, and west. This climate is strongly influenced by the large-scale warming and sinking of the air in the semi-permanent subtropical high-pressure center over the Pacific Ocean. This high-pressure system blocks out most mid-latitude storms except in the winter when most of the area's seven inches of rainfall occurs. The site is at an elevation of approximately 340 feet in a terrain of relatively few physical features. The yearly maximum temperature averages more than 100°F while the minimum averages 48°F (Avenal Power 2008b, pp. 6.2-2 and 6.2-3).

Because of the area's winds of low speeds (with little seasonal variation), the atmosphere has a limited capacity to disperse the area's air contaminants from the points of generation to other locations. Strong atmospheric temperature inversions frequently occur especially in the late mornings and early afternoons. These inversions severely limit vertical air mixing and result in the buildup of air pollutants by restricting their movement from the ground level to the upper atmosphere out of the air basin. Atmospheric stability is a measure of the turbulence that influences such pollutant dispersion. Mixing heights (the height above ground level below which the air is well mixed and in which pollutants can be effectively dispersed) are lower during the morning hours because of temperature inversions, which are followed by temperature increases in the warmer afternoons. Staff's **AIR QUALITY** section presents a more detailed discussion of the area's meteorology as related to pollutant dispersion.

EXISTING AIR QUALITY

The proposed site is within the jurisdiction of the San Joaquin Valley Air Pollution Control District (SJVAPCD). By examining average toxic concentrations from representative air monitoring sites in California 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 is about 1 in 3, or 330,000 in one million.

The toxic air monitoring station closest to the project site is on First Street in Fresno, approximately 57 miles north of the project site. Based on the levels of toxic air contaminants measured at this monitoring station in 2000, a background cancer risk of 225 in one million was calculated for this location (CARB 2001). 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. The risk from 1,3-butadiene was about 73 in one million, while the risk from benzene was about 68 in one million. Formaldehyde accounts for about 12% of the ambient cancer risk determined for Fresno, with a risk of about 26 in one million. Formaldehyde is emitted directly from vehicles and other combustion sources, such as the proposed energy project.

The use of reformulated gasoline, beginning in the second quarter of 1996, as well as other toxics reduction measures, have led to a decrease of ambient levels of toxic pollutants and associated cancer risks during the past few years. For example, at the Fresno monitoring station, cancer risk was 497 in one million based on 1991 data and 314 in one million based on 1995 data (CARB 2001). ARB's data in the 2007 Almanac of Emissions and Air Quality reflecting the background air toxics level for the same project area, also shows a continued decrease in the related cancer risk, reflecting the continued success of SJVAPCD's reduction programs (Avenal Energy 2008b pp. 6.16-7 and 6.16-8).

The noted toxic pollutant-related background risk estimates can be compared with the normal background lifetime cancer risk (from all cancer causes) of one in three, or 330,000 in a million, as will be noted later. The potential risk from Avenal Energy and similar sources should best be assessed in the context of their potential addition to these background risk levels.

The criteria pollutant-related air quality for the project area is assessed in the **AIR QUALITY** section by adding the existing levels (as measured at area monitoring stations), to the project-related levels, and comparing the resulting levels with the applicable air quality standards. Public health protection would be ensured only through specific technical and administrative measures that ensure below-standard exposures when the project is operating. It is such a combination of measures that is addressed in the **AIR QUALITY** section.

IMPACTS

POTENTIAL IMPACTS OF PROJECT'S NONCRITERIA POLLUTANTS

The health impacts of the noncriteria pollutants of specific concern in this analysis can be assessed separately as construction-phase impacts and operational-phase impacts.

Construction Phase Impacts

Possible construction-phase health impacts, as noted by the applicant (Avenal Power 2008b, pp. 6.2-69, 6.2-70, 6.16-11, and Appendix 6.2-3), are those from human exposure to the windblown dust from site excavation and grading, and emissions from construction-related equipment. The dust-related impacts may result from exposure to

the dust itself as PM10, or PM 2.5, or exposure to any toxic contaminants that might be adsorbed on to the dust particles. As more fully discussed in the **WASTE MANAGEMENT** section, results of the applicant's site contamination assessments (Avenal Power 2008b, p. 6.14-1, and Appendix 6.14-1) showed no areas of possible chemical contamination from past agricultural or other uses. This means that particulate-related chemical exposures would be unlikely during the site preparation and project erection phases.

The applicant has specified the mitigation measures necessary to minimize construction-related fugitive dust as required by SJVAPCD Rules 4201, 8021, 8061, and 8071 (Avenal Power 2008b, Appendix 6.17-1). The only soil-related construction impacts of potential significance would result from the possible impacts of PM10, or PM 2.5 as a criteria pollutant for the 27-month construction period. As mentioned earlier, the potential for significant impacts from criteria pollutants is assessed in the **AIR QUALITY** section where the requirements for the identified mitigation measures are presented as specific conditions of certification.

The exhaust from diesel-fueled construction and other equipment has been established as a potent human carcinogen. Thus, construction-related emission levels should be regarded as possibly adding to the carcinogenic risk of specific concern in this analysis. Appendix 6.2-3 (Avenal Power 2008b) presents the diesel emissions from the different types of equipment to be used in the construction phase. The maximum cancer risk from these diesel emissions was calculated as 3.6 in one million for an uninhabited zone immediately beyond the project's boundaries (Avenal Power 2008, p. 6.2-70). This risk estimate is significantly below staff's significance criterion of 10 in one million for such emissions. Staff considers the recommended control measures specified in **AIR QUALITY** conditions of certifications (AQ-SC3, and AQ-SC4) as adequate to minimize this cancer risk during the relatively short construction period.

Operational Impacts

The main health risk from Avenal Energy's operations would be associated with emissions from its combustion turbines and testing of the emergency diesel firewater pump engine. **Public Health Table 1** lists the project's toxic emissions and shows how each contributes to the risk estimated from the health risk analysis. For example, the first row shows that oral exposure to acetaldehyde is not of concern but, if inhaled, may have cancer and chronic (long-term) noncancer health effects, but not acute (short-term) effects.

As noted in a publication by the South Coast Air Quality Management District (SCAQMD 2000, p. 6), one property that distinguishes the air toxics of concern in this analysis from the criteria pollutants is that the impacts from air toxics tend to be highest in close proximity to the source and quickly drop off with distance. This means that the levels of Avenal Energy's air toxics would be highest in the immediate area and would decrease rapidly with distance. One purpose of this analysis, as previously noted, is to determine whether or not such exposures would be at levels of possible health significance as established using existing assessment methods.

The applicant's estimates of the project's potential contribution to the area's carcinogenic and non-carcinogenic pollutants were obtained from a screening-level

health risk assessment conducted according to procedures specified in the 1993 CAPCOA guidelines. The results from this assessment (summarized in staff's **Public Health Table 2**) were provided to staff along with documentation of the assumptions used (Avenal Power 2008b, pp. 6.16-12, through 6.16-18 and Appendix-6.16-1). This documentation included:

- pollutants considered;
- emission levels assumed for the pollutants involved;
- dispersion modeling used to estimate potential exposure levels;
- exposure pathways considered;
- the cancer risk estimation process;
- hazard index calculation; and
- characterization of project-related risk estimates.

Staff has found these assumptions to be acceptable for use in this analysis and has validated the applicant's findings with regard to the numerical public health risk estimates expressed either in terms of the hazard index for each non-carcinogenic pollutant, or a cancer risk for estimated levels of the carcinogenic pollutants. These analyses were conducted to establish the maximum potential for acute and chronic effects on body systems such as the liver, central nervous system, the immune system, kidneys, the reproductive system, the skin and the respiratory system.

Public Health Table 1
Types of Health Impacts And
Exposure Routes Attributed to Toxic Emissions

Substance	Oral Cancer	Oral Non-cancer	Inhalation Cancer	Non-cancer (Chronic)	Non-cancer (Acute)
Acetaldehyde			✔	✔	
Acrolein				✔	✔
Ammonia				✔	✔
Arsenic	✔	✔	✔	✔	✔
Benzene			✔	✔	✔
1,3-Butadiene			✔	✔	
Cadmium		✔	✔	✔	
Chromium			✔	✔	
Copper				✔	✔
Ethylbenzene				✔	
Formaldehyde			✔	✔	✔
Hexane				✔	
Lead	✔	✔	✔	✔	
Mercury		✔		✔	✔
Naphthalene		✔		✔	
Nickel			✔	✔	✔
Polynuclear Aromatic Hydrocarbons (PAHs)	✔	✔	✔	✔	
Propylene				✔	
Propylene oxide			✔	✔	✔
Toluene				✔	✔
Xylene				✔	✔
Zinc				✔	

Source: Prepared by staff using reference exposure levels and cancer unit risks from CAPCOA Air Toxics “Hot Spots” Program Revised 1992 Risk Assessment Guidelines, October 1993, SRP 1998, and Office of Environmental Health Hazard Assessment Air Toxics Hot Spots Program Risk Assessment Guidelines.

As shown in **Public Health Table 2**, the chronic hazard index for the maximally exposed individual is 0.023 while the maximum hazard index for acute effects is 0.19. These values are well below staff's significance criterion of 1.0, suggesting that the pollutants in question are unlikely to pose a significant risk of chronic or acute noncancer health effects anywhere in the project area.

Public Health Table 2
Operation Hazard/Risk

Type of Hazard/Risk	Hazard Index/Risk	Significance Level	Significant?
Acute Noncancer	0.19	1.0	No
Chronic Noncancer	0.023	1.0	No
Individual Cancer	0.46×10^{-6}	10.0×10^{-6}	No

Staff's summary of information from Avenal Power 2008b pp. 6.16-17, 5.16-9 and Appendix 6.16-1.

The cancer risk to the maximally exposed individual from normal project operation is shown as 0.046 in a million, which is well below staff's significance criterion of 10 in one million for this screening-level assessment. Thus, project-related cancer risk from routine operations would be less than significant for all individuals in the project area. The conservatism in these assessments is reflected in the noted fact that (a) the individual considered is assumed to be exposed at the highest possible levels to all the carcinogenic pollutants from the project for a 70-year lifetime, (b) all the carcinogens are assumed to be equally potent in humans and experimental animals, even when their cancer-inducing abilities have not been established in humans, and (c) humans are assumed to be as susceptible as the most sensitive experimental animal, despite knowledge that cancer potencies often differ between humans and experimental animals. Only a relatively few of the many environmental chemicals identified so far as capable of inducing cancer in animals have been shown to also cause cancer in humans.

Since the population within the project site's six-mile radius consists of only a few scattered farmhouses, there would be no environmental justice concerns related to minority or poverty status. Furthermore, staff's analysis has established that no significant health impacts would result anywhere around the project area meaning that the issue of environmental injustice from significant impacts would not arise during operations. Given the relative lack of impacts on the area resident conservatively assumed to be potentially exposed to the facility's emissions at maximum levels over a 70-year lifetime, there would be also be an insignificant health risk to any farm workers whose exposure would occur only during working hours in the field.

CUMULATIVE IMPACTS

As noted by the applicant, (Avenal Power 2008b, p. 6.2-84) the SJVAPCD has not identified any future sources of the toxic air pollutants of concern in this analysis in the immediate vicinity of the proposed Avenal project. As with several area residents, the Center on Race Poverty & Environment specifically pointed (in their March 11, 2009 letter to the Energy Commission) to the potential for operational-phase significant health impacts of a cumulative nature given the presence of existing area projects such as the

Kettleman Hills waste disposal facility approximately 10 miles south of the project site. In addressing this cumulative impacts-related concern, staff would note that any pollutants from existing area sources would reflect the respective contribution of each source to the existing background levels and any cancer or noncancer risks from these sources as a whole. The present approach to regulating this group of pollutants is to ensure that further additions from identifiable sources are maintained within insignificant levels as established using the methods discussed in this analysis.

As previously noted, the maximum impact locations for the proposed Avenal Energy and similar sources would be the spot where pollutant concentrations would theoretically be highest. Even at this location, staff does not expect any significant Avenal Energy -related changes in lifetime risk to any person, given the calculated incremental cancer risk of only 0.46 in one million, which staff regards as not potentially contributing significantly to the previously noted average lifetime individual cancer risk of 330,000 in one million. This background risk should best be seen as reflecting the cumulative impacts of all encountered carcinogens whether man-made or naturally occurring. It is because of its related low cancer risk that staff considers the proposed Avenal Energy as not contributing significantly to any cancer-related impacts of a cumulative nature.

The worst-case long-term noncancer health impact from the project (represented as a chronic hazard index of 0.023) is well below staff's significance level of 1.0 at the location of maximum impact suggesting an insignificant contribution to the incidence of the area's noncancer health symptoms from cumulative toxic exposures. The cumulative impacts from emission of the criteria pollutants are addressed in the **AIR QUALITY** section.

COMPLIANCE WITH LORS

The toxic pollutant-related cancer and noncancer risks from the Avenal project operation reflect the effectiveness of control measures (including use of an oxidation catalyst which reduces hazardous air pollutant emissions) proposed by the applicant. Since these risk estimates are much below the significance levels in the applicable LORS, staff concludes that the related operational plan would comply with these LORS.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff has addressed the concern of the general public and other interested parties in the cumulative impacts section regarding the cumulative impacts from the contributions from the proposed Avenal Energy and existing area sources of the toxic pollutants of concern in this analysis.

CONCLUSIONS AND RECOMMENDATIONS

Staff has determined that the toxic air emissions from the construction and operation of the proposed natural gas-burning Avenal Energy project are at levels that do not require mitigation beyond the specific emission control measures noted above. Since (a) the potential impacts would be at insignificant levels, and (b) there are very few residences

in the project's zone of exposure-related impacts, there would be neither environmental justice issues nor significant impacts on agricultural field workers when the project is operating. The conditions for ensuring compliance with all applicable air quality standards are specified in the **AIR QUALITY** section for the area's criteria pollutants.

PROPOSED CONDITION OF CERTIFICATION

Staff recommends approval of the proposed project with respect to the health impacts of concern in this analysis and proposes no conditions of certification.

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ATTACHMENT A
CRITERIA POLLUTANTS

OZONE (O_3)

Ozone is not directly emitted from specific sources but is formed when reactive organic compounds (VOCs) interact with nitrogen oxides in the presence of sunlight. Heat speeds up the reaction, typically leading to higher concentrations in the relatively hot summer months. Ozone is a colorless, reactive gas with oxidative properties that allow for tissue damage in the exposed individual. The effects of such damage could be experienced as respiratory irritation that could interfere with normal respiratory function. Ozone can also damage plants and other materials susceptible to oxidative damage.

The U.S. EPA revised its federal ozone standard on July 18, 1997 (62 Fed. Reg. 38856), based on health studies that had became available since the standard was last revised in 1979. These new studies showed that adverse health effects could occur at ambient concentrations much lower than reflected in the previous standard, which was based on acute health effects experienced during heavy exercise. In proposing the new standard, the EPA identified specific health effects known to have been caused by short-term exposures (of one to three hours) and prolonged exposure (of six to eight hours) (61 Fed. Reg. 65719). However, a 1999 federal court ruling blocked implementation of the ozone 8-hour standard, which is yet to be implemented.

Acute health effects from short-term exposures include a transient reduction in pulmonary function, and transient respiratory symptoms including cough, throat irritation, chest pain, nausea, and shortness of breath with associated effects on exercise performance. Other health effects of short-term or prolonged O_3 exposures include increased airway responsiveness (which predisposes the individual to bronchoconstriction induced by external stimuli such as pollen and dust), susceptibility to respiratory infection (through impairment of lung defense mechanisms), increased hospital admissions and emergency room visits, and transient pulmonary inflammation.

Generally, groups considered especially sensitive to the effects of air pollution include persons with existing respiratory diseases, children, pregnant women, and the elderly. However, controlled exposure data on people in clinical settings have indicated that the population at greatest risk of acute effects from ozone exposures as children and adults engaged in physical exercise. Children are most at risk because they are active outside, playing and exercising, during summer when ozone levels are highest. Adults who are outdoors and engaging in heavy exertion in the summer months are also among the individuals most at risk. This happens because such exertion increases the amount of O_3 entering the airways and can cause O_3 to penetrate to peripheral regions of the lung where lung tissue is more likely to be damaged. These individuals, as well as those with respiratory illnesses, such as asthma, can experience a reduction in lung function and increased respiratory symptoms, such as chest pain and cough, when exposed to relatively low ozone levels during periods of moderate exertion.

CARBON MONOXIDE (CO)

Carbon monoxide is a colorless, odorless gas, which is a product of inefficient combustion. It does not persist in the atmosphere, being quickly converted to carbon dioxide. However, it can reach high levels in localized areas, or "hot spots".
CO reduces the oxygen carrying capacity of the blood, thereby disrupting the delivery of oxygen to the body's organs and tissues. Persons sensitive to the effects of carbon monoxide include those whose oxygen supply or delivery is already compromised. Thus, groups potentially at risk to carbon monoxide exposure include persons with coronary artery disease, congestive heart failure, obstructive lung disease, vascular disease, and anemia, the elderly, newborn infants, and fetuses (CARB 1989, p. 9). In particular, people with coronary artery disease were found to be especially at risk from carbon monoxide exposure (CARB 1989, p. 9). Tests conducted on patients with confirmed coronary artery disease indicated that exposure to low levels of carbon monoxide during exercise can produce significant cardiac effects. These effects include chest pain (angina) and electrocardiographic changes indicative of effects on the heart muscle (CARB 1989, p. 6). Such changes can limit the ability of patients with coronary artery disease to exert themselves even moderately. Therefore, the statewide carbon monoxide one-hour and eight-hour standards were adopted in part to prevent aggravation of chest pain. Additionally, however, the standards are intended to prevent decreased exercise tolerance in persons with peripheral vascular disease and lung disease, impaired central nervous system functions, and effects on the fetus (Cal. Code Regs. Tit. 7, sec 70200).

PARTICULATE MATTER (PM)

Particulate matter is a generic term for particles of various substances, which occur as either liquid droplets or small solids of a wide range of sizes. Particles with the most potential to adversely affect human health are those less than 10 micrometers (millionths of a meter) in diameter (known as PM10), which may be inhaled and deposited within the deep portions of the lung (PM10). PM may originate from anthropogenic or natural sources such as stationary or mobile combustion sources or windblown dust. Particles may be emitted directly to the atmosphere or result from the physical and chemical transformation of gaseous emissions such as sulfur oxides, nitrogen oxides, and volatile organic compounds. PM10 may be made up of elements such as carbon, lead, and nickel; compounds such as nitrates, organics, and sulfates; and complex mixtures such as diesel exhaust and soil fragments. The size, chemical composition, and concentration of ambient PM10 can vary considerably from area to area and from season to season within the same area.

PM10 can be grouped into two general sizes of particles, fine and coarse, which differ in formation mechanisms, chemical composition, sources, and potential health effects. Fine-mode particles are those with a diameter of 2.5 micrometers or less (PM2.5), while the coarse-mode fraction of PM consists of particles ranging from 10 micrometers down to 2.5 micrometers in diameter.

Coarse-mode PM10 is formed by crushing, grinding, and abrasion of surfaces, and in the course of reducing large pieces of materials to smaller pieces. Coarse particles

consist mainly of soil dust containing oxides of silicon, aluminum, calcium, and iron; as well as fly ash, particles from tires, pollen, spores, and plant and insect fragments. Coarse particles normally have shorter lifetimes (minutes to hours) and only travel over short distances (of less than tens of kilometers). They tend to be unevenly distributed across urban areas and have more localized effects than the finer particles.

PM2.5 is derived both from combustion by-products, which have volatilized and condensed to form primary PM2.5, and from precursor gases reacting in the atmosphere to form secondary PM2.5. Components include nitrates, organic compounds, sulfates, ammonium compounds, and trace elements (including metals) as well as elemental carbon such as soot. Major sources of PM2.5 are fossil fuel combustion by electric utilities, industry and motor vehicles, vegetation burning, and the smelting or other processing of metals. Dry deposition of fine mode particles is slow allowing such particles to often exist for long periods of time (of from days to weeks) in the atmosphere and travel hundreds to thousands of kilometers. They tend to be uniformly distributed over urban areas and larger regions and are removed from the atmosphere primarily by forming cloud droplets and falling out within raindrops.

The health effects of PM10 from any given source usually depend on the toxicity of its constituent pollutants. The size of the inhaled material usually determines where it is deposited in the respiratory system. Coarse particles are deposited most readily in the nose and throat area while the finer particles are more likely to be deposited within the bronchial tubes and air sacs, with the greatest percentage deposited in the air sacs. Until recently, PM10 particles had been considered to be the major fraction of airborne particulates responsible for various adverse health effects. The PM10 fraction is known to be capable of penetrating the thoracic and alveolar regions of the human and animal lungs. The PM2.5 fraction, however, was found to pose a significantly higher risk for health. This is due to their size and associated deposition and retention characteristics in the respiratory tract, enabling it to penetrate and deposit within the deeper alveolar regions of the lung. The following aspects of PM2.5 deposition all contribute to the more serious health effects attributed to smaller particles:

- The deposition of PM2.5 favors the periphery of the lungs, which is especially vulnerable to injury for anatomical reasons.
- Clearance of the PM2.5 from within the deeper reaches of the lungs is a much slower process than from the upper regions. Consequently, the residence time is longer, implying longer exposure, and hence greater risk.
- The human anatomy further allows the penetration of the superficial tissues by PM2.5 and entry into the bodily circulation without much effort in the periphery of the lungs.

Many epidemiological studies have shown exposure to particulate matter capable of inducing a variety of health effects, including premature death, aggravation of respiratory and cardiovascular disease, changes in lung function and increases in existing respiratory symptoms, effects on lung tissue structure, and impacts on the body’s respiratory defense mechanisms. The underlying biological mechanisms are still poorly understood. Based on their review of a number of these epidemiological studies (as published after 1987 when the federal standards were revised), together with

suggestion of PM2.5 concentrations as a more reliable surrogate for the health impacts of the finer fraction of PM than PM10, the U.S. EPA concluded that the then-current standards were not sufficiently stringent to protect against significant effects in exposed humans. Therefore, federal PM standards were revised on July 18, 1997 (62 Fed. Reg. 38652) to add new annual and 24-hour PM2.5 standards to the existing annual and 24-hour PM10 standards. Taken together, these new standards were meant to provide additional protection against a wide range of PM-related health effects, including premature death, increased hospital admissions and emergency room visits, primarily among sensitive individuals such as the elderly, children and individuals with cardiopulmonary diseases such as asthma. Other impacts include decreased lung function (particularly in children and asthmatics), and alterations in lung tissue and structure.

California has also had 24-hour and annual standards for PM10 (CARB 1982, pp. 81, 84). These studies were aimed at establishing the PM10 levels capable of inducing asthma, premature death and bronchitis-related symptoms. They were set to protect against such impacts in the general population as well as sensitive individuals such as patients with respiratory disease, declines in pulmonary function, especially as related to children (Tit. 17, Cal. Code Regs. §70200). These standards were set to be more stringent than the federal standard, which the ARB regarded as inadequate for the protection desired (CARB 1991, p. 26).

On June 20, 2002, the ARB approved the adoption of a lower annual state standard for PM10, as well as a new annual standard for PM2.5 (CARB 2002). The new standards took effect on July 5, 2003. The 24-hour PM10 standard was not changed. The standards were established to prevent excess death, illnesses such as respiratory symptoms, bronchitis, asthma exacerbation, and cardiac disease, and restrictions in activity from short- and long-term exposures (Title 17, Cal. Code Regs. §70200).

NITROGEN DIOXIDE (NO_2)

Nitrogen dioxide is formed either directly or indirectly when oxygen and nitrogen in the air combine together during the combustion. It is a relatively insoluble gas, which can penetrate deep into the lungs, its principal site of toxicity. Its toxicity is thought to be due to its capacity to initiate free radical-mediated reactions while oxidizing cellular proteins and other biomolecules (CARB 1992, Appendix A, p. 4).

Sub lethal exposures in animals usually produce inflammations and varying degrees of tissue injury characteristic of oxidant damage (Evans in CARB 1992, Appendix A, and p 5). The changes produced by low-level acute or sub chronic exposures appear to be reversible when the animal study subject is allowed to recover in clean air.

Health effects of particular concern in relation to low-level nitrogen dioxide exposure include: (1) effects of acute exposure on some asthmatics and possibly on some persons with chronic bronchitis, (2) effects on respiratory tract defenses against infection, (3) effects on the immune system, (4) initiation or facilitation of the development of chronic lung disease, and (5) interaction with other pollutants (CARB 1992, Appendix A, p. 5).

Several groups, which may be especially susceptible to nitrogen dioxide-related health effects have been identified from human studies (CARB 1992, Appendix A, and p. 3). These include asthmatics, persons with chronic bronchitis, infants and young children, cystic fibrosis and cancer patients, people with immune deficiencies, and the elderly.

Studies involving brief, controlled exposures on sensitive individuals have shown an increase in bronchial reactivity or airway responsiveness of some asthmatics, as well as decreased lung function in some patients with chronic obstructive lung disease (CARB 1992, Appendix A, p. 2). In general, bronchial hyper reactivity (an increased tendency of the airways to constrict) is markedly greater in asthmatics than in non-asthmatics upon exposure to initiating respiratory irritants (CARB 1992a, p. 107). At exposure concentrations of specific relevance to the current one-hour ambient standard, there appears to be little, if any, effect on respiratory symptoms of asthmatics (CARB 1992a, p. 108).

SULFUR DIOXIDE (SO_2)

Sulfur dioxide is formed when any sulfur-containing fuel is burned. SO_2 is highly soluble and consequently absorbed in the moist passages of the upper respiratory system. Exposure to sulfur dioxide can lead to changes in lung cell structure and function that adversely affect a major lung defense mechanism known as mucociliary transport. This mechanism functions by trapping particles in mucus in the lung and sweeping them out via the cilia (fine hair-like structures) also in the lung. Slowed mucociliary transport is frequently associated with chronic bronchitis.
Exposure to sulfur dioxide can produce both short- and long-term health effects. Therefore, California has established sulfur dioxide standards to reflect both short- and long-term exposure concerns. Based on controlled exposure studies of human volunteers, investigators have found that asthmatics comprise the group most susceptible to adverse health effects from exposure to sulfur dioxide (CARB 1994, p. V-1).

The primary short-term effect is bronchoconstriction, a narrowing of the airways, which results in labored breathing, wheezing, and coughing. The short-term (one-hour) standard is based on bronchoconstriction and associated symptoms (such as wheezing and shortness of breath) in asthmatics and is designed to protect against adverse effects from five to ten minute exposures. In the opinion of the California Office of Environmental Health Hazard Assessment, the short-term ambient standard is likely to afford adequate protection to asthmatics engaged in short periods of vigorous activity (CARB 1994, Appendix A, p. 16).

Longer-term exposure is associated with increased incidence of respiratory symptoms (such as coughing and wheezing) or respiratory disease, decreases in pulmonary function, and an increased risk of premature mortality (CARB 1991a, p. 12). The long-term (24-hour) standard is based upon increased incidence of respiratory disease and premature mortality. The standard includes a margin of safety based on epidemiological studies, which have shown adverse respiratory effects at levels slightly above the standard. Some of the studies indicate a sulfur dioxide threshold for effects, suggesting that no significant effects are expected from exposures to concentrations at the state standard (Ibid.).

ATTACHMENT A - REFERENCES

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SOCIOECONOMICS

Testimony of Joseph Diamond, Ph. D.

SUMMARY OF CONCLUSIONS

Staff concludes that the 600-megawatt Avenal Energy project would cause neither a significant adverse direct or indirect impact nor contribute to a cumulative socioeconomic impact on the area's housing, schools, parks and recreation, police, emergency services, or hospitals, since most of the project's construction and operation workforce currently resides in the regional or local labor market area, and its construction would be short-term. Gross public benefits from the project include capital costs, construction and operation payroll, natural gas transportation franchise fee surcharge, and property and sales taxes.

INTRODUCTION

Staff's socioeconomics impact analysis evaluates project-induced changes on community services and/or infrastructure, and related community issues such as environmental justice. Staff discusses the estimated beneficial impacts of the construction and operation of the Avenal Energy project (Avenal Energy) and other related economic impacts.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following table contains all applicable socioeconomic laws, ordinances, regulations, and standards (LORS).

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

Applicable Law	Description
State	
California Education Code, Section 1762	The governing board of any school district is authorized to levy a fee, charge, dedication, or other requirement for the purpose of funding the construction or reconstruction of school facilities.
California Government Code, Sections 65996-65997	These sections include provisions for school district levies against development projects. As amended by Senate Bill (SB) 50 (stats. 1998, ch. 407, sec. 23), these sections state that, except for fees established under Education Code 17620, state and local public agencies may not impose fees, charges, or other financial requirements to offset the cost of school facilities.

SETTING

Although the project is within the Avenal city limits, the project site is located approximately six miles northeast of the actual population center. Avenal Energy would require an average of approximately 326 construction workers per month and 25 full-time employees to operate (Avenal Power 2008b).

The 2000 U.S. Census shows that California had a total population of 33,871,648, with a minority (non-white and white-Hispanic) population of 18,054,858 (53.3%) and a white population of 15,816,790, (46.7%). Kings County had a total population of 129,461 in 2000 and the City of Avenal 14,674 in 2000. By 2010, projections show a California population of 39,957,616 and 154,617 residents in Kings County (California Department of Finance 2000 and Avenal Power 2008b).

The preliminary unemployment rate for Kings County was 12.9% in December 2008 (not seasonally adjusted). This is not full employment for Kings County. Over the past few decades, full employment has been typically defined as approximately 4-5.5% unemployment. For California, the preliminary unemployment rate was 9.1% in December 2008 (not seasonally adjusted) (State of California Employment Development Department 2009).

DEMOGRAPHIC SCREENING

The purpose of an environmental justice screening is to determine whether a below-poverty-level and/or minority population exists within the potentially affected area of the proposed site. Staff conducted the demographic screening in accordance with the *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis* (guidance document) (US EPA 1998). People of color populations, as defined by this guidance document, are identified where:

- The minority population of the affected area is greater than 50% of the affected area's general population; or
- The minority population percentage of the area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis; or
- One or more census blocks in the affected area have a minority population greater than 50%.

In 1997, the President's Council on Environmental Quality issued environmental justice guidance defining "minority" as individuals who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. Low-income populations are identified with the annual statistical poverty thresholds from the US Bureau of the Census's current population reports, Series P-60, on income and poverty (OMB 1978). The 2000 poverty level varies by age and size of family and number of related individuals. So for example, the weighted average threshold for one person (unrelated individual) is $8,794 (US Census 2000).

Staff reviewed Census 2000 information showing the minority population by census block (the smallest geographic unit for which the Census Bureau collects and tabulates data) as 92.44% within a 6-mile radius of the proposed Avenal Power project site (see **Socioeconomics Figure 1**). Census 2000 by census block group (a combination of census blocks and subdivision of a census tract) information shows that the below-poverty population is 30.89% within the 6-mile radius. Several census block groups extend beyond the 6-mile radius and therefore may affect this population statistic. Poverty status excludes institutionalized people, people in military quarters, people in college dormitories, and unrelated individuals under 15 years old.

ASSESSMENT OF IMPACTS

Staff reviewed the Avenal Energy socioeconomics section of the AFC and other socioeconomic data. Staff used the socioeconomic data provided and referenced from various governmental agencies, trade associations, and its own independent analysis to form the following socioeconomic analysis and conclusions.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

According to Appendix G of the California Environmental Quality Act (CEQA) guidelines, a project may have a significant effect on population, housing, and public services if the project will:

- Induce substantial population growth in an area, either directly or indirectly;
- Displace substantial numbers of people and/or existing housing, necessitating the construction of replacement housing elsewhere; or
- Adversely impact acceptable levels of service for fire and police protection, schools, parks and recreation, and other public facilities.

A socioeconomic analysis looks at beneficial impacts on local finances from property and sales taxes as well as potential adverse impacts on public services. In order to determine if a project would have any significant impacts, staff analyzes whether the current status of these community services and capacities can absorb the project-related impacts in each of these areas. A project's property taxes, sales tax, local school impact fees, or development fees can help local governments augment public services required to meet project needs. If the project's impacts could appreciably strain or degrade these services, staff considers this to be a significant adverse impact and would propose mitigation.

In this analysis, staff used fixed percentage criteria for evaluating demographics for environmental justice. Impacts on housing, schools, medical services, law enforcement, parks and recreation, and cumulative impacts are based on subjective professional judgments or input from local and state agencies. Substantial employment of people coming from regions outside the study area has the potential to create significant adverse socioeconomic impacts. Significance criteria for subject areas such as utilities, fire protection, water use, and wastewater disposal are identified in the **SOIL AND WATER RESOURCES**, **RELIABILITY**, **WORKER SAFETY AND FIRE PROTECTION**, and **WASTE MANAGEMENT** sections of this final staff assessment (FSA).

DIRECT/INDIRECT/INDUCED IMPACTS

Population and Employment

Research shows that construction workers may commute as much as two hours one way from their communities rather than relocate (Electric Power Research Institute 1982). For example, this information was verified in the La Paloma Generating Project siting case by the Kern County Building Trades Council (La Paloma 1998). It was estimated that there were 47,000 mining and construction workers in 2002 in the Fresno, Kings, Tulare, and Kern counties (Avenal Power 2008b). Staff accepts the applicant's conservative scenario that at least 80% of the construction workers would reside in Fresno, Kings, Tulare, and Kern counties as useful. Therefore most of the construction workers are within a 2-hour commute of the project site. This would include the major population centers of Fresno and Bakersfield which are generally within a one-hour commute to the project site and would be substantial contributors to the construction workforce. The majority, 80%, of the construction workforce would be contracted out to residents who would travel daily or weekly to the county (Kings) but would not need to relocate (Avenal Power 2008b and Diamond 2008b). Construction workers beyond a 2-hour commute would relocate but most likely return to their families on the weekends. Staff utilized the Fresno, Kings, Tulare, and Kern labor market area for its evaluation of construction worker availability and for community services and infrastructure impacts from construction of Avenal Energy.

Staff used Kings County as the study area in identifying many fiscal and non-fiscal (private sector) benefits and other potential socioeconomic impacts from the operation of Avenal Energy. The results of the Impact Analysis for Planning (IMPLAN) economic impact analysis is discussed separately on the following page.

Project construction of the power generation facility is expected to occur over a 27-month period. The applicant proposes that construction of the project start in second quarter 2010. The greatest number of construction workers (peak) would occur in the 19th and 20th month of construction. The number of construction workers would range from about 58 in the first month of construction to approximately 550 workers at peak construction. There would be an average of 326 workers per month during construction (Diamond 2008b).

Socioeconomics Table 2 shows that total labor, by skill, in the Fresno, Kings, Tulare, and Kern counties, with annual averages for 2005, is adequate when compared to Avenal Energy project needs. The project's peak construction activity, approximately 550 workers, represents approximately 1% of the Fresno, Kings, Tulare, and Kern labor market construction and extraction workforce of 47,000 in 2002 (Avenal Power 2008b).

About 25 full-time workers would be needed to maintain and operate the project. Operational workers are expected to come mostly (approximately 66%) from Kings County. This small increase in employment would have little effect on employment rates.

Socioeconomics Table 2
Total Labor in Fresno, King, Tulare, and Kern Counties
By Skill for Construction In 2005

Occupational Title	Annual Average 2005	Maximum Needed Per Month By Avenal Energy
Insulation Workers	430	33
Boilermakers	150*	65
Brick Masons/Block Masons	5240	10
Carpenters	5490	53
Electricians	2870	90
Structural Iron and Steel Workers	130	47
Construction Workers	19510	33
Millwrights	970	60
Operating Engineers and other Construction Equipment Operators	1560	33
Painters	2330	33
Plumbers, Pipefitters, and Steamfitters	2660	176
Surveyors	190	6
Teamsters	15477	5
Staff	Not Available	46

Source: Avenal Power 2008b, Diamond 2008b, and State of California Employment Development Department 2008a. * State of California Employment Development Department 2004 data.

The IMPLAN model (an input-output model) used by the applicant to estimate employment and income impacts from the Avenal Power project on the study area, is acceptable to staff. The University of California at Berkeley uses the IMPLAN model for regional economic assessment; it has also been used to assess other generating projects in California and the U.S. IMPLAN is a disaggregated type of model that divides the regional economy into sectors and provides a multiplier for each sector (Lewis et al. 1979). Type II[1] multipliers were used because they both include the indirect and induced effects (secondary impacts). IMPLAN multipliers were used to calculate direct, indirect, and induced personnel income and value added in the regional economy.

[1] A Type I multiplier is the ratio of the direct plus indirect change to the direct change resulting from a unit increase in final demand for any given sector. A Type II multiplier is the ratio of the direct, indirect, and induced change to the direct change resulting from a unit increase in final demand. The Type II multiplier takes into account the Avenal Energy repercussionary effects of secondary rounds of consumer spending in addition to the direct and indirect inter-industry effects (Richardson 1972). Both multipliers can be of an income or employment type. Indirect changes are production changes in industries supplying the original industry (backward linkages). Induced changes are changes in regional household spending levels caused by regional employment impacts.

The applicant reports IMPLAN results for Fresno, King, and Kern counties (the three-county area) estimate total construction income and value added for 3rd quarter 2007 without escalation (Diamond 2008c). For a 27 month construction period, there would be estimated project payroll of $126 million which would yield a personal income multiplier of approximately 1.99 or $124 million in secondary (indirect and induced) impacts. Using value added (includes employee compensation, proprietary income, and other property income, and indirect taxes) the $530 million project yields a value added multiplier of 1.38 and approximately $731 million in secondary impacts. For operations, the personal income multiplier is approximately 1.76 and the value added multiplier is 1.29. So project operation personnel income of $2.1 million would result in secondary impacts of $1.5 million. Based on $530 million of value added by the project, this would result in secondary impacts of $153 million (Avenal Power 2008b and Diamond 2008d). The operation workforce is fully represented by an estimated 25 full-time workers. There would be no operation payroll for short-term (contract) operations employees (Avenal Power 2008b&c).

Staff finds the economic impact analysis reasonably consistent with the economic literature of 1.2 to 2.5 that many economists find acceptable in the long run (Moss et al. 1994), and therefore finds these projected beneficial economic impacts close enough to the benchmarks to be reasonable.

Staff notes the IMPLAN runs used for construction estimates of secondary impacts did not include the workforce for the linear facilities of a natural gas pipeline and an electrical transmission line. The number of construction workers for the linear facilities is small when compared with power plant construction workforce and would not coincide with the peak plant construction. Furthermore, the construction time for the linear facilities is only a short time or the first eight months of the 27 month construction schedule. The inclusion of the linear facilities workforce would change the average workforce by a very small number of workers or from 320 to 326 and the cost is less than 3% (Diamond 2008b). Therefore, staff accepts that the construction secondary impacts do not need to be rerun since the impact would be small. Hence, the applicant slightly underestimated the secondary gross construction benefits while still not resulting in any significant adverse socioeconomic impacts which will be discussed later. Finally, no indirect population is expected as a result of the project.

(Avenal Power 2008c). This is because of high unemployment in Kings County, the short-term nature of construction, and that most of the labor force is coming from a region which is within commuting distance.

Fiscal and Non-Fiscal Effects

Some fiscal (having to do with the public treasury) impacts of Avenal Energy include:

- Property taxes: $5.3 million to Kings County of which an estimated approximately $1 million would be distributed to the city of Avenal;
- Construction total sales tax: $181,000;
- Operation sales tax: $145,000 annually;
- School impact fee: approximately $3,000; and

- Natural gas transportation franchise fee surcharge: May vary but could be as high as $2.5 million annually for the city of Avenal (Avenal Power 2008 and Diamond 2008b).

Non-fiscal (private sector) impacts are described below.

- Total project costs for the power plant are estimated at $530 million without linear facilities. The construction payroll is $126 million over 27 months. The annual operations payroll is $2.1 million.
- Approximately $2.5 million would be spent locally on construction materials and supplies; $2 million would also be spent locally for each operation year of the Avenal Energy project for locally purchased materials, as part of an operation and maintenance budget within Kings County (Avenal Power 2008b).

All economic estimates are in 3rd quarter 2007 with no escalation (Diamond 2008c).

Housing

As of January 1, 2006, there were approximately 40,596 housing units in Kings County. The vacancy rate for this housing averages about 5.7%, and includes single-family, multi-family, and mobile homes. Furthermore, Fresno County had 297,408 housing units with a vacancy rate of 6.5%, Tulare County 132,469 housing units with a vacancy rate of 7.6% and Kern County 262,934 housing units with a 9.7% vacancy rate. For construction workers that would commute to the project site on a workweek basis, there is one motel/hotel in Avenal, Kings County, six motels/hotels in Lemoore, Kings County, nine motel/hotels in Hanford, Kings County, 11 motel/hotels in Coalinga, Fresno County, 99 motel/hotels in Fresno, Fresno County, three mobile homes/RVs in Coalinga, Fresno County, 11 mobile homes/RV parks in Visalia, Tulare County, seven mobile homes/RV parks in Tulare, Tulare County, four mobile home/RV parks in Lemoore, Kings County, and one mobile home/RV park in Kettleman City. Kings County (Avenal Power 2008b).

Again, about 20% of the construction workers, or approximately 65 workers, would relocate to Fresno, Kings, Tulare, and Kern counties during project construction (Avenal Power 2008b and Diamond 2008b). Staff finds the supply of available permanent and temporary housing adequate to accommodate the construction workers expected to relocate. Staff does not expect Avenal Energy to cause any housing displacement as a result of this project.

The permanent operational workforce is expected to commute about one hour or less mostly from within Kings County and neighboring counties (i.e. Fresno and Tulare counties) (Avenal Power 2008b and Diamond 2008b). Permanent employees would commute as much as one hour to their workplace (Electric Power Research Institute 1982). Staff agrees with this point.

Staff concludes that there would be no significant adverse socioeconomic impacts related to housing resources as a result of Avenal Energy.

Schools

Kings County has 64 schools including one community college and 27,984 students in 2006-2007. The Reef Unified School District which serves the Avenal Energy area

would have 2,527 students in 2006-2007. The district is below the California average pupil-teacher ratio for 2006-2007. In addition, Fresno, Kings, Tulare, and Kern counties are also below the California average pupil-teacher ratio for 2006-2007. (CDE 2006-2007 a, b, c, d, e, and f).

Most of the construction workforce (an estimated 80% or 261 construction workers) would be from Fresno, Kings, Tulare, and Kern counties and would commute and the remaining 20% or 65 construction workers would temporarily relocate within commuting distance of the project site and return to their homes on the weekends.

Twenty five workers would be required for operation of Avenal Energy, and are expected to come primarily from the Kings County labor force with only eight operations workers who may relocate to the area and require permanent housing (Avenal Power 2008b).

Education Code section 17620 authorizes school districts to levy a fee against construction within their districts. State and local agencies, however, cannot impose additional fees (or other required payments on development projects) to mitigate possible enrollment impacts to schools. School impact fees to the Reef-Sunset Unified School District are estimated at approximately $3,000 (Avenal Power 2008b). Staff has proposed Condition of Certification SOCIO-1 to ensure payment of this one-time school impact fee as a requirement for LORS compliance.

Staff concludes that there would be no significant adverse socioeconomic impacts on educational resources as a result of Avenal Energy. This is because construction is short-term and no workers would likely relocate to the project site along with their children and during operations the workforce is small (25) and likely to commute from the four-county area of Fresno, Kings, Tulare, and Kern counties with only about eight construction workers relocating to that area.

Parks and Recreation

There are four notable parks and recreation areas in Kings County (City-data 2008). Most (80%) of the construction labor force for this project should be drawn from the commuting labor markets or construction workers would relocate on a workweek basis. The operational workforce of 25 would be comprised mostly of local residents from Fresno, Kings, Tulare, and Kern counties with eight operations workers estimated to relocate to the four-county area (Avenal Power 2008b). Because construction is short-term and few workers would likely relocate to the four-county area along with their children and the operations workforce is small and likely to commute mostly from within the four-county area with only eight operations workers relocating to the four-county area, there should be little or no additional demand on parks and recreation due to the project. Thus, staff concludes that the project would not have a significant adverse socioeconomic impact on parks and recreation.

Law Enforcement

The Kings County Sheriff's Department would provide police protection and public safety services (traffic and neighborhood police control, emergency calls, and crime prevention) to the area of Avenal Energy. The Avenal Energy site is covered primarily

by the Avenal Station which has 14 full-time personnel and two reserve officers who work essentially full time. There also are 10 citizens who perform volunteer patrols and report potential crimes to the Avenal Station. Kettleman City which serves as a back-up has four full deputies. The Avenal Station has 15 patrol cars and the Kettleman City station has four. Estimated response time from the Avenal Station to the site is seven minutes. The California Highway Patrol (CHP) is the primary law enforcement agency for state highways and roads (Avenal Power 2008b).

Avenal Energy should not significantly impact criminal activity, traffic, or crowd control, from a population perspective, since most of the construction labor force would commute. For the operations phase, the change workforce is small (25), with most coming from the four-county area which is within commuting distance. Power plants typically have their own security forces. Avenal Energy would include appropriate site security measures during construction and operation by the applicant which would minimize the potential need for Kings County Sheriff's Department assistance (Avenal Power 2008b). The facility would not need much if any law enforcement assistance under most circumstances. This has been typical for law enforcement in siting cases before the Energy Commission. Therefore, staff concludes that there would be no significant adverse socioeconomic impacts on law enforcement resources as a result of Avenal Energy and agrees with the applicant that it should be minimal (Avenal Power 2008b).

Medical Services

Emergency medical services (EMS) in the project area can be provided by the Fire Department's officers in Avenal and Kettleman City. The Avenal Fire Department provides basic life support services. Both offices have two career fire personnel supported by a company of trained volunteers. Response time to the site from the city of Avenal is approximately ten minutes and Kettleman City approximately 15 minutes. There also is an Avenal Ambulance Company in Avenal which provides advanced life support services (Diamond 2008a).

There are three hospitals which can serve the project. Coalinga Regional Medical Center in Fresno County is about 20 to 25 miles away from the project site and it has 78 beds and EMS. Next is Hanford Community Hospital in Kings County which is about 38 miles from the project site or ¾ of an hour with 81 beds and EMS capability. Finally, there is University Medical Center in Fresno, Fresno County with 274 beds including level 1 (the highest level) EMS. It is about 50 miles from the project site or one hour by car or ½ hour by helicopter located at the hospital site (Avenal Power 2008b, University Medical Center 2008, Hanford Community Medical Center 2008, and Coalinga Medical Center 2008).

Worker Safety staff reports that construction and in particular power plant construction is hazardous relative to other workplaces. Over the last 20 or more years, significant injury in power plants licensed by the Energy Commission has been infrequent but has significant potential if safety is not a top priority. The number of construction and operation workforce is relatively small. Also, the need for prompt response for a heart attack within a few minutes is well documented in the medical literature. An on-site automatic cardiac defibrillator, as well as workers trained to use it, would provide protection in the first few minutes of heart attack and would be required for this project.

Staff notes that the closest EMS response time is within 10 to 15 minutes for a heart attack and other injuries; there are three hospitals within ¾ of an hour (including helicopter service) of the project site with 433 beds. Therefore, staff concludes that EMS and medical resources are adequate for Avenal Energy. Finally, Avenal Energy would not displace significant numbers of people or either directly or indirectly induce substantial population growth. Hence, there are no significant socioeconomic impacts that might trigger adverse physical impacts to emergency medical services. For additional discussion see the **WORKER SAFETY** section of this FSA.

CUMULATIVE IMPACTS

A project may result in significant adverse cumulative impacts when its effects are "cumulatively considerable." Cumulatively considerable means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, or the effects of probable future projects. (Title 14, California Code of Regulations, section 15130).

Cumulative impacts could occur when more than one project has an overlapping construction schedule that creates a demand for workers that cannot be met by local labor, resulting in an influx of non-local workers and their dependents.

Avenal Energy would average 326 construction workers per month, approximately 550 construction workers during peak construction month, for 27 months with construction starting in April 2010. Two other power plants in Kings County undergoing review as amendments by the Energy Commission are the Hanford Energy Park Peaker (HEPP) project and the Henrietta Peaker Project (HPP). Both would have a 15 month construction period from February 2011 to April 2012. Each project would be for 25 MWs. Peak construction workforce for both projects would total 311 workers and add 28 workers for operations. Finally, San Joaquin Solar 1&2 (SJS 1&2) near the City of Coalinga, Fresno County would have a peak construction workforce of 744 workers during a 15 month construction period and 60 operational workers.

There are four other major construction projects in Kings County. The Chemway facility expansion (expansion of the existing landfill by 11 acres and construction of a new 64-acre landfill)/PCB permit renewal in Kettleman City is undergoing California Environmental Quality Act (CEQA) and agency (US Environmental Protection Agency [EPA]) review. No information on construction dates and workforce is available. Another project is the Great Valley Ethanol plant in Hanford 27 miles away from the project site on a 112 acre site in the city of Hanford's Kings Industrial Park on property zoned for industrial use. Construction would be for 16 months but has not started since it lacks financing (Diamond 2009b). No construction workforce information was provided. The new Hanford Hospital in Hanford would create up to 200 construction jobs and should be complete by 2009 (Adventist Health 2009) before the construction of the three power plants. Lastly, the expansion of the Leprino Food Company facility in Kings County (the largest of the three phases was completed in February 2009) should be completed by the beginning of construction of Avenal Energy (Diamond 2009a) and the HEPP and HPP (Hedy Koczwara 2009a&b).

A worst-case construction workforce for the four power plant projects would be 1605. All four power plant projects would draw on a four-county area of Fresno, Kings, Tulare,

and Kern counties which had 47,000 mining and construction workers in 2002 (Avenal Power 2008b). This represents approximately 3% of the four-county labor market construction and extraction workforce.

Adding 25 operational workers from Avenal Energy and 28 operational jobs from the HEPP and HPP projects to the SJS 1&2 projected operational workforce of 60 equals' approximately 113 operational workers. The unemployment rate for Kings County was 12.9 per cent (not seasonally adjusted) for December 2008 (State of California Employment Development Department 2009). Commercial operations for Avenal Energy are proposed to begin in June 1, 2012. These four projects should have public benefit impacts since they would lower unemployment in Kings County which has a high unemployment rate. Staff finds no significant adverse socioeconomic cumulative impacts associated with Avenal Energy.

NOTEWORTHY PUBLIC BENEFITS

Important public benefits discussed under the direct, indirect, and induced impacts section and fiscal and non-fiscal effects section are: capital expenditures, construction and operation payroll, personal income and value added secondary impacts, natural gas franchise fees, annual property and sales tax.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

No comments were received from agencies or members of the public regarding the socioeconomic aspects of Avenal Energy.

CONCLUSIONS

Staff concludes that construction and operation of Avenal Energy would not cause a significant direct, indirect, or cumulative adverse socioeconomic impact on the study area's housing, schools, parks and recreation, law enforcement, emergency services, or hospitals. Hence, there are no socioeconomic environmental justice issues related to this project. Avenal Energy, as proposed, is consistent with applicable LORS.

Estimated gross public benefits from Avenal Energy include increases in secondary personal income and value added for Fresno, Kings, and Kern counties' construction and operations. There is an estimated average of 326 direct project-related construction jobs for the 27 months of construction. Avenal Energy is estimated to have total project costs of $530 million. Avenal Energy construction payroll is estimated to be $126 million for 27 months, and the operation payroll is $2.1 million annually. There are $5.3 million in property taxes, and $3,000 in school impact fees. Total sales and use taxes during construction are estimated to be approximately $181,000 and during operation the local sales tax is estimated to be $145,000 annually over the life of the project. The natural gas transportation franchise fee surcharge may vary but could be as high as $2.5 million. An estimated $2.5 million would be spent locally for materials and equipment during construction, and an additional $2 million would be spent annually for the project's local operations and maintenance budget.

Finally, **Socioeconomics Table 3,** below, provides a summary of socioeconomic data and information from this analysis, with emphasis on the economic benefits of Avenal Energy.

Socioeconomics Table 3
Data and Information[2]

Estimated Project Costs without linear facilities	$530 million
Estimate of Locally Purchased Materials	
Construction	$2.5 million
Operation (Operation and Maintenance)	$2 million annually
Estimated Annual Property Taxes (Kings County and the city of Avenal)	$5.3 million per year
Estimated School Impact Fees	$3,000 to the Reef-Sunset Unified School District
Estimated Direct Employment	
Construction (average)	326 jobs (average per month)
Operation	25 jobs
Estimated Construction Secondary Impacts (Fresno, Kings, and Kern Counties)	
Personal Income	$124 million
Value Added	$731 million
Estimated Operation Secondary Impacts (Fresno, Kings, and Kern Counties)	
Personal Income	$1.5 million
Value Added	$153 million
Estimated Payroll	
Construction	$126 million total
Operation	$2.1 million annually
Estimated Sales Taxes (to the State of California with amounts flowing to Kings County and the city of Avenal as well as the cities of Hanford, Lemoore, and Corcoran)	
Construction	$181,000
Operation	$145,000 annually
Natural gas transportation franchise fee surcharge (city of Avenal)	May vary but could be as high as $2.5 million annually
Preliminary Existing Unemployment Rates	12.9% in December 2008, for Kings County (Not Seasonally Adjusted) and 9.1% in December 2008 for California (Not Seasonally Adjusted)
Percent Minority Population (6-mile radius)	92.44%
Percent Poverty Population (6-mile radius and beyond)	30.89%

[2] **Table 3** uses 3rd quarter 2007 dollars with no escalation for capital costs. Construction would be for 27 months and the project's life is planned for 30 years. Unemployment information is for Kings County. The results of the IMPLAN input-output modeling are for Fresno, Kings, and Kern Counties and show secondary impacts (indirect and induced). Population is for a 6 mile radius from the power plant, except as noted.

PROPOSED CONDITION OF CERTIFICATION

SOCIO-1 The project owner shall pay the one-time statutory school development fee to the Reef-Sunset Unified School District as required by Education Code Section 17620.

Verification: At least 30 days prior to start of project construction, the project owner shall provide the Compliance Project Manager (CPM) proof of payment of the statutory development fee.

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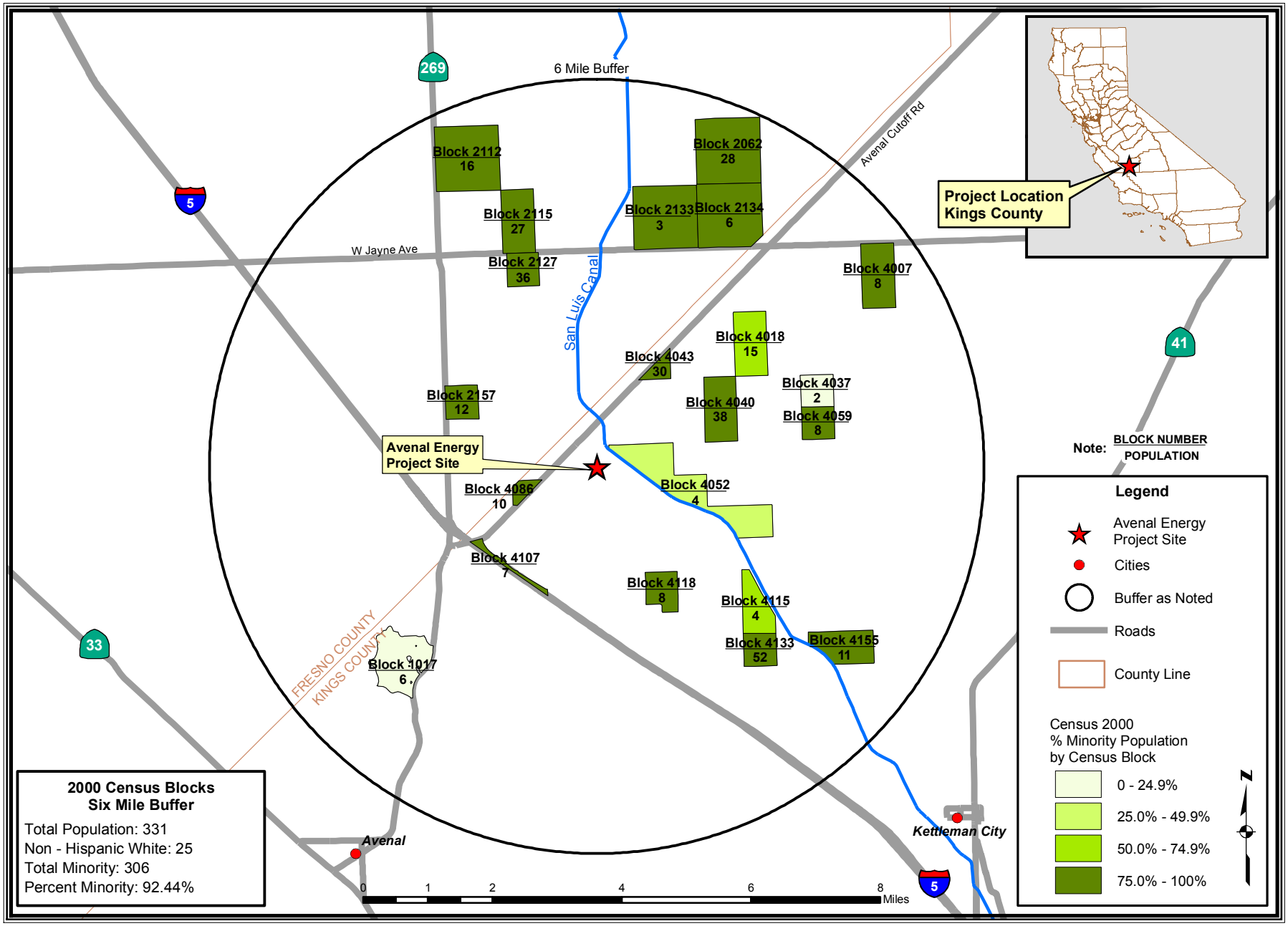
SOCIOECONOMICS - FIGURE 1

Avenal Energy - Census 2000 Minority Population by Census Block - Six Mile Buffer



CALIFORNIA ENERGY COMMISSION, ENERGY FACILITIES SITING DIVISION, JUNE 2009

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

SOIL AND WATER RESOURCES

Testimony of Casey Weaver

SUMMARY OF CONCLUSIONS

Staff has not identified any unmitigable significant impacts to Soil and Water Resources provided the proposed conditions of certification are implemented. The following are staff's findings based on its assessment of the proposed Avenal Energy project:

- Implementation of Best Management Practices (BMPs) during Avenal Energy's construction and operation in accordance with effective Storm Water Pollution Prevention Plans and a Drainage, Erosion and Sediment Control Plan would avoid significant adverse effects that could be caused by transport of sediments or contaminants from the project site by wind or water erosion;
- The proposed primary process water supply for the project is untreated surface water supplied by the city of Avenal. This proposed water supply would not cause a significant adverse environmental impact or affect current or future users of water or adversely impact biological resources, and is consistent with state water use and conservation policies;
- The use of dry cooling and zero liquid discharge technology is consistent with the Energy Commission's water policy;
- Effective operation of a zero liquid discharge system would reuse industrial waste water discharge and produce a waste that can be disposed of in a licensed landfill facility. This would protect surface water and/or groundwater quality from potential degradation;
- The proposed project would be constructed outside the 100-year floodplain and would not exacerbate flood conditions in the vicinity of the project; and
- The proposed project would comply with all applicable federal, state and local laws, ordinances, regulations and standards and potentially significant impacts would be mitigated through the preparation and implementation of various construction and operating plans and compliance with local ordinances.

INTRODUCTION

This section analyzes potential impacts to soil and water resources from the construction or operation of the Avenal Energy project (Avenal Energy). The analysis specifically focuses on the potential for the project to cause impacts in the following areas:

- Whether construction or operation will lead to accelerated wind or water erosion and sedimentation.
- Whether the project will exacerbate flood conditions in the vicinity of the project.
- Whether the project's water use would cause a substantial, or potentially substantial, adverse change in the quantity or quality of groundwater or surface water.

- Whether project construction or operation will lead to degradation of surface or groundwater quality.
- Whether the project will comply with all applicable laws, ordinances, regulations and standards (LORS).

Where the potential for impacts is identified, staff has proposed mitigation measures to reduce the significance of the impact and, as appropriate, has recommended conditions of certification.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Soil & Water Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
Clean Water Act (33 U.S.C. Section 1251 et seq.)	The Clean Water Act (33 USC § 1257 et seq.) requires states to set standards to protect water quality, which includes regulation of storm water discharges during construction and operation of a facility.
Resource Conservation and Recovery Act	The Resource Conservation Recovery Act (RCRA) of 1976 (40 CFR Part 260 et seq.) seeks to prevent surface and groundwater contamination, sets guidelines for determining hazardous wastes, and identifies proper methods for handling and disposing of those wastes.
State	
California Water Code Section 13260	Requires filing with the appropriate Regional Board a report of waste discharge that could affect the water quality of the state, unless the requirement is waived pursuant to Water Code section 13269.
California Water Code Section 13551	Requires the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such water is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare.
Local	
Kings County Article VI, Sec. 5-81, Uniform Plumbing Code	601.1 Except where not deemed necessary for safety or sanitation by the Administrative Authority, each plumbing fixture shall be provided with an adequate supply of potable running water piped thereto in an approved manner, so arranged as to flush and keep it in a clean and sanitary condition without danger of backflow or cross-connection.
Chapter 5, Article VI, Sec. 5-83, Kings County Code	Sewage disposal systems for commercial, industrial, and multifamily units are subject to review by the health officer. Deviation from any guidelines regulating the location of private sewage disposal systems shall be granted only with the concurrence of the health officer. (Ord. No. 375, § 10, 1-4-77; Ord. No. 480, § 5, 12-12-89; Ord. No. 513, § 5, 6-16-92; Ord. No. 545, § 3, 12-19-95)

Applicable Law	Description
State Policies and Guidance	
California Constitution, Article X, Section 2	This section requires that the water resources of the State be put to beneficial use to the fullest extent possible and states that the waste, unreasonable use or unreasonable method of use of water is prohibited.
The Porter-Cologne Water Quality Control Act of 1967, Water Code Sec 13000 et seq.	Requires the State Water Resources Control Board (SWRCB) and the nine RWQCBs to adopt water quality criteria to protect state waters. Those regulations require that the RWQCBs issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable.
SWRCB Resolutions 75-58 and 88-63	The principal policy of the SWRCB that addresses the specific siting of energy facilities is the Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling (adopted by the Board on June 19, 1976, by Resolution 75-58). This policy states that use of fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound. Resolution 75-58 defines brackish waters as “all waters with a salinity range of 1,000 to 30,000 mg/l” and fresh inland waters as those “which are suitable for use as a source of domestic, municipal, or agricultural water supply and which provide habitat for fish and wildlife”. Resolution 88-63 defines suitability of sources of drinking water. The total dissolved solids must exceed 3,000 mg/L for it to not be considered suitable, or potentially suitable, for municipal or domestic water supply.
SWRCB WQO 99-08	The SWRCB regulates storm water discharges associated with construction projects affecting areas greater than or equal to one acre to protect state waters. Under Order 99-08, the SWRCB has issued a National Pollutant Discharge Elimination System (NPDES) General Permit for storm water discharges associated with construction activity for which applicants can qualify if they meet the criteria and upon preparing and implementing an acceptable Storm Water Pollution Prevention Plan (SWPPP) and notifying the SWRCB with a Notice of Intent.
California Code of Regulations, Title 17	Title 17, Division 1, Chapter 5, addresses the requirements for backflow prevention and cross connections of potable and non-potable water lines.
California Code of Regulations, Title 23	Title 23, Division 3, Chapter 15, requires the Regional Board issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable.
2003 Integrated Energy Policy Report	In the 2003 IEPR, consistent with State Water Resources Control Board Policy 75-58 and the Warren-Alquist Act, the Energy Commission reiterated the State Water Policy, stating the Commission will approve the use of fresh water for cooling purposes by power plants only where alternative water supply sources and alternative cooling technologies are shown to be “environmentally undesirable” or “economically unsound.

SETTING

The proposed Avenal Energy project is a 600 MW natural gas-fired, combined cycle electric generating facility (Avenal Energy 2008a). The project would incorporate dry cooling, Zero Liquid Discharge (ZLD), dry NOx reduction and closed loop inlet air chillers to minimize water use. The proposed site is located within the Westside Groundwater Basin on the western edge of the San Joaquin Valley in Kings County, California. The site is situated approximately 200 miles north of Los Angeles, about 200 miles south of San Francisco, and about six miles northeast of the residential and commercial districts of the city of Avenal. The site lies approximately two miles east of Interstate 5 and adjacent to the right bank of the State Water Project's San Luis Canal. All lands adjacent to the power plant site are currently open farmland except for a water treatment facility owned and operated by the city of Avenal that is located at the northeast corner of the site and the USBR right of way for the San Luis Canal located along the eastern side of the site. The proposed power plant site occupies a 148 acre parcel that is currently zoned industrial within the jurisdiction of city of Avenal, Kings County. Permanent project facilities would occupy approximately 34.8 acres of the 148 acre site. Construction activities (primarily equipment laydown), would require temporary use of an additional area comprising approximately 39.3 acres of the 148 acre site.

SOILS

Currently, the project site is a wheat field. The site has been extensively graded, tilled, planted and farmed for over 40 years. Power plant site development will include construction of the power block, office buildings, parking areas and a storm water retention basin. The soil at the proposed power plant site consists of Wasco sandy loam. Wasco sandy loam is very deep, well-drained soil formed on alluvial fans and derived primarily from sandstone. The soil has moderately rapid permeability and good drainage.

The transmission line corridor will traverse areas designated as Prime Farmland and Williamson Act contract lands near and north of Avenal Cutoff Road. The transmission line will follow an existing PG&E regional transmission line corridor, thereby minimizing conflict with ongoing agricultural operations. (Avenal Energy 2008a, Page 6.4-8).

Three soils (Westhaven Loam, and Kimberlina Sandy Loam and Wasco Sandy Loam), occupy the area traversed by the transmission line corridor. The southern portion of the transmission line corridor near the Avenal Energy site is underlain by Wasco Sandy Loam soils. The characteristics of the Wasco Sandy Loam are discussed above. The Westhaven Loam is located at the northern end of the transmission corridor near the Gates Substation. The Westhaven Loam is a very deep, well drained soil found on alluvial fans, formed in alluvium derived predominantly from calcareous sedimentary rock. The Kimberlina Sandy Loam is located along the transmission line corridor between the Westhaven Sandy Loam and the Wasco Sandy Loam. The Kimberlina Sandy Loam is a very deep, well drained soil with moderately rapid permeability found on floodplains and recent alluvial fans.

The water line routes traverse Milham Sandy Loam and Wasco Sandy Loam soils. The Milham Sandy Loam is restricted to a small area adjacent to the San Luis canal. The

remainder of the water line routes traverse areas underlain by Wasco Sandy Loam. Rather than listing the other numerous soil types separately, only the primary soil types are listed below in **Soil & Water Table 2**. Additional soil characteristic data can be found in Table 6.2-3 of the Application for Certification (AFC).

Soil & Water Table 2
Soil Types Potentially Affected & Characteristics

Primary Soil Name	Surface Slope	Erosion Hazard Rating	Drainage	Permeability	Depth	USDA Texture
Milham Sandy Loam	0 to 2%	slight	Well Drained	Slow	0 to 14 inches	Sandy Loam
					14 to 32 inches	Loam, Sandy Clay Loam
					32 to 60 inches	Silty Clay Loam
Wasco Sandy Loam	0 to 5%	moderate	Well Drained	Moderately Rapid	0 to 20 inches	Sandy Loam
					20 to 60 inches	Sandy Loam, Fine Sandy Loam
Kimberlina Sandy Loam	0 to 2%	Slight	Well Drained	Moderately Rapid	0 to 14 inches	Sandy Loam
					14 to 72 inches	Sandy Loam, Fine Sandy Loam
Westhaven Loam	0 to 2%	Slight	Well Drained	Moderately Slow	0 to 7 inches	Loam
					7 to 17 inches	Loam
					17 to 42 inches	Stratified Loam to Silty Clay Loam
					42 to 65 inches	Stratified Loamy Sand to Silty Clay Loam
					65 to 72 inches	Stratified Loam to Silty Clay Loam

Avenal Energy 2008a, Section 6.4.1.1

GROUNDWATER

The proposed project is located in the Westside Groundwater Sub-basin (Westside sub-basin) of the San Joaquin Valley Groundwater Basin within the Tulare Lake Hydrologic Region. The Tulare Lake Hydrologic Region covers approximately 17,000 square miles in the southern half of the San Joaquin Valley. It is bounded by the Diablo Range to the west, the Sierra Nevada Mountains to the east and the Tehachapi Mountains to the south. For management purposes, the Department of Water Resources (DWR) has divided the Tulare Lake Hydrologic Region into 13 groundwater basins. One of the 13 groundwater basins (the San Joaquin Valley Groundwater Basin) is divided into seven sub-basins.

The Avenal Energy site is located in one of the seven sub-basins of the San Joaquin Groundwater Basin called the Westside sub-basin. The Westside sub- basin occupies 640,000 acres and is located in the northwest corner of the San Joaquin Valley Groundwater Basin. The aquifer system comprising the Westside Sub-basin consists of unconsolidated continental deposits of Tertiary and Quaternary age. These deposits form an unconfined to semi-confined upper aquifer and a confined lower aquifer. These

aquifers are separated by an aquitard named the Corcoran Clay (E-Clay) member of the Tulare Formation. The unconfined to semi-confined aquifer (upper zone) above the Corcoran Clay includes younger alluvium, older alluvium, and part of the Tulare Formation. These deposits consist of highly lenticular, variably mixed combinations of clay, silt, and sand, intercalated with occasional beds of well-sorted fine to medium grained sand. The depth to the top of the Corcoran Clay varies from approximately 500 feet to 850 feet. The confined aquifer (lower zone) consists of the lower part of the Tulare Formation and possibly the uppermost part of the San Joaquin Formation. This unit is also composed of lenticular beds of silty clay, clay, silt, and sand interbedded with occasional strata of well-sorted sand. Brackish or saline water underlies the usable groundwater in the lower zone. Unpublished DWR (San Joaquin District) information indicates specific yield ranges from 5.1-17.8% to a depth of 300 feet. Wells in the Westside Sub-basin typically have an average yield of 1,100 gallons per minute.

The Westside sub-basin consists mainly of lands within the Westlands Water District (Westlands). Westlands was formed under California Water District Law in 1952 (Westlands Water District, 1996). Negotiations between Westlands and the US Bureau of Reclamation began on a contract to provide a dependable, supplemental supply of surface water to Westlands through the Bureau's Central Valley Project (CVP) shortly after Westlands' formation.

CVP water deliveries began in 1968. Prior to 1968, the San Joaquin Groundwater Basin was in a severe state of overdraft. Portions of the San Joaquin Valley floor subsided over 30 feet due to groundwater pumping. With the beginning of CVP water deliveries, groundwater pumping was reduced and the groundwater surface rose steadily until reaching 89 feet above mean sea level in 1987, the highest average elevation of record dating back to the early 1940s. The only exception during this period was the increase in pumping and accompanying drop in the groundwater surface elevation due to the 1977 drought and reduced CVP water supply. An increase in pumping to approximately 472,000 AF during 1977 caused a dramatic drop in the groundwater surface elevation of approximately 97 feet. During the 1990s, groundwater pumpage quantities increased significantly because of the reduced CVP water supplies caused by the extended drought and regulatory actions related to the Central Valley Project Improvement Act, the Endangered Species Act, and Bay/Delta water quality. Groundwater pumpage quantities are estimated to have reached 600,000 AF annually during 1991 and 1992 when Westlands received only 25% of its contractual entitlement of CVP water. This increased pumping caused the groundwater surface to decline to 62 feet below mean sea level, the lowest elevation since 1977. An abundant surface water supply due to record precipitation in 1995 reduced the estimated quantity of groundwater pumped to 150,000 AF, allowing the average groundwater surface elevation to increase 78 feet to an average elevation of 27 feet above mean sea level. Overall, due to the mostly water-short years since 1990, the average piezometric water surface elevation has declined approximately 36 feet from December 1989 to December 1995. This decline also resulted in an increase in subsidence in areas of the Central Valley.

The Department of Water Resources estimates the amount of subsidence since 1983 has been up to two feet in some areas of the District with the majority occurring since 1989 (Westlands, 1996). Groundwater levels were generally at their lowest levels in the late 1960s, prior to importation of surface water.

Currently, Westlands controls approximately 604,000 acres of the 640,000 acre Westside sub-basin. As part of Westlands' Groundwater Management Program (Program), Program participants transferred ownership of the groundwater pumping facilities (wells) to Westlands so that electrical power could be provided for pump operation through the Program. Avenal Energy proposes to use three of these wells to provide backup water supply for plant operation.

SURFACE WATER AND FLOOD PLAIN DESIGNATION

Several ephemeral streams descend the Kettleman Hills to the west of the site and one terminates in the site vicinity. The stream closest to the site is Arroyo Largo which terminates approximately 1 ½ miles west of the site. There is no visible evidence of its channel to the east of its terminus. However, a one hundred year flood zone has been mapped along its reach, extending approximately 1 ½ miles to the northeast of its visible terminus.

The other surface water body in the site vicinity is the San Luis Canal. The San Luis Canal is located approximately 200 feet northeast of the project site and supplies water to the city of Avenal and to other central and southern California users. A one hundred year flood zone has been mapped along both sides of the canal. The western edge of the mapped zone encroaches upon the northeastern corner of the project site.

PROJECT WATER SUPPLY

The Avenal Energy facility is estimated to require a maximum annual supply of 104 acre-feet per year (AFY) of water for process use, domestic use, and landscape irrigation. This water would be supplied to the proposed project from the city of Avenal's water treatment facility which obtains untreated surface water from the adjacent San Luis Canal. The San Luis Canal is operated as part of the Central Valley Project (CVP) by the Bureau of Reclamation and delivers water from the Sacramento-San Joaquin Delta (Bureau of Reclamation 2008a).

The CVP manages nine million acre-feet of water and annually delivers about seven million acre-feet of water for agricultural, urban, and wildlife use. The CVP annually provides about five million acre-feet for farms and furnishes about 600,000 acre-feet for municipal and industrial use. Additionally, the CVP dedicates 800,000 acre-feet per year to fish and wildlife and their habitat and 410,000 acre-feet to State and Federal wildlife refuges and wetlands, pursuant to the Central Valley Project Improvement Act (CVPIA) (Bureau of Reclamation 2008b).

The city of Avenal has a contract with the Bureau of Reclamation that allocates 3,500 AFY to the city of Avenal (CEC 2008). Major users of the city of Avenal's allotment of water include the Avenal State Prison (prison) and the city of Avenal itself. The city of Avenal's water use is roughly split between the prison and the city. While the city's use is relatively predictable, the prison's use is highly variable. The variability in the prison's demand is directly connected to the substantial variation in the prison population.

Untreated surface water supplied by the city of Avenal would be used for power plant process needs. Potable water would be provided through the city of Avenal potable water supply (Response to Data Request #92). The estimated annual water requirement for operational workforce needs is 1 AFY.

During the first stage of construction grading for the power block area, the applicant estimates that the maximum daily water demand would be 8,000 gallons. For hydrotesting, maximum daily water usage would be 85,000 gallons with a total use for hydrotesting to be approximately 300,000 gallons.

During project operation, the applicant estimates an annual water demand of 20 AFY with a maximum annual use estimated to be 104 AFY. The average daily rate would be 12.4 gallons per minute (gpm) and the maximum daily rate would be 68 gpm.

Soil & Water Table 3
Avenal's Annual Water Demands

Water Use	Maximum Annual Use (AFY)	Average Annual Use (AFY)	Maximum Daily Use (gpm)	Average Daily Use (gpm)
Process Water	101	15	66	9.6
Operational Workforce	1	1	1	0.9
Landscape Irrigation	2	2	1	0.9
Contingency (10%)	-----	2	------	1.2
Total Power Plant Use	104	20	68	12.4

Backup water for power plant needs would come from groundwater supplied through three high capacity agricultural wells located on surrounding properties owned by Kochergen Farms. Those wells extract high quality fresh water from the confined aquifer on the west side of the Westside Sub-basin.

In conjunction with submittal of a previous application for certification in 2001, Avenal Energy financed the implementation of water conservation measures on the Kochergen Farms property. The conservation measures included the installation of a drip irrigation system and micro sprinklers for the almond orchards located adjacent to the proposed power plant site.

Avenal Energy states that this conservation measure is saving approximately 0.50 acre-foot per acre annually over approximately 280 acres of Kochergen Farms property, which translates to a savings of approximately 140 AFY. In addition, the proposed project will permanently remove approximately 38.4 acres of land from irrigation. Taken together, these measures would save more water each year than the project would use (Response to Data Request 48).

PROCESS AND SANITARY WASTEWATER

The applicant proposes two separate wastewater collection systems for the Avenal Energy Facility; one for process wastewater and one for sanitary wastewater. The process wastewater will be collected and delivered to a zero liquid discharge (ZLD) system. All process wastewater streams will be recycled through the water purification system and returned to the demineralizer as a makeup supply. The remaining sludge will be concentrated in a dryer, which will reduce the sludge to solids for disposal in a landfill. The process wastewater system would also collect any drainage from plant drains and hazardous materials storage areas and route this flow through an oil/water separator before its reuse. No wastewater would be discharged to surface waters (Avenal Energy 2008a, Sections 2.2.2 and 6.5.2.4).

The sanitary wastewater system would collect wastewater from sinks, toilets, and other sanitary facilities for discharge to an onsite wastewater treatment system consisting of a septic tank and an effluent disposal leachfield (Avenal Energy 2008a, Section 2.4.5.4).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section provides an evaluation of the expected direct, indirect and cumulative impacts to soil and water resources that would be caused by construction, operation and maintenance of the project. Staff's analysis of potential impacts consists of a brief description of the potential effect, an analysis of the relevant facts, and application of the threshold criteria for significance to the facts. If mitigation is warranted, staff provides a summary of the applicant's proposed mitigation and a discussion of the adequacy of the proposed mitigation. If necessary, staff presents additional or alternative mitigation measures and refers to specific conditions of certification related to a potential impact and the required mitigation measures. Mitigation is designed to reduce the effects of potentially significant project impacts to less than significant.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Impacts leading to soil erosion or depletion of local/regional water supplies are among those staff believes could be most potentially significant associated with the proposed project. Staff evaluated the potential impacts to soil resources including the effects of construction and operation activities that could result in erosion of soils, the deposition of sediments into surface waters or the contamination of either groundwater or surface water. There are extensive regulatory programs in effect designed to prevent or minimize these types of impacts. Our experience with these programs has demonstrated that they are effective. Therefore, absent unusual circumstances, we conclude that if an applicant is required to identify and implement Best Management Practices (BMPs) these impacts will be less than significant. Soils can be adequately protected by development and implementation of a proper Drainage, Erosion and Sediment Control Plan (DESCP) and a Storm Water Pollution Prevention Plan (SWPPP) for both construction and operational phases of the project. The LORS and Policies presented in **Soil & Water Table 1** were used to determine the significance of project impacts for this proceeding.

Staff also evaluated the potential of the project's construction and operation to cause:

- Substantial depletion or degradation of local or regional surface water supplies, particularly fresh water.
- Substantial depletion or degradation of groundwater supplies or substantial interference with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level.
- Substantial alteration of the existing drainage of the area or increased surface runoff in a manner that would result in on-site or off-site flooding.

DIRECT/INDIRECT IMPACTS AND MITIGATION

The direct and indirect impact and mitigation discussion presented below is divided into a discussion of impacts related to construction and a discussion of impacts related to operation. For each potential impact evaluation, staff briefly describes the potential effect and applies the threshold criteria for significance to its analysis of the facts. If mitigation is warranted, staff provides a summary of the applicant's proposed mitigation and a discussion of the adequacy of the proposed mitigation. In the absence of an applicant-proposed mitigation or if mitigation proposed by the applicant is inadequate, staff mitigation measures are recommended. Staff also provides specific conditions of certification related to a potential impact and the required mitigation measures.

Construction Impacts and Mitigation

Construction of the Avenal Energy facility would include soil excavation, grading, installation of utility connections and the use of water, primarily for dust suppression. Potential impacts to soils related to increased erosion or release of hazardous materials are possible during construction. Potential storm water impacts could result if increased runoff flow rates and volume discharges from the site were to increase flooding downstream. Water quality could be impacted by discharge of eroded sediments from the site, discharge of hazardous materials released during construction, or migration of existing hazardous materials present in the subsurface soil and groundwater. Project water demand could affect quantity of groundwater or surface water resources. Potential construction related impacts to soil, storm water, and water quality or quantity, including the applicant's proposed mitigation measures and staff's proposed mitigation measures are discussed below.

Soil - Construction

Construction activities can lead to adverse impacts to soil resources including increased soil erosion, soil compaction, loss of soil productivity, and disturbance of soils crucial for supporting vegetation or wetlands. Activities that expose and disturb the soil leave soil particles vulnerable to detachment by wind and water. Soil erosion results in the loss of topsoil and increased sediment loading to nearby receiving waters or sewer systems.

Construction of the proposed Avenal Energy facility would permanently disturb approximately 34.8 acres on-site and 1.2 acres off-site. During construction, there would be additional temporary disturbance of approximately 39.3 acres on-site and nine acres off-site. According to the AFC, it will take a 27 month period to complete project construction (AFC, Page 2-46). The earth work will consist of primarily cut and fill

grading with excavation for foundations and underground systems (Avenal Energy 2008a, page 2-48). The Applicant has indicated to staff that no temporary disturbance will extend more than 24 months.

The linear features of the power plant include water lines, natural gas lines and electric transmission lines. The waterline interconnections to the existing groundwater wells that will be used for power plant back up water supply will traverse Prime Farmlands and Williamson Act contract lands. The proposed water line routes generally follow the edges of fields outside of the areas typically planted for agriculture; therefore, their affect on farm land or farming operations will be negligible. Similarly, the natural gas pipeline that will supply fuel to the power plant will be buried along existing roads and only cross Prime Farmland and Williamson Act lands for a short distance near the northwest corner of the site.

In general, soils of the project are highly permeable and have low to moderate water erosion potential. However, the coarse texture of the soils causes them to be overall highly vulnerable to wind erosion. The applicant proposes to apply water during construction as the primary Best Management Practice (BMP) to limit erosion from wind and vehicular traffic.

The Avenal Energy project site will be subject to wind and water erosion during construction and operation. Several factors contribute to the significant potential for water and wind erosion effects, including earth displacement, a long duration for construction, and soil properties that have a low to moderate susceptibility for water erosion and high susceptibility for wind erosion. Prolonged periods of precipitation, or high intensity and short duration runoff events coupled with earth disturbance activities can result in on-site erosion. In addition, high winds during grading and excavation activities can result in wind borne erosion leading to increased particulate emissions that adversely impact air quality. In the absence of proper BMPs and due to the soil type, the project earth work could cause significant fugitive dust and erosion. The implementation of appropriate erosion control measures will help conserve soil resources, maintain water quality, prevent accelerated soil loss, and protect air quality.

In reference to **Soil & Water Table 2**, the predominant surface soil on the proposed Avenal Energy site is sandy loam or very fine sandy loam with a water erosion potential of slight to moderate. However, the surface textures of these soil types have a high potential for wind erosion (Natural Resources Conservation Service Web Soil Survey URL: websoilsurvey.nrcs.usda.gov). The erosion and sedimentation control measures proposed for the construction phase of project development include but are not limited to: wetting the roads in active construction and laydown areas; controlling speed on unpaved surfaces; placing gravel in entrance ways; use of straw bales, silt fences, and earthen berms to control runoff.

Storm Water - Construction

The Avenal Energy site is located in an area of active agricultural production. The site has most recently been used to grow wheat. All wheat stubble and other vegetation will be cleared from the site prior to grading.

Potentially significant water quality impacts could occur during construction, excavation, and grading activities if contaminated or hazardous soil or other materials used during construction were to contact storm water runoff and drain off-site. Water quality could also be potentially diminished if the storm water drainage pattern concentrates runoff in areas that are not properly protected with BMPs, causing erosion of soils and sediment discharge off-site and possibly into surface waters.

During construction, the laydown and parking/staging areas will be graded to generally drain from southwest to northeast by means of sheet flow to intercept trenches that would convey collected storm water to the storm water holding basin. The Power Block area would be graded to create a ridgeline through the center of the Block causing sheet flow to be directed to the northwest and southeast where it would be intercepted by perimeter intercept trenches. Following settlement of suspended sediments and attenuation of peak flows, storm water would discharge into an existing depression immediately east of the storm water holding basin.

Several factors contribute to the significant potential for water erosion effects, including the high volume of earth displacement, a long duration for construction, and soil properties that have a low to moderate potential for water erosion. The applicant recognizes that construction of the Avenal Energy facility will add impervious areas to the site causing an increase in storm water runoff, and has proposed drainage and erosion control measures.

Storm water falling within the plant boundary, outside of potentially contaminated areas, will be collected in a gravity drainage system and routed to the storm water evaporation/percolation basin. The evaporation/percolation basin is designed to capture runoff generated at the site following two back to back 100 year, 24-hour storms. Percolation rates are expected to range between two to six inches per hour. On the basis of two inches per hour, the water surface in the basin will recede approximately 48 inches in a 24 hour period. The basin will be constructed with a spillway on the eastern (down slope) side. The spillway will allow collected water in excess of the design storm to escape the basin and flow into a naturally occurring depression adjacent to the west levee of the San Luis Canal.

Storm water falling onto the relatively small areas containing equipment items that could be a source of contamination will be collected in a segregated drainage system and routed to an oily water sump. The oily water collected in the sump will be treated in an oil/water separator. Clear water will be returned to the plant clear water sump for recycling and the separated oil will be collected and sent to an offsite treatment facility. During grading work, soil would be stabilized by maintaining sufficient water content to make it resistant to erosion by wind and water.

The State Water Resources Control Board (SWRCB), in implementing federal law, will require that the applicant prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) for construction activity. Staff proposes Condition of Certification **SOIL & WATER-1** to ensure compliance with State and Federal LORS. The applicant has prepared a draft Drainage, Erosion and Sediment Control Plan (DESCP), to be implemented during the construction phase of the Avenal Energy facility. The DESCP has included measures for properly storing and containing hazardous materials used,

and hazardous waste generated, during the course of construction. Staff believes the applicant has identified a reasonable conceptual plan and sequence for implementing BMPs in order to avoid significant adverse impacts in consideration of the proposed project and its unique site conditions. Condition of Certification **SOIL & WATER-2** would require the applicant to prepare a Final DESCP for construction to assure these BMPs are implemented. Staff believes that through the proper application of BMPs, the impact to soil and water resources from storm water drainage during construction will be reduced to a level that is less than significant.

A 100-year flood zone has been mapped along both sides of the San Luis Canal. The western edge of the mapped zone encroaches upon the northeastern corner of the project property. No structures or other project facilities are planned for this area. Therefore, staff concludes that construction of the proposed project would neither be impacted nor cause impact resulting from the occurrence of the 100 year flood.

Project Water Supply - Construction

Untreated surface water provided by the city of Avenal would be used to meet the construction water demand. The applicant estimates that the construction period will last 27 months. Additionally, the applicant estimates that daily water demand during construction will average approximately 8,000 gallons per day for dust control, soil compaction, and other needs. The estimated volume of water needed for construction is approximately 20 acre feet, which is also the estimated average annual demand for power plant operation. A sufficient supply of water is available, and has been approved for delivery, to the project from the city of Avenal. Staff concludes that there will not be significant adverse environmental impacts associated with water use during project construction. Staff's impact assessment for water use during operations more thoroughly addresses this volume of water use.

Potable water demands during construction will be minimal. The applicant proposes to use bottled water to supply drinking water for the construction workforce. Portable facilities would be used for sanitary needs and operate without water. Therefore, staff concludes that there will not be significant adverse environmental impacts associated with potable water use during project construction.

Based on Avenal's response to data request #59, groundwater is not expected to be encountered during plant or linear feature excavation activities (Avenal Energy 2008c). If any groundwater is encountered during construction, the water will be collected and discharged to the on-site storm water evaporation/percolation basin (Avenal Energy 2008c, Response to Data request #59).

If groundwater is encountered during construction, it will likely be brackish and not suitable for agricultural or municipal use. Staff agrees the likelihood of encountering useable groundwater during construction is remote, and based on the applicant's proposed dewatering operations, no impacts to groundwater resources will occur during construction of the Avenal Energy facility.

Waste Water - Construction

Hydrostatic testing of pipelines and pressure vessels during construction will require up to 85,000 gallons of water per day. It is estimated that a total of 300,000 gallons of water will be used for testing purposes. After use, this water will be stored in portable tanks and tested. Once the testing confirms that the water is not impacted, it will be released to the storm water basin for disposal through evaporation. If the testing indicates that the water is not suitable for evaporation/ infiltration in the storm water collection basin, it would be disposed of at an appropriate facility.

Operation Impacts and Mitigation

Operation of the Avenal Energy power plant could lead to potential impacts to soil, storm water runoff, water quality, water supply, and waste water treatment. Soils may be potentially impacted through erosion or the release of hazardous materials used in the operation of the facility. Storm water runoff from the Avenal Energy site could result in potential impacts if increased runoff flow rates and volumes discharged from the site increase downstream flooding. Water quality could be impacted by discharge of eroded sediments from the Avenal Energy site, or discharge of hazardous materials released during operation. Water supply for plant processes, cooling, fire protection and landscape irrigation could lead to potential quantity or quality impacts to regional groundwater or surface water resources. Potential impacts to soil, storm water, water quality, water supply, and wastewater related to the operation of the Avenal Energy facility including the applicant's proposed mitigation measures and staff's proposed mitigation measures are discussed below.

Soil - Operations

The applicant has proposed permanent erosion control measures to mitigate all potential soil related impacts from the operation of the Avenal Energy power plant. During operations, the Power Block area will be covered predominantly with gravel (about 70%) and landscaping, serving to prevent wind and water erosion while maintaining a high degree of the pre-project water infiltration capacity into the soil. The balance of the Power Block area (30%) will be covered by foundations and paving. The Sediment/Storm Water Retention Facility will offset the loss of permeable surface area by attenuating storm water discharges and promoting water infiltration into the soil.

Staff believes that if the appropriate BMPs are implemented and the applicant complies with Condition of Certification **SOIL & WATER-3** (which requires implementation of an operation SWPPP), there would be no significant impacts to soil resources during operation of the Avenal Energy facility.

Storm Water - Operations

Staff's evaluation of potential storm water effects of the proposed project involved verifying that storm water discharge rates from the project would not exceed pre-development rates, using the methods specified by local LORS, and reviewing conceptual plans for controlling drainage to assure that appropriate BMPs are planned to avoid degradation of water quality from erosion or contact with contaminants. Without mitigation, post-development runoff from the Avenal Energy site would exceed pre-development runoff due to the increase of impervious areas in proportion to the overall

site. As a result, Avenal Energy will design the drainage features for the site in accordance with the State Water Resources Control Board NPDES General Permits for management of storm water during both the construction and operations phases of the project. Staff proposes Condition of Certification **SOIL & WATER-1, 2, and 3** to ensure compliance with State and Federal LORS.

Staff has reviewed the applicant's conceptual plans for controlling storm water drainage to assure that appropriate BMPS are identified to avoid degradation of water quality from erosion or contact with contaminants. The 25-acre Power Block will be gently sloped and surfaced with equipment and foundations, paving, gravel and landscaping. Non-contact areas of the Power Block (where there is no potential for contamination from hazardous materials) would be graded to drain to the northwest and southeast by means of sheet flow away from equipment foundations and into swales, inlets and/or storm sewer pipes along the perimeter of the Power Block. At the north and south sides of the Power Block, the runoff would then be conveyed eastward by ditches and culverts into the Sediment/Stormwater Retention Facility. Following settlement of suspended sediments and attenuation of peak flows, storm water would either infiltrate into the ground, evaporate or in the case of runoff exceeding design flow, discharge into an existing depression immediately east of the site. During operation, the capacity of the Sediment/Stormwater Retention Facility will be maintained by performing sediment removal as needed. Contact areas (in the vicinity of oil-filled transformers and hazardous materials storage) would drain into a separate collection system and be conveyed through an oil-water separator before it is conveyed to the cooling tower for reuse. Secondary containment structures would be built around the oil-filled equipment and hazardous materials to prevent dispersion in case of a spill. Solid wastes and small amounts of hazardous waste that are generated would be properly accounted for, tracked, handled, and disposed of off-site using licensed transporters and disposal facilities.

A 100-year flood zone has been mapped along both sides of the San Luis Canal. The western edge of the mapped zone encroaches upon the northeastern corner of the project property. No structures or other project facilities are planned for this area. Therefore, staff concludes that operation of the proposed project would neither be impacted nor cause impact resulting from the occurrence of the 100 year flood.

Project Water Supply - Operations

The applicant has proposed to use three sources of water for project operations. Untreated raw surface water obtained from the city of Avenal's water treatment plant would be the primary water supply for all of the project's process water demands. Water for domestic use would be provided from the city of Avenal's potable water supply. The project also proposes to use pumped groundwater for the process backup water supply. The project's potential effects on these three water supplies are evaluated below.

Surface Water

Staff analyzed the project's proposed use of surface water supplied to the site by the city of Avenal to determine if this water use would cause a substantial depletion or degradation of local or regional surface water or groundwater supplies. The city of Avenal has a contract with the Bureau of Reclamation that entitles it to 3,500 AFY

(CEC 2008). The city obtains fresh, untreated surface water through a turn out on the Central Valley Project's (CVP) San Luis Canal. The surface water is pumped to the treatment plant located adjacent to the canal for treatment by filtration and chlorination prior to delivery to the city of Avenal and Avenal State Prison.

The city of Avenal has the capacity to take all of its 3,500 AFY entitled allotment. Over the last ten years, the city of Avenal has drawn an average of 2,639 AFY. Between January 1998 and January 2007, the total annual deliveries to the city of Avenal have been relatively consistent, ranging between 2341 AF in 2001 to 2908 AF in 2006 with an annual average of 2639 AF. The average monthly water delivery to the city of Avenal over this ten year period is approximately 220 AF per month. However, demand for water decreases in the period between November through April and increases in demand between May and October. Average monthly delivery over the last ten years for the period between November and April is 185.5 AF per month. Average monthly delivery over the last ten years for the period between May and October is 254.3 AF per month. During this 10 year period, the maximum monthly delivery to the city of Avenal was 342 AF (Nov 2005) and the minimum monthly delivery was 85 AF (Nov 2002).

The fluctuation in monthly delivery is based on the city's need. Seasonally, more water is needed during the dry hot months from May to October and less is needed during the cool wet months between November and April. Superimposed on this seasonal cycle are the variable population changes at Avenal State Prison. As the population increases or decreases at the prison, the water needs change accordingly.

The maximum monthly consumptive water use for the Avenal Energy power plant operation is estimated to be less than 8.7 AF. This maximum value is approximately 10% of the lowest monthly volume delivered to the city of Avenal over the last 10 years (85 AF /month – Nov 2002). The average monthly consumptive use for the power plant operation is estimated at 1.7 AF. This average value is approximately 2% of the lowest monthly volume delivered to the city of Avenal over the last 10 years. Additionally, surface water storage at the site is sufficient for several days of power plant operation. Therefore, even during periods when canal deliveries to the city of Avenal are reduced, it is likely that an adequate supply of water will be available for power plant operation.

The city of Avenal has the ability and has agreed to provide untreated surface water to Avenal Energy for power plant process needs (Avenal Energy 2008a, Appendix 6.5-3). Untreated surface water would be purchased by Avenal Energy from the city of Avenal in accordance with the agreement provided in the AFC. Avenal Energy would treat (filter) the surface water on-site to a quality necessary for process needs.

Staff identified reduction in flow in the San Luis Canal as the one potential direct impact that could be caused by the project's use of CVP water. Project use of CVP water could also indirectly cause an increase in groundwater pumping where agricultural use of CVP water is dependent upon its availability. Avenal Energy estimates its maximum water use for plant operations would be 104 AFY which would increase the city of Avenal's draw from the San Luis Canal by 3.9%.

The increase in the city of Avenal's current draw from the San Luis Canal due to power plant operation is minor and the power plant's contribution to reduction in available

surface water for other users would also be minor. Staff did not identify any potential for the degradation of surface water or groundwater caused by project use of untreated surface water. Therefore, staff concludes that proposed project use of CVP water would not cause significant impacts to either surface water or groundwater resources.

Staff recognizes that current allocations of water from the Sacramento – San Joaquin Delta are currently under dispute and a federal ruling is pending that may affect current and future water deliveries. However, since the project water use is currently within the limits of the city of Avenal's CVP entitlement, and the CVP and State Water Project entitlements are based on water rights that are managed to protect environmental resources and ensure equitable allocation of the water supply among all Delta water contractors, staff concludes that the proposed project's use of surface water would cause no impact to the regional water supply. To ensure that water use will not exceed the amount evaluated and permitted by the CEC, staff recommends the adoption of Conditions of Certification **SOIL & WATER-4** and **-5**, which establish the project's annual water-use limits and specify requirements for the metering and reporting of water use.

Domestic Water

The applicant previously proposed to plumb the facility and deliver non potable surface water for domestic use. Bottled water was proposed as the source for drinking water. (Avenal Energy 2008a, pp 2-16, 17& 20). In response to Data Request #92, the applicant now states that that facility would be plumbed to distribute potable water obtained from the city of Avenal's potable water supply. The city of Avenal's potable water supply is obtained from the San Luis Canal, treated at the city of Avenal's Water Treatment Plant and distributed to the city of Avenal's water supply system. The city of Avenal has the ability and has agreed to provide up to 10 acre-feet per year of potable water to Avenal Energy for domestic use (Avenal Energy 2008d).

Staff concludes that the proposed project's use of surface water for domestic needs is minimal (1 acre-foot per year maximum) and would cause no impact to the local or regional water supply. However, to ensure that water use will not exceed the amount evaluated and permitted by the CEC, staff recommends the adoption of Conditions of Certification **SOIL & WATER-4** and **-5**, which establish the project's annual water-use limit and specifies requirements for the metering and reporting of water use.

Groundwater

Staff analyzed the project's proposed use of groundwater as a backup supply to determine if this water use would cause a substantial depletion or degradation of local or regional surface water or groundwater supplies. The applicant proposes to use groundwater as a backup supply for process needs during outages of the city of Avenal/CVP water system.

Avenal Energy estimates the maximum annual water use for plant operation to be 104 AF. By averaging, the maximum monthly consumptive water use for the Avenal Energy power plant operation is estimated to be less than 8.7 AF/month. Avenal Energy expects that, if the backup water supply is ever needed, it will be for a relatively short

duration (less than a month). If the backup supply is needed, the applicant proposes to use groundwater that would be pumped from neighboring agricultural wells and piped to the facility.

Avenal Energy does not expect problematic events to occur that would disrupt the physical water delivery in the canal (Avenal Energy 2008c). Avenal Energy stated that the San Luis Canal initiated operation in approximately 1968 and since that date, the canal has not been out of operation. They further state that it would be rare for water quality events to occur that would require an interruption of the use of canal water by the power plant.

Soil & Water Table -4 presents a comparison of groundwater withdrawal vs. groundwater surface elevation changes within the Westside Sub-basin over the last 30 years. This data shows there have been significant fluctuations in the amount of groundwater pumped from the basin. Much of the fluctuation appears to be related to increased demand for groundwater during dry or drought years when surface water deliveries were reduced. Some fluctuations may be due to increased development of agriculture.

Soil & Water Table 4
Trends of Groundwater Surface Elevation Due To Pumping[1]

Crop Year	Acre feet Pumped	Groundwater Surface Elevation (ft ASL)	Elevation Change from previous year (FT)
1978	159,000	-4	**+95**
1979	140,000	-13	-9
1980	106,000	4	**+17**
1981	99,000	11	**+7**
1982	105,000	32	**+21**
1983	31,000	56	**+24**
1984	73,000	61	**+5**
1985	228,000	63	**+2**
1986	145,000	71	**+8**
1987	159,000	89	**+18**
1988	160,000	64	-25
1989	175,000	63	-1
1990	300,000	9	-54
1991	600,000	-32	-41
1992	600,000	-62	-30
1993	225,000	1	**+63**
1994	325,000	-51	-52
1995	150,000	27	**+78**
1996	50,000	49	**+22**
1997	30,000	63	**+14**
1998	15,000	63	0
1999	20,000	65	**+2**
2000	225,000	43	-22
2001	215,000	25	-18
2002	205,000	22	-3
2003	160,000	30	**+8**
2004	210,000	24	-6
2005	75,000	56	**+32**
2006	15,000	77	**+21**
2007	310,000	35	-42
30 Year Annual Average	177,00	31.37	**+4.47**

[1] Table reference: Westlands Water District, Deep Groundwater Conditions Report, Dec 2007

The annual average increase in water levels suggests there has been a significant increase in groundwater storage in the basin over the 30 year period of record. Given the groundwater basin area of about 640,000 acres, and assuming a reasonable estimate of specific yield equal to 10%, staff estimates there has been an increase in storage of about 290,000 AF. The increasing water levels and related estimated increase in storage indicate the proposed use of 8.7 AF would not have a substantial effect on groundwater supplies and recharge in the basin.

The applicant also modeled groundwater pumping from the Kochergen wells (TRC 2008a). The results of this modeling show that drawdown from project pumping under a maximum use scenario (104 AFY) would be about five feet at a distance of 1000 feet from the closest pumping well. The parameters used to develop the model appear to be reasonable. Staff also believes the groundwater pumping scenario used in the model is conservative based on the applicant's proposed temporary use of 8.7 AF. In addition, the proposed pumping of 8.7 AF is minor compared to agricultural pumping that could occur in wells adjacent to or in the project area. Staff believes pumping of any of the three Kochergen wells would not result in significant well interference impacts on other wells within a ¼ mile radius.

Staff also notes that in a past project application, the applicant initially proposed to use fresh groundwater for evaporative cooling. Use of this technology would have required a significant volume of water. To offset this proposed use the applicant funded implementation of a water conservation program at Kochergen Farms. In the applicant's response to Data Request #48, the applicant states that Kochergen Farms installed drip irrigation systems and microsprinklers on almond orchards in the immediate vicinity of the Avenal Energy site shortly after Kochergen Farms received payment of option agreement funds from Avenal Energy in association with the Water Supply Agreement between Avenal Energy and Kochergen Farms dated May 1, 2001. The applicant states that this water conservation method is saving approximately 0.50 acre-foot per acre annually over approximately 280 acres of Kochergen Farms property, or 140 acre-feet of water per year (Avenal Energy 2008b). In addition, the proposed project would permanently remove approximately 34.8 acres of land from irrigation at the site. Taken together, these measures would save more water each year than the project would use, even when compared to a maximum use scenario (104 AFY), and would result in a net reduction in groundwater pumping from the specified wells.

Staff concludes that the proposed limited use of groundwater for emergency backup of process needs would not result in substantial depletion or degradation of groundwater resources or substantially interfere with groundwater recharge. To ensure that groundwater use is consistent with the amount evaluated, staff recommends the adoption of Condition of Certification **SOIL & WATER-4**, which specifies requirements for metering and reporting water use. Staff also believes that if the applicant complies with Condition of Certification **SOIL & WATER-5**, use of the water would be secured and there would be no significant impacts to water resources during operation of the Avenal Energy facility.

Waste Water - Operations

The applicant proposes two separate waste water-collection systems for Avenal Energy. The first is the process waste water system, which collects all waste water generated

from operation of the plant and delivers it to the zero liquid discharge (ZLD) system. The ZLD System would recover about 90% of the waste water for reuse by Avenal Energy, and would concentrate the solids into a salt cake for disposal at a local Class III landfill (Avenal Energy 2008a, page 1-8). Power plant discharges consisting of leakage and drainage from facility containment areas would be collected in a system of floor drains, sumps, and pipes within the Avenal Energy facility and discharged to an oil/water separator (Avenal Energy 2008a, page 2-21). The oil-free water would be reused in the power production cycle. Staff proposes Condition of Certification **SOIL & WATER-6** to ensure the ZLD operates efficiently and the production of waste water is minimal.

The second waste water-collection system proposed by the applicant is the sanitary system. The sanitary system would collect waste water from sinks, toilets, and other sanitary facilities for discharge to an on-site waste water disposal system consisting of septic tank and associated leach lines (Avenal Energy 2008a, Page 2-22). No significant water or soil related impacts are expected due to sanitary waste water provided the applicant complies with Condition of Certification **SOIL & WATER-7.**

Soil and Groundwater Contamination

A Phase I Environmental Site Assessment (ESA) was conducted by TRC for the proposed Avenal Energy site (Avenal Energy 2008a, Appendix 6.14-1). The ESA determined that the site has been a cultivated field since 1967. Chemicals that can be expected to be present in surface soils in agricultural areas typically include herbicides, pesticides and fertilizers. During the site reconnaissance conducted for the ESA no evidence of past or present hazardous substance use, storage, or disposal was observed on the property.

Based on the ESA's determination that no recognized environmental conditions occur on site, the recommendation in the ESA for no further action, and the lack of other indications suggesting the presence of significant residual pesticide concentration in site soils, staff believes that significant pesticide contamination is not likely to occur in on-site soils. However, the ESA did not address whether residual persistent agricultural chemicals are present on the site. To address the potential for site workers to be impacted by residual persistent agricultural chemicals, a soil sampling program has been recommended in the **WASTE MANAGEMENT** section of this FSA.

The Avenal Energy site is located northeast of and down gradient from the Kettleman Compressor Station. The Kettleman Compressor Station is owned by PG&E and has been used to compress natural gas since 1929. Waste water generated at the Kettleman Compressor Station is derived from cooling tower blowdown and site maintenance activities. Waste water from that facility was formerly disposed of in unlined surface impoundments. Chromium-based corrosion inhibitor was added to the cooling tower make up water between 1959 and 1979.

The compressor site is located within the Westside Sub-basin which includes an upper perched aquifer and a deeper regional aquifer system (Avenal Energy 2008a, page 6.5-10). Portions of the aquifer system in the vicinity of the Compressor Station have been contaminated with hexavalent and total chromium due to infiltration from the unlined ponds. Historically, groundwater collected in monitoring wells located down gradient of the disposal ponds has been impacted with chromium constituents. Due to changes in

operation at the compressor facility, chromium concentrations in groundwater began decreasing in 1988 and, as of April 1994, neither hexavalent chromium nor total chromium have been detected in groundwater collected from down gradient monitoring wells at concentrations above their respective method detection limits (MDL). There is no indication that contaminated groundwater is present beneath the Avenal Energy site.

CUMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. “Cumulatively considerable” means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. Cumulative impacts represent impacts that result, directly or indirectly, from project-related activities over the life of the project. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over time in the same area.

Project Water Supply

Staff evaluated the cumulative effect of Avenal Energy’s water use in addition to water uses by other reasonably foreseeable projects that are likely to consume available water. The Avenal Energy site is situated in an extensive agricultural area. Agricultural production is highly variable based on weather and market trends. Agriculture consumes large volumes of water which, in this area, are supplied mainly by deep groundwater wells. Deliveries of surface water for agricultural production are extremely variable and dependent upon climatic conditions. During periods of low precipitation (drought), the BOR severely restricts deliveries of surface water for agriculture. As a result, agriculture relies on groundwater pumped from wells. During these drought conditions, deliveries for industrial and municipal uses have priority over other uses and sufficient surface water supply would be available from the canal. Therefore, staff does not consider that agriculture demand will have an impact on availability of surface water deliveries necessary for power plant needs.

Staff identified four other projects in the Avenal Energy vicinity. These projects include the Panoche Energy Center (located approximately 55 miles to the northwest), the Starwood Power-Midway Peaking Project (located adjacent to the Panoche Energy Center) the Great Valley Ethanol Project (located approximately 27 miles to the northwest) and the San Joaquin Solar 1 & 2 Project (located approximately five miles northwest). A discussion of these projects’ source of water is summarized below:

- The Panoche Energy Center uses groundwater obtained from deep groundwater wells and will not affect surface water supplies.
- The Starwood Power-Midway Peaking Project uses either Baker Farms backwash water or groundwater obtained from the underlying semi-confined aquifer and will not affect surface water supplies.
- The Great Valley Ethanol Plant will use water from the city of Hanford’s municipal water supply system. The city of Hanford obtains its water from the groundwater aquifer beneath the city. All process water from the Great Valley Ethanol Plant will be reused in the process. While water is apparently available as stipulated in the Urban Water Management Plan, the project may require improvements to the water

system. A supplemental water well, tanks or booster pumps may be required to provide the required fire flow. The Great Valley Ethanol Project will not affect surface water supplies for the Avenal Energy facility.

- The proposed San Joaquin Solar 1 & 2 Power Plant project would use groundwater from the Pleasant Valley sub-basin on a temporary basis until recycled water from the city of Coalinga can be delivered. Use of these supplies will not affect the proposed surface water supply. The backup supply for the Avenal Energy Project would be obtained from the Westside groundwater sub-basin. The Westside sub-basin and Pleasant Valley sub-basin are part of the San Joaquin Valley groundwater basin. Water levels in the Pleasant Valley sub-basin are in decline, while water levels and groundwater storage have increased over time in the Westside sub-basin. Staff believes the limited use of groundwater from the Westside sub-basin will have no cumulative impacts on the Pleasant Valley sub-basin.

Based on the information presented above, staff concludes that there are no significant cumulative impacts in the site vicinity that would result from operation of the Avenal Energy facility.

Avenal Energy has executed a service agreement with the city of Avenal for annual delivery of 200 acre-feet of surface water. Staff believes this amount of water is acceptable provided that Avenal Energy complies with proposed Condition of Certification **SOIL & WATER-5**. In accordance with **SOIL & WATER-5**, Avenal Energy would be required to explain why an increase in water use greater than 104 AFY is necessary. Avenal Energy would also be required to obtain approval from the CPM prior to use of this additional volume.

COMPLIANCE WITH LORS

The Energy Commission's power plant certification process requires staff to review each of the proposed project's elements for compliance with LORS and policies. Staff has reviewed the project elements and concludes that the proposed Avenal Energy project would comply with all applicable LORS addressing protection of water resources, storm water management, erosion control, and wastewater discharge requirements. Summary discussions of project compliance with significant LORS and policies are provided below.

CLEAN WATER ACT

Staff has determined that Avenal Energy would satisfy the requirements of the General NPDES Storm Water Permits with the adoption of Conditions of Certification **SOIL & WATER-1** and**-3**, which require compliance with the requirements of the NPDES permits and the development and implementation of a SWPPP for both construction and industrial activities.

PORTER-COLOGNE WATER QUALITY CONTROL ACT

Staff has concluded that Avenal Energy would satisfy the applicable requirements of the Porter-Cologne Water Quality Control Act through implementation of the DESCP and SWPPPs, as well adherence with the discharge requirements of the county's Municipal Storm Water NPDES Permit.

STATE WATER POLICY

Article 10, Section 2, of the state constitution requires that the water resources of the state be put to beneficial use to the fullest extent possible and states that the waste, unreasonable use or unreasonable method of use of water is prohibited. In order to better define what "unreasonable use" means in terms of power plant cooling, the SWRCB issued Resolution 75-58, "Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling" (Resolution 75-58). It sets forth, in priority order, a list of preferable water sources for power plant cooling as follows: (1) wastewater being discharged to the ocean, (2) ocean, (3) brackish water from natural sources or irrigation return flow, (4) inland wastewaters of low TDS, and (5) other inland waters.

In the 2003 IEPR, consistent with State Water Resources Control Board Policy 75-58 and the Warren-Alquist Act, the Energy Commission reiterated State Water Policy, stating it will approve the use of fresh water for cooling purposes by power plants only where alternative water supply sources and alternative cooling technologies are shown to be "environmentally undesirable" or "economically unsound." Staff has concluded that due to the project's design incorporating dry cooling, ZLD, and dry NOx reduction technologies, it is in compliance with the State Water Policy and its intent of reducing the use of fresh water for cooling purposes by power plants.

UNIFORM PLUMBING CODE

Staff has determined that Avenal Energy would satisfy the requirements of the Uniform Plumbing Code by providing all water fixtures used for domestic water conveyance with potable water.

RESPONSE TO PUBLIC AND AGENCY COMMENTS

No public or agency comments were received concerning Soil & Water Resources.

CONCLUSIONS

With the information provided to date for the Avenal Energy Power Plant, staff has not identified any unmitigable significant impacts to Soil and Water Resources provided the proposed conditions of certification are implemented. The following are staff's findings based on its assessment of the proposed Avenal Energy project:

- Implementation of Best Management Practices (BMPs) during Avenal Energy's construction and operation in accordance with effective Storm Water Pollution

Prevention Plans and a Drainage, Erosion and Sediment Control Plan would avoid significant adverse effects that could be caused by transport of sediments or contaminants from the project site by wind or water erosion;

- The proposed primary process water supply for the project is untreated surface water supplied by the city of Avenal. This proposed water supply would not cause a significant adverse environmental impact or affect current or future users of water or adversely impact biological resources, and is consistent with state water use and conservation policies;
- The use of dry cooling and zero liquid discharge technology is consistent with the Energy Commission's water policy;
- Effective operation of a zero liquid discharge system would reuse industrial waste water discharge and produce a waste that can be disposed of in a licensed landfill facility. This would protect surface water and/or groundwater quality from potential degradation;
- The proposed project would be constructed outside the 100-year floodplain and would not exacerbate flood conditions in the vicinity of the project; and
- The proposed project would comply with all applicable federal, state and local laws, ordinances, regulations and standards and potentially significant impacts would be mitigated through the preparation and implementation of various construction and operating plans and compliance with local ordinances.

Staff concludes that there would not be any significant adverse impacts to soil and water resources due to construction and operation of the proposed Avenal Energy Project. With the applicant's adherence to the conditions of certification, there will be no potential significant adverse impacts and therefore, there are no environmental justice issues.

PROPOSED CONDITIONS OF CERTIFICATION

SOIL & WATER-1: The project owner shall comply with the requirements of the general National Pollutant Discharge Elimination System (NPDES) permit for discharge of stormwater associated with construction activity. The project owner shall develop and implement a construction stormwater pollution prevention plan (construction SWPPP) for the construction of the Avenal Energy site, laydown area, and all linear facilities.

Verification: The project owner shall submit to the CPM a copy of the construction SWPPP prior to site mobilization and retain a copy on site. The project owner shall submit copies to the compliance project manager (CPM) of all correspondence between the project owner and the Central Valley Regional Water Quality Control Board regarding the NPDES permit for the discharge of stormwater associated with construction activity within 10 days of its receipt or submittal. Copies of correspondence shall include the notice of intent sent to the State Water Resources Control Board, and the Board's confirmation letter indicating receipt and acceptance of the notice of intent.

SOIL & WATER-2: Prior to site mobilization, the project owner shall obtain CPM approval for a site-specific drainage, erosion, and sediment control plan (DESCP). The DESCP must ensure proper protection of water quality and soil resources, demonstrate no increase in off-site flooding potential, include provisions for sediment and storm water retention, and identify all monitoring and maintenance activities. The DESCP shall contain elements 1 through 9 below outlining site management activities and erosion- and sediment-control BMPs to be implemented during site mobilization, excavation, construction, and post construction (operating) activities.

1. **Vicinity Map** – A map(s) at a minimum scale 1”=100’ shall be provided indicating the location of all project elements (construction site, laydown area, pipelines) with depictions of all significant geographic features including swales, storm drains, and sensitive areas.

2. **Site Delineation** – All areas subject to soil disturbance for the Avenal Energy power plant (project site, laydown area, all linear facilities, landscaping areas, and any other project elements) shall be delineated showing boundary lines of all construction areas and the location of all existing and proposed structures, pipelines, roads, and drainage facilities.

3. **Watercourses and Critical Areas** – The DESCP shall show the location of all nearby watercourses including swales, storm drains, and drainage ditches. It shall indicate the proximity of those features to the Avenal Energy power plant construction, laydown, and landscape areas and all transmission and pipeline construction corridors.

4. **Drainage Map** – The DESCP shall provide a topographic site map(s) at a minimum scale 1”=100’ showing existing, interim, and proposed drainage swales and drainage systems and drainage-area boundaries. On the map, spot elevations are required where relatively flat conditions exist. The spot elevations and contours shall be extended off site for a minimum distance of 100 feet.

5. **Drainage of Project Site Narrative** – The DESCP shall include a narrative of the drainage measures to be taken to protect the site and downstream facilities. The narrative shall include the summary pages from the hydraulic analysis prepared by a professional engineer and erosion control specialist. The narrative shall state the watershed size(s) in acres that was used in the calculation of drainage features. The hydraulic analysis shall be used to support the selection of BMPs and structural controls to divert off-site and on-site drainage around or through the Avenal Energy site and laydown and linear areas.

6. **Clearing and Grading Plans** – The DESCP shall provide a delineation of all areas to be cleared of vegetation and areas to be preserved. The plan shall provide elevations, slopes, locations, and extent of all proposed grading as shown by contours, cross sections, or other means. The

locations of any disposal areas, fills, or other special features shall also be shown. Existing and proposed topography shall be illustrated tying in proposed contours with existing topography.

7. **Clearing and Grading Narrative** – The DESCP shall include a table with the quantities of material excavated or filled for the site and all project elements (project site, laydown area, transmission and pipeline corridors, roadways, and bridges) whether such excavation or fill is temporary or permanent, and the amount of such material to be imported or exported.

8. **Best Management Practices Plan** – The DESCP shall identify on the topographic site map(s) the location of the site specific BMPs to be employed during each phase of construction (initial grading, project element excavation and construction, and final grading/stabilization). BMPs shall include measures designed to prevent wind and water erosion.

9. **Best Management Practices Narrative** – The DESCP shall show the location (as identified in H above), timing, and maintenance schedule of all erosion- and sediment-control BMPs to be used prior to initial grading, during all project element (site, pipelines) excavations and construction, final grading/stabilization, and post-construction. Separate BMP implementation schedules shall be provided for each project element for each phase of construction. The maintenance schedule shall include post-construction maintenance of structural-control BMPs, or a statement provided about when such information will be available.

Verification: No later than 90 days prior to start of site mobilization, the project owner shall submit a copy of the DESCP to Kings County and the Central Valley Regional Water Quality Control Board (CVRWQCB) for review and comment. No later than 60 days prior to start of site mobilization, the project owner shall submit the DESCP with the county's and CVRWQCB's comments to the CPM for review and approval. The CPM shall consider comments by the county and CVRWQCB before approval of the DESCP. The DESCP shall be consistent with the grading and drainage plan as required by Condition of Certification **CIVIL-1**, and relevant portions of the DESCP shall clearly show approval by the chief building official. The DESCP shall be a separate plan from the SWPPP developed in conjunction with any NPDES permit for Construction Activity. The project owner shall provide in the monthly compliance report a narrative on the effectiveness of the drainage, erosion, and sediment-control measures and the results of monitoring and maintenance activities. Once operational, the project owner shall update and maintain the DESCP for the life of the project and shall provide in the annual compliance report information on the results of monitoring and maintenance activities.

SOIL & WATER-3: The project owner shall comply with all of the requirements of the General NPDES Permit for Discharges of Storm Water Associated with Industrial Activity. The project owner shall develop and implement a Storm Water Pollution Prevention Plan (SWPPP) for the operation of the power plant (operation SWPPP). The project owner shall keep the CPM informed of any modifications to the permit.

Verification: The project owner shall submit to the CPM a copy of the operation SWPPP prior to commercial operation and retain a copy on-site. The project owner shall submit to the CPM copies of all correspondence between the project owner and the CVRWQCB about the General NPDES permit for the Discharge of Storm Water Associated with Industrial Activity within 10 days of its receipt or submittal. This information shall include copies of the Notice of Intent and Notice of Termination for the project.

SOIL & WATER-4: The project owner shall use untreated surface water supplied from the city of Avenal Water Treatment Plant as its water supply for process water, landscape irrigation and for other approved non-potable uses. The project owner shall use untreated groundwater supplied from Kochergen Farms' agriculture wells as its backup water supply for process water, landscape irrigation and for other approved non-potable uses. Potable water will be provided to the site from the city of Avenal municipal water supply.

Prior to the use of these water sources for process needs and for domestic use during commercial operation, the project owner shall install and maintain metering devices as part of the water supply and distribution systems to monitor and record, in gallons per day, the total volume(s) of water supplied to Avenal Energy from the water sources. Those metering devices shall be operational for the life of the project.

For the first year of operation, the project owner shall prepare an annual Water Use Summary, which will include the monthly range and monthly average of daily non-potable water usage in gallons per day, and total water used by the project on a monthly and annual basis in acre-feet. Potable water for domestic use on-site shall be recorded on a monthly basis. For subsequent years, the annual Water Use Summary shall also include the yearly range and yearly average water use by the project. The annual Water Use Summary shall be submitted to the CPM as part of the annual compliance report.

Verification: At least sixty (60) days prior to commercial operation of Avenal Energy, the project owner shall submit to the CPM evidence that metering devices have been installed and are operational on the water supply and distribution systems.

The project owner shall submit a Water Use Summary to the CPM in the annual compliance report. The report shall distinguish the recorded water use from city of Avenal water supply and the Kochergen Farms' agriculture wells. The project owner shall provide a report on the servicing, testing and calibration of the metering devices in the annual compliance report.

SOIL & WATER-5: Prior to site mobilization, the project owner shall provide the CPM with two (2) copies of the executed and final Service Agreements for connecting the project's water supply lines (potable for domestic use and untreated for process use) to the city of Avenal's Water Treatment Plant and to the Kochergen Farms' agriculture wells. The Service Agreements shall detail any requirements, conditions, or restrictions on the project owner for the use of the water from the source(s). The project owner shall not connect to

the city of Avenal's water system or to the Kochergen Farm's wells without final approval from the local agency. The project owner shall provide the CPM copies of the final approval from the local agency and all monitoring or other reports required by the Service Agreements. The CPM shall be notified of any violations of the Service Agreements terms and conditions, the actions taken or planned to bring the project back into compliance with the Service Agreements, and the date compliance was reestablished.

The existing will-serve letter from the city of Avenal (Avenal Energy 2008), allocates 200 AFY of combined untreated surface water to Avenal Energy for power plant use and potable water for domestic use. As described in the AFC and restricted here, the project's process water use shall average 20 AFY and not exceed 104 AFY in any single year. If, for any reason, Avenal Energy requires more than 104 AFY, Avenal Energy shall estimate the additional volume needed, explain why additional volume is needed, and acquire approval from the CPM prior to increased use. Similarly, as described in the AFC and restricted here, the project's potable water use shall average one AFY and not exceed 2 AF in any single year. If, for any reason, Avenal Energy requires more than 2 AFY, Avenal Energy shall estimate the additional volume needed, explain why additional volume is needed, and acquire approval from the CPM prior to increased use.

Verification: No later than sixty (60) days prior to site mobilization, the project owner shall submit the executed and final Service Agreement(s) for supplying both the primary and backup process water supplies and the potable water supply to the project. The project owner shall submit any water quality monitoring required by the city of Avenal to the CPM in the annual compliance report. The project owner shall submit any notice of violation of the Service Agreement terms and conditions to the CPM within ten (10) days of receipt, and shall fully explain the corrective actions taken in the next monthly compliance report or annual compliance report, as appropriate. For calculating the total water use, the term "year" will correspond to the date established for the annual compliance report submittal.

No later than sixty (60) days prior to use, the project owner shall submit a request to the CPM for approval for use of process water in excess of 104 AFY.

No later than sixty (60) days prior to use, the project owner shall submit a request to the CPM for approval for use of potable water in excess of 2 AFY.

SOIL & WATER-6: The project owner shall treat all routine process waste water streams with a zero liquid discharge (ZLD) system that results in a residual solid waste. The solid waste shall be disposed of in the appropriate class of landfill suitable for the constituent concentrations in the waste. Surface or subsurface discharge of process waste water from the Avenal Energy power plant is prohibited. The project owner shall operate the ZLD system in accordance with a ZLD management plan approved by the CPM. The ZLD management plan shall include the following elements:

A. a flow diagram showing all water sources and waste water disposal methods at the power plant;

B. a narrative of expected operation and maintenance of the ZLD system;

C. a narrative of the redundant or back-up waste water disposal method to be implemented during periods of ZLD system shutdown or maintenance;

D. a maintenance schedule;

E. a description of on-site storage facilities and containment measures;

F. a table identifying influent water quality; and

G. a table characterizing the constituent concentrations of the solid waste or brine and specifying the permit limits of the selected landfill.

The Avenal Energy operation and wastewater production shall not exceed the treatment capacity of the ZLD system or result in an industrial waste water discharge.

Verification: At least 60 days prior to the start of commercial operation, the project owner shall submit to the CPM evidence that the final design of the ZLD system has the approval of the CBO. At least 60 days prior to the start of commercial operation, the project owner shall prepare a ZLD management plan for review and approval by the CPM. The ZLD management plan shall be updated by the project owner and submitted to the CPM for review and approval if a change in water source or infrastructure is needed.

In the annual compliance report, the project owner shall submit a status report on operation of the ZLD system, including dates and length of disruptions, maintenance activities performed, volumes of interim wastewater streams stored on site, monthly volumes of residual salt cake or brine generated, and results of at least one annual sampling of the waste solids or brine comparing the constituent concentrations to the permit limits of the landfill. The annual compliance report shall contain an evaluation of whether the ZLD is being operated within the parameters described in the ZLD management plan. The ZLD management plan shall be updated by the project owner if the CPM has determined it is necessary based on the project owner's annual compliance report(s).

SOIL & WATER-7: The project owner shall install an on-site wastewater system (septic system) designed for site-specific soils and percolation conditions by a qualified professional. The septic system design shall comply with Chapter 5, Article VI, Sec. 5-83 of the Kings County Code. The project owner shall operate the septic system in accordance with an operations and maintenance manual prepared by a qualified professional.

Verification: No later than ninety (90) days prior to commercial operation, the project owner shall submit to the CPM a copy of the septic system design, construction, and operations plan that has been reviewed and commented on by the Kings County Health Officer.

No later than sixty (60) days prior to commercial operation, the project owner shall submit the operations and maintenance manual to Kings County for review and

comment. No later than thirty (30) days prior to commercial operation, the project owner shall submit the operations and maintenance manual to the CPM for review and approval. The submittal shall include copies of any agency comments the project owner has received.

The wastewater system shall be monitored following either the general standards adopted in State Water Resources Control Board's On-Site Wastewater Treatment System Regulations or the procedures outlined in the CPM-approved operations and maintenance manual. Any testing results or correspondence exchanged between project owner and the California Department of Health Services, the CVRWQCB, or Kings County during operations shall be provided to the CPM in the annual compliance report.

REFERENCES

Avenal Energy 2008a – Application for Certification for the Avenal Energy project, Volumes 1 and 2. Submitted to the California Energy Commission, February 21, 2008.

Avenal Energy 2008b – Supplement to the Application for Certification for the Avenal Energy project. Submitted to the California Energy Commission, March 27, 2008.

Avenal Energy 2008c – Response to California Energy Commission Data Request 1 through 74. Submitted to the California Energy Commission, June 20, 2008.

Avenal Energy 2008d – Will Serve Letter from city of Avenal for both Potable Water and Process Water sent to Jim Rexroad, September 22, 2008.

Bureau of Reclamation 2008a– Reclamation Updates the Central Valley Project Water Supply Allocation, June 03, 2008.

Bureau of Reclamation 2008b – Central Valley Project – General Overview, updated October 7, 2008.

CEC 2008 – California Energy Commission. Personal communication from Casey Weaver – CEC with Melissa Whitten – city of Avenal on 6/26/08.

Department of Water Resources 2003 – Tulare Lake Hydrologic Region, California's Groundwater Bulletin 118, update October 2003.

Department of Water Resources 2006 – San Joaquin Valley Groundwater Basin, Westside Subbasin, California's Groundwater Bulletin 118, update 1/20/2006.

TRC 2008a - Aquifer Drawdown Estimate, Avenal Energy, 2008.

TRC 2008b – Response to Cure Data Request Set 1 for Avenal Energy, October 30, 2008.

TRC 2009 – Final Comments to Avenal Energy (08-AFC-1) Preliminary Staff Assessment, March 4, 2009.

USGS 1989 – Groundwater Flow in the Central Valley, California. USGS professional Paper 1401-D, 1989.

Westlands Water District 1996 – Groundwater Management Plan – 1996.

Westlands Water District 2007- Deep Groundwater Conditions Report, December 2007.

Westlands Water District 2008 – Comments Concerning the Avenal Energy Project, May 29, 2008.

TRAFFIC AND TRANSPORTATION

Testimony of James Adams

SUMMARY OF CONCLUSIONS

Avenal Energy would be consistent with the Circulation Element in the city of Avenal General Plan and the Kings County General Plan and all other applicable laws, ordinances, regulations, and standards (LORS). The project would not have a significant adverse impact on the local and regional road/highway network. However, staff has identified a potential adverse impact on school buses that use the portion of Avenal Cutoff Road adjacent to the site, and proposes a modification to Condition of Certification **TRANS-1** to mitigate the impact. During the construction and operation phases, local roadway and highway demand resulting from the daily movement of workers and materials would not increase beyond significance thresholds established by Kings County and the city of Avenal. During the operational phase, the project would not adversely affect local roads or aviation operations associated with any airport flight traffic or agricultural spraying operations.

INTRODUCTION

In the Traffic and Transportation analysis, staff addresses the extent to which the project may impact the transportation system in the local area. This analysis includes the identification of: (1) the roads and routings that are proposed to be used for construction and operation; (2) potential traffic-related problems associated with the use of those routes by construction workers and truck deliveries; (3) the anticipated encroachment upon public rights-of-way during the construction of the proposed project and associated facilities; (4) the frequency of trips and probable routes associated with the delivery of hazardous materials; and (5) the possible effect of project operations on local airport flight traffic.

In addition to assessing potential project related impacts, staff has reviewed the applicable LORS. The LORS that govern the project are listed below in **Traffic and Transportation Table 1**. This is followed by a discussion of the setting and potential impacts related to traffic operations and safety hazards resulting from the construction and operation of the Avenal Energy project.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Traffic and Transportation Table 1
Laws, Ordinances, Regulations, and Standards

Applicable LORS	Description
Federal	
Code of Federal Regulations (CFR) Title 14, Chapter 1, Part 77	Includes standards for determining obstructions in navigable airspace. Sets forth requirements for notice to the Federal Aviation Administration of certain proposed construction or alteration. Also, provides for aeronautical studies of obstructions to air navigation to determine their effect on the safe and efficient use of airspace.
Title 49, Subtitle B	Includes procedures and regulations pertaining to interstate and intrastate transport (includes hazardous materials program procedures), and provides safety measures for motor carriers and motor vehicles who operate on public highways.
State	
California Vehicle Code, Division 2, Chapter. 2.5, Div. 6, Chap. 7, Div. 13, Chap. 5, Div. 14.1, Chap. 1 & 2, Div. 14.8, Div. 15	Includes regulations pertaining to licensing, size, weight and load of vehicles operated on highways, safe operation of vehicles, and the transportation of hazardous materials.
California Streets and Highway Code, Division 1 & 2, Chapter 3 & Chapter 5.5	Includes regulations for the care and protection of State and County highways, and provisions for the issuance of written permits.
Local	
Kings County General Plan – Circulation Element	Reflects the urban and rural nature of Kings County and establishes standards that guide the development of the transportation system, and management of access to the highway system by new development, throughout the unincorporated areas of the county. Roadways are classified in this system based on the linkages they provide, their function in the hierarchy of roadways, and the importance of the route's service to the residents and businesses of Kings County.
City of Avenal General Plan – Circulation Element	Purpose is to provide a safe, efficient, and adequate circulation system for the City. The Element addresses the circulation improvements needed to provide adequate capacity for future land uses.

SETTING

The Avenal Energy site is located on Avenal Cutoff Road about two miles east of Interstate 5 (I-5) in western Kings County. The facility would be located adjacent to the San Luis Canal. **Traffic and Transportation Figure 1, Regional Transportation System** shows the region surrounding the project site. Transportation figures are located at the end of this analysis.

Plant construction and operation traffic would use the existing roadways, which would include I-5, SR-269, SR-41, SR-198 and Avenal Cutoff Road. Access to the site would be via Avenal Cutoff Road. The local roadways that could be affected by Avenal Energy are shown in **Traffic and Transportation Figure 2, Local Transportation System.** Avenal Cutoff Road is a designated bikeway (Avenal Power 2008a, pp. 6.11-3 & 11-4). The existing roads, highways, and transit modes in the area of the project are identified below.

EXISTING HIGHWAYS AND ROADS

I-5 is a north-south four-lane freeway that connects the Central Valley with northern and southern California. Caltrans records show average daily traffic volume on I-5 in the project area is about 35,400 vehicles per day (Caltrans 2006). About 30% of the daily traffic involves truck movement. Corresponding statistics for State Route (SR)-198 (east-west), SR-296 (north-south), and SR-41 (north-south) are 18,500 (8% trucks), 3,984 (26% trucks), and 14,200 (13% trucks), respectively. These routes are two-lane roads in the general project area.

Avenal Cutoff Road is a two-lane east-west road that provides access to the Avenal Energy site from I-5 and the state highways noted above. East of I-5, it has unimproved shoulders 15-20 feet wide which contain telephone poles. Further out the road shoulders adjoin agricultural fields. Avenal Cutoff Road carries about 5,000 vehicles per day with 16% truck traffic. It also connects with the local circulation network to the east and north accessing communities such as Huron (north), Kettleman City (east), and Fresno (north) via SR-41.

LEVEL OF SERVICE

“Level of Service” (LOS) is a qualitative measure describing operational conditions within a traffic stream. LOS is a term used to describe and quantify the congestion level on a particular roadway or intersection, and generally describes these conditions in terms of such factors as speed, travel time, and delay. The Highway Capacity Manual[1] defines six levels of service for roadways or intersections ranging from LOS A representing the best operating conditions and LOS F the worst. According to the Kings and Fresno County’s Circulation Element of the respective General Plans, LOS D is the lowest (level of congestion) acceptable LOS (Kings County 2004, Fresno County 2000).

Traffic and Transportation Table 2 provides existing daily and peak traffic volume and LOS in the project area. It demonstrates that state routes in the project vicinity operate at LOS A and B. As noted below, Avenal Cutoff Road has a considerable amount of

[1] National Research Council, Highway Capacity Manual, Third Edition, 2000.

traffic as exemplified by the LOS C. This is attributed in part to traffic increases when the Avenal Prison shift changes occur at 6 a.m, 9 a.m., and 10 p.m. (City of Avenal 2008).

AIRPORTS

The Avenal Airport, a private facility, is located about seven miles southwest of the Avenal Energy site. Additional aviation facilities include Harris Ranch Airport (fifteen miles northwest), and Lemoore Naval Air Station (fifteen miles northeast) [Avenal Power 2008a, pg. 6.11-3]. The project site is not in the landing or take-off pattern of any of these facilities. However, the project would be located beneath the Military Operational Airspace of the Lemoore facility. There are no agricultural airstrips in the project area.

Traffic and Transportation Table 2
Roadway Segment Average Daily Traffic Volume and LOS

Roadway Segment	Volume	LOS
I-5 – Intersection with SR-269	34,000[2]	B
SR-198	18,850	A*
SR-41	14,200	A
SR-269	3,984	A
Avenal Cutoff Road	5,031	C

Source: Avenal Power 2008a, Table 6-.11-2, Pg. 6.11-5
[2] Caltrans 2007 Traffic Counts

- SR-198 is currently LOS D during afternoon peak period at the ramp from Avenal Cutoff Road

PUBLIC TRANSPORTATION

The Kings Area Rural Transit provides bus service from Avenal to Hanford six times per day and uses Avenal Cutoff Road (Kings Area Rural Transit 2008a). The Reef-Sunset School District provides school bus service from the city of Avenal to Kettleman City three times per day; 7 a.m., 3:15 p.m., and 3:30 p.m. In addition, schools are let out early on Wednesdays and the bus would pass by the site at 1:20 and 2:20 p.m. The school bus route uses Avenal Cutoff Road between Orange Avenue and I-5 (Reef-Sunset School District 2009a).

RAILROADS

The major rail lines in the vicinity of Avenal Energy site are the Union Pacific (UP) line (leased by the San Joaquin Valley Railroad) which connects the communities of Huron and Exeter, and the Burlington Northern and Santa Fe (BNSF) line spur to the community of Corcoran. The UP line is about eight miles north of the project site and the BNSF line is about 35 miles east of the project site (see **Traffic and Transportation Figure 1).**

[2] Caltrans 2008 – Average Annual Daily Traffic (AADT) for 2006.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

According to Appendix G of the California Environmental Quality Act (CEQA) Guidelines, a project may have a significant adverse effect on traffic and transportation if the project would:

- cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections);
- exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways;
- result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- result in inadequate emergency access; or
- result in inadequate parking capacity; or conflict with adopted policies, plans, or programs.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Construction Impacts and Mitigation

When evaluating a project's potential impact on the local transportation system, staff uses LOS determinations as the foundation on which to base its analysis. The following discussion identifies potential traffic impacts associated with the construction of Avenal Energy, and provides an explanation of the impact conclusion.

The AFC provides an analysis of projected traffic conditions with the addition of project construction traffic trips. Project construction is expected to be completed in 27 months. Construction is expected to commence in April 2010 with commercial operation scheduled to begin on or before June 1, 2012 (Avenal Power 2008a, pg. 1-2). All plant construction workers would park on the Avenal Energy site (Avenal Power 2008a, pg. 1-16). This would also serve as a laydown area for materials and equipment. Staff has determined that the parking area is adequate for the number of construction workers involved in the project.

Construction Workforce Traffic

To determine the amount of vehicle trips to the project site during average and peak construction, the applicant assumed that workers would commute alone during the morning and afternoon peak intervals (7 to 9 AM and 4 to 6 PM). Project construction workers would operate in two shifts; 6:30 a.m. to 3:00 p.m. and 7:30 a.m. to 4:00 p.m. The average number of construction workers would be approximately 320, while the peak workforce would consist of 550 workers during a two month period (months 19

and 20). The applicant used a 15% carpool rate for the construction worker traffic analysis (Avenal Power 2009 J). Given experience with previous projects, staff believes that the estimated construction traffic trips and assumptions about peak construction activity are reasonable. Based on regional demographics and availability of skilled laborers, the construction workers would probably come from Fresno County. However, staff believes that some workers could come from Kern and Kings Counties.

To reach the project site, the applicant assumes construction workers coming from Kings and Fresno County would use SR-41, SR-198 and SR-269 and exit onto Avenal Cutoff Road. They would then go west until reaching the Avenal Energy access road. A left turn (heading south) would lead to the project site. Staff believes that Avenal Energy construction workers from the Bakersfield area could travel on I-5 via SR-41. Staff does not anticipate that construction traffic would degrade the LOS on these roads.

Construction Truck Traffic

Construction of the generating plant would require the use and installation of heavy equipment and associated systems and structures. Heavy equipment would be used throughout the construction period, including trenching and earthmoving equipment, forklifts, cranes, cement mixers and drilling equipment. A passenger car equivalent (PCE) factor of three cars per truck was used to determine the traffic impacts of trucks and heavy equipment deliveries (National Research Council 1994). Project construction is expected to require ten trucks on average and 110 trucks on two days during peak construction (PCE of 30 and 330, respectively per day (Avenal Power 2008a, pg. 6.11-15). In-bound and out-bound truck traffic would arrive and depart the project site using the same route as construction workers.

Total Construction Traffic

Given the 320-person average construction workforce and the 15% carpool rate estimated by the applicant, total average construction traffic impact (workforce and trucks) would be 302 vehicle round trips (272 workers plus 30 PCE for trucks and deliveries), or 700 one-way vehicle trips. Total peak construction traffic impact with 15 per cent carpooling would be 798 vehicle round trips (468 workers plus 330 PCE for trucks and deliveries), or 1596 one-way vehicle trips. The average construction total is about a 12% increase in traffic (when compared to 2007 average daily traffic counts (5,000). Peak construction total is about a 35% increase. Staff believes the LOS C on Avenal Cutoff Road would not degrade during construction, which is consistent with the applicant's projected level of service (Avenal Power 2008a, Table 6.11-4A). Staff is proposing Condition of Certification **TRANS-2** to repair any damage to Avenal Cutoff Road from construction traffic, particularly heavy trucks.

The applicant has identified two potential significant and adverse impacts to local roads from project construction. The first involves the SR-198 eastbound ramp at Avenal Cutoff Road. Currently, the afternoon peak is LOS D which is at the threshold for acceptable/unacceptable congestion level per Caltrans Guide to Traffic Impact Studies (Avenal Power 2008, Table 6.11-4, pg. 6.11-17). During peak construction (in 2011) of the Avenal Energy project the congestion during the afternoon peak (end of construction shift one and two) would increase to an unacceptable level (LOS F). The applicant is proposing mitigation such as hiring an off-duty traffic officer to direct traffic or installing a

trailer-mounted camera activated temporary signal (Avenal Power 2008c). Statf believes that this mitigation is reasonable and is proposing Condition of Certification **TRANS-1,** which incorporates the applicant's proposed mitigation of this potentially significant impact to maintain the existing LOS on the SR-198 eastbound ramp on Avenal Cutoff Road.

The second potential adverse impact involves the intersection of Jayne Avenue and Avenal Cutoff Road. Existing eastbound semi-truck and trailer traffic on Jayne Avenue must cross over the centerline to enter Avenal Cutoff Road and could cause a delay, depending on traffic flow on Avenal Cutoff Road. Though the current situation is less than ideal, the applicant and staff agree that it is unlikely that Avenal Energy construction truck traffic would use this intersection. However, given the possibility of an adverse impact, staff's proposed Condition of Certification **TRANS-1** prohibits project truck traffic from using the Jayne Avenue/Avenal Cutoff Road intersection.

Linear Facilities

Approximately 2.5 miles of 20-inch diameter pipeline would deliver natural gas to the project site. The pipeline would be installed along the south side of Avenal Cutoff Road. The pipeline would connect to a PG&E gas line at the Kettleman Compressor Station southwest of the project site (Avenal Power 2008a, pg. 1-7). Water for all the project needs would be supplied by the City of Avenal's turnout on the San Luis Canal adjacent to the Avenal Energy site. A back-up water supply would be provided by existing groundwater wells via approximately 1.6 miles of new water pipeline. About 6.4 miles of new 230-kV transmission line would interconnect with PG&E's Gates Substation west of the Avenal Energy site (Ibid, pg. 1-7). Traffic impacts from the construction of the linears would be short term in nature, mitigated by cones and flagmen when necessary, and would not significantly impact traffic flow. Proposed Condition of Certification **TRANS-1** would ensure that the project owner works with the city of Avenal to mitigate any significant adverse impact on traffic flows on Avenal Cutoff Road during construction of the linear facilities.

School Bus Route

As noted earlier, the Reef-Sunset Unified School District provides school bus service between the city of Avenal and Kettleman City. The bus route includes Avenal Cutoff Road at 7 a.m., 3:15 p.m., and 3:30 p.m., and at 1:20 and 2:20 p.m. on Wednesdays. Staff is concerned that construction worker and truck traffic could interfere with the school bus service or compromise the safety of the bus or school children. Staff has discussed the issue with the bus driver for the School District who expressed concern with the potential impact project construction traffic may have on the school bus route, and is supported of staff's proposed Condition of Certification **TRANS-1**.

Construction Phase Transport of Hazardous Materials and Waste

Deliveries to the Avenal Energy site would include small quantities of hazardous materials to be used during project construction. The applicant has stated that there would be delivery/disposal of hazardous materials about two trucks per month [Avenal Power 2008a, Table 6.11-5] to and from the site. Materials handling on site would be conducted in accordance with all applicable federal and state statutes (see the

HAZARDOUS MATERIALS MANAGEMENT section of this assessment for more information). The preferred transportation route for hazardous materials would use I-5 and Avenal Cutoff Road.

Operation Impacts and Mitigation

Employee and Truck Traffic

Operation of the power plant would require a labor force of 25 full-time employees that would generate 50 one-way trips to and from the Avenal Energy site. Other project-related trips (i.e. delivery truck) are expected to be minimal (five per day) and would occur during regular business hours. Staff assumes that operational workers would use the same routes as for construction. These minor trip additions to surrounding local streets and highways would not significantly affect the LOS of these roads.

Transport of Hazardous Materials and Waste

The transportation and handling of hazardous substances associated with the project can increase roadway hazard potential. Impacts associated with hazardous material transport to the facility can be mitigated to a less than significant level by compliance with existing federal and state standards established to regulate the transportation of hazardous substances. The applicant intends to comply with all federal and state regulations related to the transportation of hazardous materials (Avenal Power 2006a, pp. 5.11-17 - 21).

Project operation would require use of hazardous substances including sulfuric acid and cleaning and water treatment chemicals. It is estimated that there would be an average of approximately seven truck trips per month including four deliveries per month of aqueous ammonia. In addition, there would be 27 additional truck trips of various hazardous materials every year. A licensed hazardous waste transporter would haul any hazardous waste from the project site to one of three Class 1 hazardous waste landfills in western Kern County near the communities of Buttonwillow and Kettleman City, and in Imperial County near the community of Westmoreland. The handling and disposal of hazardous substances are also addressed in the **WASTE MANAGEMENT, WORKER SAFETY AND FIRE PROTECTION** and **HAZARDOUS MATERIALS** sections of this assessment.

Airport and Aircraft Operations

As noted earlier, the Avenal Airport, a private facility, is located about seven miles southwest of the Avenal Energy site, and the Lemoore Naval Air Station is located fifteen miles northeast. The project site is not in the landing or take-off pattern of either of these facilities. However, the project would be located within the Military Operational Airspace of the Lemoore facility. There are no agricultural airstrips in the project area.

The two HRSG stacks would be 145 feet high, the air cooled condenser would be 139 feet high, and the transmission line towers would be 100 feet high (Avenal Power 2008a, Table 6.13-1, pg.6.13-17). These structures would not penetrate navigable airspace for any airport.

As in other power plant siting cases, staff determines the plume velocities from the HRSGs and other project components to see if they have the potential to destabilize low flying aircraft. A threshold velocity of 4.3 meters per second (m/s) or greater can cause moderate to severe turbulence. Staff estimates that the 4.3 m/s average thermal plume velocity would rise up to almost 1,000 above ground level (AGL) during certain meteorological conditions (calm wind, cool temperatures). The diameter of the thermal plume at this elevation would be 265 feet (80 meters). The peak velocity in the center of the plume could be considerably higher. Staff believes that the Avenal Energy HRSG would have thermal plume velocities resulting in turbulence that could affect low-flying aircraft maneuverability. The thermal plume velocities from the air condenser could be considerably higher and could maintain staff's 4.3 m/s threshold at 2,250 feet AGL. In addition, the diameter of the plume is very large (900 feet (287 meters) compared to the HRSG plume (Aspen 2009).

The existing flight pattern for the Avenal Airport and the Lemoore Naval Air Station does not bring aircraft at 1,500 feet or lower over the project site. However, the project is located beneath Lemoore NAS's Military Operational Airspace. Representatives from the military have reviewed the project and have concluded that it would not have any impact on the military mission in the area (NAVAIR 2008).

Staff has been advised that the agricultural fields near the project area are sprayed by crop-dusting aircraft**.** The applicant controls the 148-acre parcel that surrounds the project site and would implement requirements that would preclude aerial spraying without prior notice and permission from the applicant (Avenal Power 2008d**)**. Based on the potential adverse impact on aircraft encountering plumes from the HSRGs and the air cooled condenser, staff is proposing Condition of Certification **TRANS-3** that would require the project owner to advise the Kings and Fresno County Agricultural Commissioners that crop-dusting aircraft should avoid direct overflight of the project site.

In addition, the visible HRSG plumes rise vertically and would not create ground hugging plumes that could impact vehicle traffic on Avenal Cutoff Road. The project air condenser would not emit visible plumes. Staff concludes that the proposed project, with appropriate mitigation, would not cause a significant adverse impact on aircraft or vehicle operations.

Emergency Services Vehicle Access

The Kings County Fire Department would provide 24-hour fire protection and emergency medical services to the Avenal Energy site. The nearest fire station is in the city of Avenal about six miles west of the project site (Avenal Power 2008a, pg. 6.10-12). Emergency service vehicles would reach the project site via the access road off Avenal Cutoff Road. For a detailed discussion of emergency services concerning adequate ingress/egress serving the facility, see the **WORKER SAFETY AND FIRE PROTECTION** section in this assessment.

CUMULATIVE IMPACTS

The applicant has estimated a 1.5-3.5% increase in traffic per year in the vicinity of the project site and concluded that cumulative traffic impacts are less than significant. Staff

believes this is a reasonable conclusion and appears to be a conservative estimate since it is unlikely that there would be a 3.5 or greater percent increase in traffic each year (City of Avenal 2009). Staff is unaware of any other construction project that would affect Avenal Cutoff Road.

Staff has considered the minority populations (as identified in **Socioeconomics Figure 1**) and low income populations in its impact analysis. There are no unmitigated significant direct or cumulative traffic and transportation impacts, and therefore, no environmental justice issues.

COMPLIANCE WITH LORS

The applicant has provided a table listing all applicable LORS (Avenal Power 2008a, Table 6.11-7, pg. 6.11-31). Staff has concluded that the project as proposed would comply with relevant LORS. **Traffic and Transportation Table 3** presents the project's compliance with all applicable LORS.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff has not received any agency or public comments on the traffic and transportation aspects of the proposed project.

Traffic & Transportation Table 3
Project Compliance with Adopted Traffic and Transportation LORS

Applicable LORS	Description
Federal	
Code of Federal Regulations (CFR) Title 14, Chapter 1, Part 77	Includes standards for determining obstructions in navigable airspace. Sets forth requirements for notice to the Federal Aviation Administration of certain proposed construction or alteration. Also, provides for aeronautical studies of obstructions to air navigation to determine their effect on the safe and efficient use of airspace. Consistent: The project is not located within 20,000 feet of any airport and its structures would not penetrate any navigable airspace. The applicant is not required to file a "Notice of Proposed Construction or Alteration" with the FAA. In addition the project does not have any structure exceeding 200 feet in height which also triggers a notification to the FAA.
Title 49, Subtitle B	Includes procedures and regulations pertaining to interstate and intrastate transport (includes hazardous materials program procedures), and provides safety measures for motor carriers and motor vehicles who operate on public highways. Consistent: Enforcement is conducted by state and local law enforcement agencies, and through state agency licensing and ministerial permitting (e.g., California Department of Motor Vehicles licensing, Caltrans permits), and/or local agency permitting (e.g., Kings County Department of Public Works).

Applicable LORS	Description
State	
California Vehicle Code, Division 2, Chapter. 2.5, Div. 6, Chap. 7, Div. 13, Chap. 5, Div. 14.1, Chap. 1 & 2, Div. 14.8, Div. 15	Includes regulations pertaining to licensing, size, weight and load of vehicles operated on highways, safe operation of vehicles, and the transportation of hazardous materials. Consistent: Enforcement is provided by state and local law enforcement agencies, and through ministerial state agency licensing and permitting, and/or local agency permitting.
California Streets and Highway Code, Division 1 & 2, Chapter 3 & Chapter 5.5	Includes regulations for the care and protection of State and County highways, and provisions for the issuance of written permits. Consistent: Enforcement is provided by state and local law enforcement, and through ministerial state agency licensing and permitting, and/or local agency permitting.
Local	
Kings County General Plan–Circulation Element.	Reflects the urban and rural nature of Kings County and establishes standards that guide the development of the transportation system, and management of access to the highway system by new development, throughout the unincorporated areas of the county. Roadways are classified in this system based on the linkages they provide, their function in the hierarchy of roadways, and the importance of the route's service to the residents and businesses of Kings County. Consistent: The Kings County General Plan's Circulation Element acknowledges that the road system in the project area should operate at LOS C or better. With implementation of proposed Condition of Certification **TRANS-1**, the local roads would meet the LOS standard with the addition of project related traffic.
City of Avenal General Plan-Circulation Element	Purpose is to provide a safe, efficient, and adequate circulation system for the City. The Element addresses the circulation improvements needed to provide adequate capacity for future land uses. Consistent: The project is consistent with this Element by maintaining a safe, efficient, and adequate circulation on Avenal Cutoff Road.

CONCLUSIONS

1. The project as proposed would comply with all applicable LORS related to traffic and transportation, and would not degrade the LOS levels on Avenal Cutoff Road, I-5, or SR-198, 269, and 41.

2. Staff is proposing Condition of Certification **TRANS-1** which would require a construction traffic control plan to provide appropriate mitigation during construction activities.

3. In order to ensure that the current congestion during the afternoon peak period at the intersection of SR-198 and Avenal Cutoff Road does not deteriorate to an unacceptable LOS F, staff agrees with the applicant that a mitigation plan, such as hiring an off-duty traffic officer to direct traffic or installing a trailer-mounted camera activated temporary signal, be implemented.

4. Staff is also proposing Condition of Certification **TRANS-2** which would require a mitigation plan to repair Avenal Cutoff Road if it is damaged by project related traffic.

5. Because of the distance from the nearest airports, proposed mitigation to advise crop dusting aircraft pilots to avoid direct overflight of the Avenal Energy site (see proposed Condition of Certification **TRANS-3**), and no impact on the Lemoore NAS Military Operational Airspace, the project would not impact aviation safety.

6. There would be no significant direct or cumulative traffic and transportation impacts and therefore no environmental justice issues.

PROPOSED CONDITIONS OF CERTIFICATION

TRANS-1 The project owner shall, in coordination with the city of Avenal and Kings County, and in consultation with the Reef-Sunset Unified School District, develop and implement a construction traffic control plan prior to construction site mobilization. Specifically, the traffic control plan shall include the following:

- The use of an off-duty traffic officer or the installation of a trailer-mounted camera activated temporary signal to maintain the existing LOS D during the afternoon peak on the SR-198 eastbound ramp on Avenal Cutoff Road.
- The project owner shall advise project construction contractors and subcontractors that they should not arrive or depart the site within one-half hour of the times noted earlier when school buses use Avenal Cutoff Road between Orange Avenue and I-5.
- Project truck traffic shall avoid using the Jayne Road/Avenal Cutoff Road intersection.
- Traffic safety measures for ingress/egress from the project site to Avenal Cutoff Road shall include at a minimum a full time stop sign, and a flag person during shift changes and heavy equipment ingress/egress.
- Ensure that the construction of the linears uses appropriate mitigation such as cones, signs, trailer-mounted camera, and flagmen/traffic officer to avoid unnecessary disruption of traffic flows on Avenal Cutoff Road;

Verification: At least 90 days prior to the start of site mobilization activities, the project owner shall submit a construction traffic control plan to the city of Avenal, the Kings County Public Works Department, and the Reef-Sunset Unified School District for review and comment, and to the CPM for review and approval, to ensure that the construction of the linears and the increase in construction traffic would not adversely affect traffic flow on Avenal Cutoff Road, and would not degrade existing LOS on the

SR-198 eastbound ramp at Avenal Cutoff Road. The plan shall also describe how workers will be advised to avoid arriving and departing the Avenal Energy site within one-half hour of the time when the school bus uses Avenal Cutoff Road. The project owner shall provide the CPM with a copy of any comments received regarding the construction traffic control plan within 15 days of receipt.

TRANS-2 Prior to site mobilization activities, the project owner shall prepare a mitigation plan for Avenal Cutoff Road should it be damaged by project construction. The plan shall ensure that if Avenal Cutoff Road is damaged by project construction it will be repaired and reconstructed to original or as near original condition as possible. This plan shall include:

- Documentation of the pre-construction condition of Avenal Cutoff Road from I-5 to the access road to the site. Prior to the start of site mobilization, the project owner shall provide to the CPM photographs or videotape of Avenal Cutoff Road.
- Documentation of any portions of Avenal Cutoff Road that may be inadequate to accommodate oversize or large construction vehicles, and identify necessary remediation measures;
- Provide for appropriate bonding or other assurances to ensure that any damage to Avenal Cutoff Road due to construction activity will be remedied by the project owner; and
- Reconstruction of portions of Avenal Cutoff Road that are damaged by project construction due to oversize or overweight construction vehicles.

Verification: At least 90 days prior to the start of site mobilization, the project owner shall submit a mitigation plan for restoring Avenal Cutoff Road to its pre-project condition to the city of Avenal for review and comment, and to the CPM for review and approval.

Within 90 days following the completion of construction, the project owner shall provide photo/videotape documentation to the Kings County Planning Department, and the CPM that the damaged sections of Avenal Cutoff Road have been restored to their pre-project condition.

TRANS-3 Prior to start-up and testing activities, the project owner shall notify the Kings and Fresno County Agricultural Commissioners that due to the potential presence of project thermal plumes with significant size and velocities, crop-dusting aircraft should avoid direct overflight of the Avenal Energy site.

Verification: At least 60 days prior to start-up and testing activities, the project owner shall provide the CPM with a copy of letters advising the Kings and Fresno County Agricultural Commissioners that crop dusting aircraft should avoid direct overflight of the Avenal Energy site.

REFERENCES

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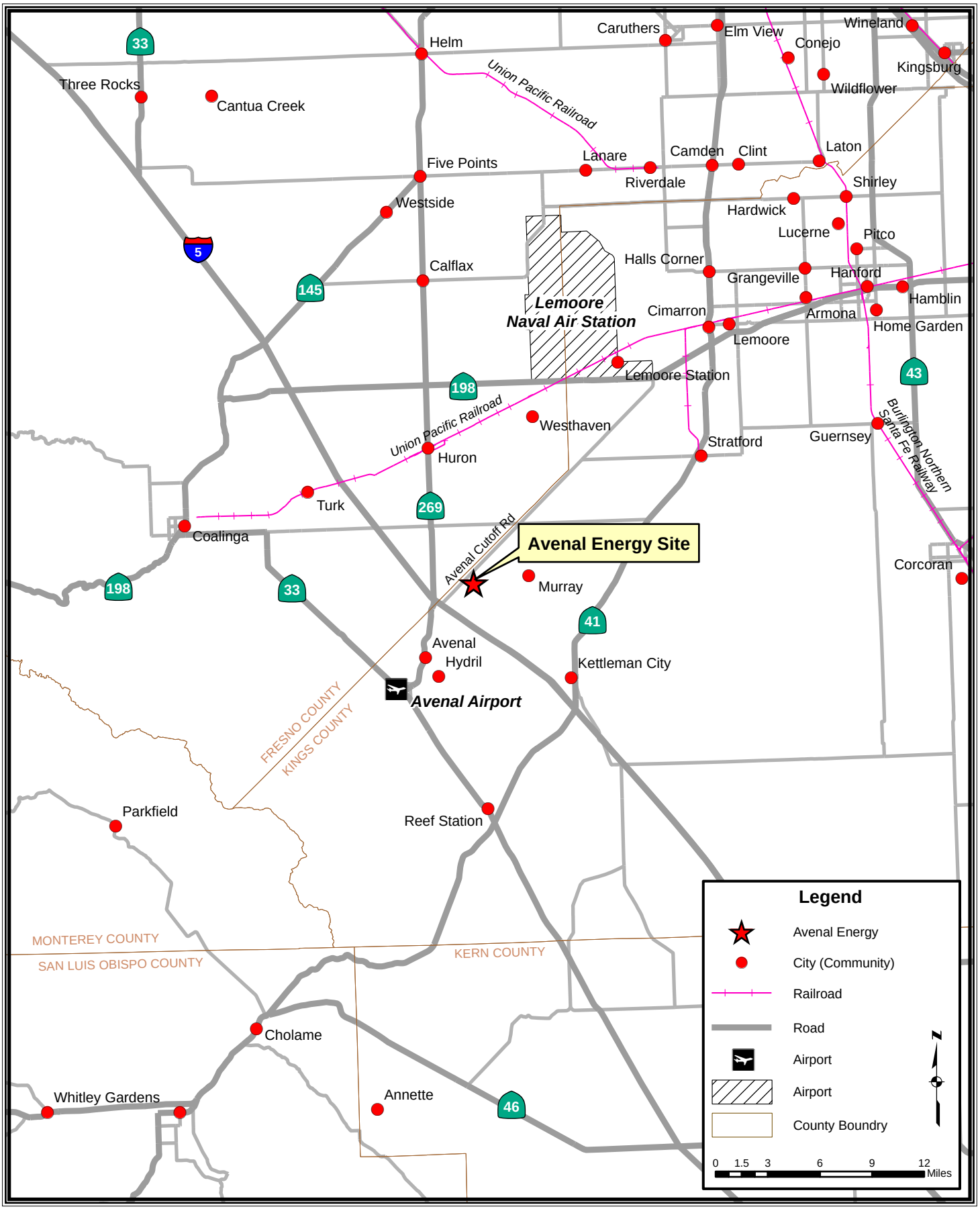
TRAFFIC & TRANSPORTATION - FIGURE 1

Avenal Energy - Regional Transportation System

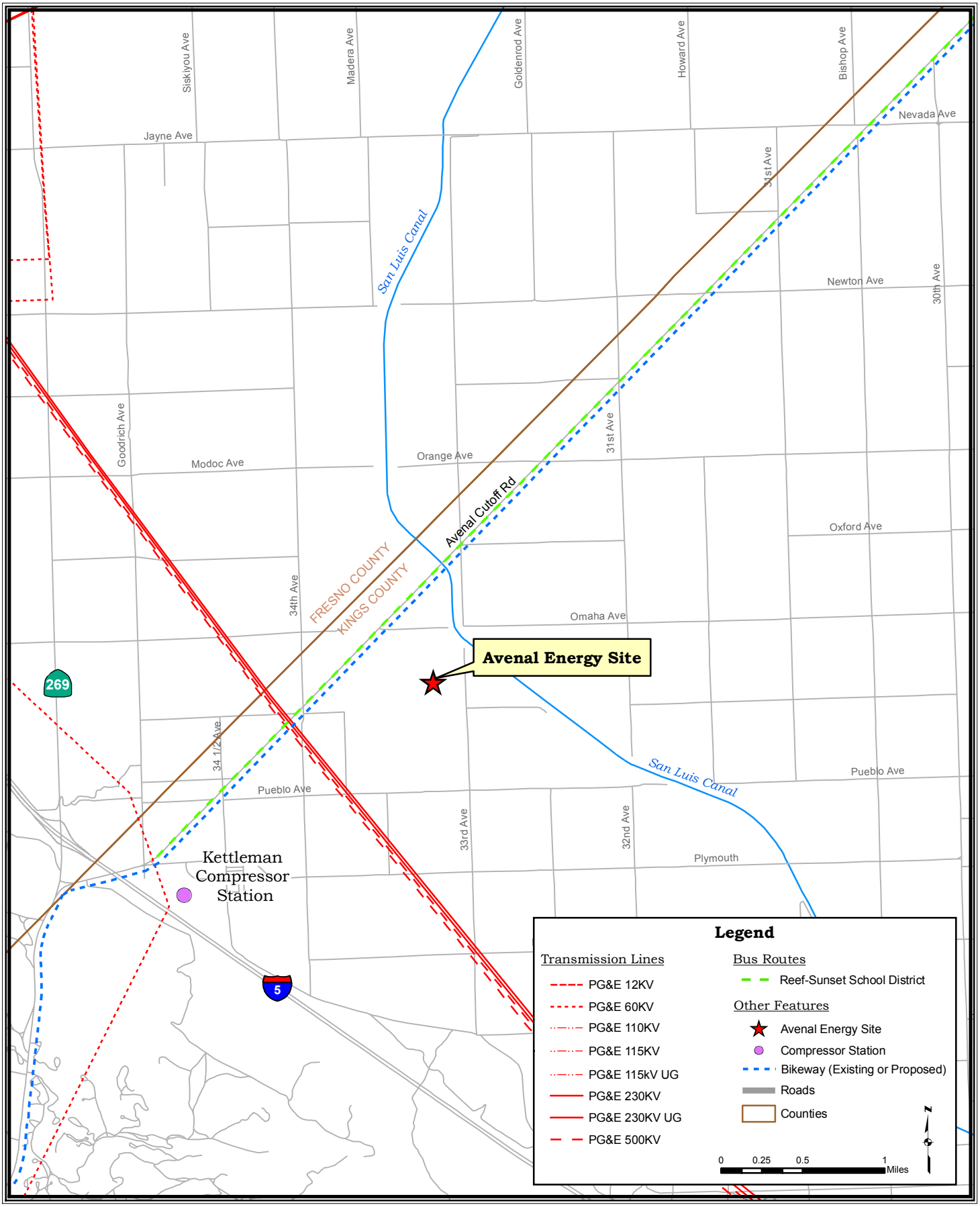


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2009

SOURCE: California Energy Commission

TRAFFIC & TRANSPORTATION - FIGURE 2

Avenal Energy - Local Transportation System



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

SOURCE: California Energy Commission

TRANSMISSION LINE SAFETY AND NUISANCE

Testimony of Obed Odoemelam, Ph.D.

SUMMARY OF CONCLUSIONS

The applicant, Avenal Power Center, LLC, proposes to transmit the power from the proposed Avenal Energy project to the Pacific Gas and Electric transmission grid through PG&E's existing Gates Substation approximately 4.5 miles northwest of the site. The new, single-circuit, 230-kV line to be used would traverse a mostly agricultural land with no nearby residences thereby eliminating the potential for residential electric and magnetic field exposures that in recent years have raised concern about human health effects. The proposed line would be operated in the PG&E service area therefore, its design, erection, and maintenance plan would be according to standard PG&E practices, which conform to applicable laws, ordinances, regulations and standards. With the five proposed conditions of certification, any line-related safety and nuisance impacts would be less than significant.

INTRODUCTION

The purpose of this analysis is to assess the proposed line design and operational plan to determine whether its related field and non-field impacts would constitute a significant environmental hazard in the area around the proposed route. All related health and safety laws, ordinances, regulations and standards (LORS) are 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 non-field 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	
Kings County Noise Element	Sets noise limits for specific land uses.
Fresno County Noise Element	Sets sound level limits at residences and outdoor activity areas.
City of Avenal Noise Element.	Sets noise limits for sensitive land uses.
Hazardous and Nuisance Shocks	
State	
CPUC GO-95, "Rules for Overhead Electric Line Construction"	Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.
Title 8, California Code of Regulations (CCR) Section 2700 et seq. "High Voltage Safety Orders"	Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.

Applicable LORS	Description
National Electrical Safety Code	Specifies grounding procedures to limit nuisance shocks. Also specifies minimum conductor ground clearances.
Industry Standards	
Institute of Electrical and Electronics Engineers (IEEE) 1119, "IEEE Guide for Fence Safety Clearances in Electric-Supply Stations"	Specifies the guidelines for grounding-related practices within the right-of-way and substations.
Electric and Magnetic Fields	
State	
GO-131-D, CPUC "Rules for Planning and Construction of Electric Generation Line and Substation Facilities in California"	Specifies application and noticing requirements for new line construction including EMF reduction.
CPUC Decision 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

According to the applicant (Avenal Power 2008b, pp. 1-3, 1-6, 1-17 through 1-20, and 6.9-1, and 6-9-2), the site for the proposed project is a 148-acre land parcel in the northeastern corner of the City of Avenal in an area zoned for industrial development. The route for the project's 230-kv transmission line would traverse an agricultural area with no nearby residences. As noted by the applicant (Avenal Power 2008b, pp. 1-4, 1-17, and 1-20) the project site was chosen in part for its proximity to the existing Pacific Gas and Electric (PG&E) Gates Substation to which it would be connected to the northwest of the site. The proposed route would be located within a 120-foot right-of-way as it runs adjacent to the existing PG&E transmission corridor.

PROJECT DESCRIPTION

According to the information from the applicant (Avenal Power 2008b, pp. 2-53 through 2-55) the proposed Avenal Energy project's (Avenal Energy's) transmission line will consist of the segments listed below:

- a new, 6.4-mile long, single-circuit overhead 230-kV line routed over the approximately 4.3 miles between the project site and PG&E's Gates Substation to the northwest;
- the project's on-site 230-kV switchyard from which the conductors would extend to the connection points at the Gates Substation; and
- a system reliability upgrade within the Gates Substation to accommodate the generated power.

The proposed line would be connected to the power grid of the area main service utility (PG&E), therefore its conductors would be standard low-corona aluminum steel reinforced cables to be erected on new single tubular support structures. The applied design and construction would be in keeping with PG&E's guidelines that ensure line safety and efficiency together with reliability, and maintainability.

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 LORS. These LORS 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

Aviation Safety

Any potential hazard to area aircraft would relate to the potential for collision in the navigable airspace and the need to file a "Notice of Proposed Construction or Alteration" (Form 7640) with the FAA as noted in the LORS section. The need for such a notice depends on factors related to the height of the structure, the slope of an imaginary surface from the end of nearby runways to the top of the structure, and the length of the runway involved.

The project site is located more than six miles from the nearest population centers, and there are no nearby airports for concern over a collision hazard to aircraft from the presence of the project and related facilities. The nearest airport is the Avenal Airport, which at more than seven miles southwest of the site, is too far according to FAA distance specifications for the project's transmission line to pose a collision hazard to aircraft utilizing that airport (Avenal Power 2008b, p. 6.9-3). Furthermore, the maximum

height of the supporting structures would, at 120 feet, be much less than the 200 feet regarded by the FAA as triggering the concern about aviation safety. Given these facts, staff considers the proposed line structures as not posing an obstruction-related aviation hazard to area aircraft as defined using current FAA criteria.

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 line would be built and maintained in keeping with standard PG&E 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 line. The proposed low-corona designs are used for all PG&E lines of similar voltage rating to reduce surface-field strengths and the related potential for corona effects. Staff does not expect any corona-related radio-frequency interference or related complaints in the general project area with no residences. However, staff recommends Condition of Certification **TLSN-2** to ensure mitigation as required by the FCC in the unlikely event of complaints.

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 Avenal Energy. 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 PG&E lines would be implemented for the proposed project line (Avenal Power 2008b, pp. 1-1 and 2-64). The applicant's intention to ensure compliance with the clearance-related aspects of GO-95 would be an important part of this mitigation approach. Moreover, the line would traverse an agricultural area with no trees of sufficient size to pose a contact-related fire hazard. 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 (Avenal Power 2008b, p. 2-8) 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 (Avenal Power 2008b, p. 2-28). Staff recommends Condition of Certification **TLSN-5** to ensure such grounding.

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, hence the general practice of describing exposure to them together 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 reduction of such fields as feasible 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 high-voltage lines) 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 each new line in California is currently required by the CPUC to be designed according to the EMF-reducing guidelines of the electric utility in the service area involved, its 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 identify a need for significant changes to existing field management policies. Since there are no residences in the vicinity of the proposed project line, there would not be the long-term human residential EMF exposures mostly responsible for the health concern of recent years. The only project-related EMF exposures of potential significance are the short-term exposures of plant workers, regulatory inspectors, maintenance personnel, visitors, or individuals in the immediate vicinity of the line. These types of exposures are short term and well understood as not significantly related to the health concern.

Industrial Standards

The present focus is on the magnetic field because only it can penetrate the soil, buildings and other materials to potentially produce the types of health impacts at the root of the health concern of recent years. As one focuses on the strong magnetic fields from the more visible overhead transmission and other 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 (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 exposure 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 PG&E lines, specific field strength-reducing measures would be incorporated into the design of the proposed line 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.

The applicant has calculated the maximum field strengths at representative points along the proposed route to reflect the potential contribution of Avenal Energy to area EMF levels. Field strengths were calculated for specific points along the line's own 120-foot right-of-way to reflect the interactive effects of all conductors (Avenal Power 2008b, Appendix 6.18-1). Staff has verified the accuracy of the applicant's calculations with regard to parameters bearing on field strength dissipation and exposure assessment. As shown in Table A-6.18-1, the magnetic field intensity within the route would decrease from a maximum of 217 mG to 49 mG depending on the distance from the centerline. The maximum electric field strength was calculated to vary from 0.1 kV/m to 3.8 kV/m. These field strengths reflect the effectiveness of PG&E's field-reducing designs to be applied. These field strengths are similar to those of similar PG&E lines, therefore, staff considers further mitigation to be unnecessary, but would seek to validate the applicant's assumed reduction efficiency from the field strength measurements recommended in Condition of Certification **TLSN-3**.

CUMULATIVE IMPACTS AND MITIGATION

Since the proposed project transmission line and switchyard would be designed according to applicable field-reducing PG&E guidelines (as currently required by the CPUC for effective field management), any contribution to cumulative area exposures should be at levels expected for PG&E 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-3**.

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 PG&E. Since the proposed project line and related switchyard would be designed according to the respective requirements of GO-95, GO-52, GO-131-D, and Title 8, Section 2700 et seq. of the California Code of Regulations, and operated and maintained according to current PG&E guidelines on line safety and field strength management, staff considers the presented design and operational plan to be in compliance with the health and safety LORS of concern in this analysis. The actual contribution to the area's field exposure levels would be assessed from results of the field strength measurements required in Condition of Certification **TLSN-3**.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff received no public or agency comments on the transmission line nuisance and safety aspects of the proposed Avenal Energy.

CONCLUSIONS

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

The potential for nuisance shocks would be minimized through grounding and other field-reducing measures to be implemented in keeping with current PG&E 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 and related complaints especially in the traversed area with no residences. The potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of PUC's General Order 95. Compliance with Title 14, California Code of Regulations, Section 1250, will 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 proposed route.

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed Avenal Energy 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. The long-term, mostly residential magnetic exposure of health concern in recent years would be insignificant for the proposed line given the absence of residences along the proposed route. On-site worker or public exposure would be short term and at levels expected for PG&E 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, and would be located along a route without nearby residences, staff considers the proposed design, maintenance, and construction plan as complying with the applicable laws. With the conditions of certification proposed below, any such impacts would be less than significant.

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 Pacific Gas and Electric's EMF-reduction guidelines.

Verification: At least thirty days before starting construction of 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 project-related lines and associated switchyards. The project owner shall maintain written records for a period of five years, of all complaints of radio or television interference attributable to line operation together with the corrective action taken in response to each complaint.

Verification: All reports of line-related complaints shall be summarized for the project-related lines and included during the first five years of plant operation in the Annual Compliance Report.

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 identified by the applicant in Table A-6.18-1. 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 not later than six months after the start of operations.

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

TLSN-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 five years of 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

Electric Power Research Institute (EPRI) 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.

Avenal Power 2008b. Application for Certification for the Avenal Energy project, Volumes I and II submitted to the California Energy Commission on February 21, 2008.

VISUAL RESOURCES

Testimony of Mark R. Hamblin

SUMMARY OF CONCLUSIONS

Staff has analyzed visual resource related information pertaining to the proposed Avenal Energy project, and found that the project would not introduce an adverse "Aesthetic" impact under the California Environmental Quality Act and Guidelines. At KOP 3, the introduction of the project's publicly visible structures to the existing physical environment would create a significant visual impact; however, with the effective implementation of recommended Condition of Certification **VIS-3** and **VIS-4**, the project would create a less than significant visual character and quality impact. Staff concludes that the project would comply with all applicable laws, ordinances, regulations, and standards pertaining to aesthetics, or preservation and protection of sensitive visual resources.

INTRODUCTION

Visual resources are the viewable natural and human-made features of the environment. In this section, staff evaluates the proposed project's construction and operation. Staff uses the criteria in the "Aesthetic" section of Appendix G in the California Environmental Quality Act (CEQA) Guidelines to determine if the project would introduce a significant impact under CEQA. Staff also determines whether the project would comply with applicable laws, ordinances, regulations, and standards (LORS) pertaining to aesthetics, or preservation and protection of sensitive visual resources.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Visual Resources Table 1 provides a general description of identified adopted federal, state, and local LORS pertaining to aesthetics or preservation and protection of sensitive visual resources relevant to the proposed project.

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

Applicable LORS	Description
Federal	
Transportation Equity Act for the 21st Century of 1998, and Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2005.	The project site does not involve federal managed lands, nor a recognized National Scenic Byway or All-American Road within its vicinity.
State	
California Streets and Highways Code, Sections 260 through 263 – Scenic Highways	Ensures the protection of highway corridors that reflect the State's natural scenic beauty. The project site does not involve a designated State Scenic Highway.
Local	
City of Avenal General Plan, adopted August 11, 2005 • Chapter 6.0 Circulation Element o Policy 6.1 General Circulation and Street System • Chapter 7.0 Land Use Element o Policy 7.4 Industrial Land Use • Chapter 8.0 Community Design Element o Policy 8.3 Commercial and Industrial Development	Includes a provision to provide additional landscaping, including street trees, along existing roadways. Includes a requirement that industrial development should not create significant off-site circulation, noise, dust, visual and hazardous material impacts that cannot be adequately mitigated. Includes a requirement that commercial and industrial development be attractive and of high-quality design to enhance the image of the city.
City of Avenal Municipal Code Title 9-Zoning Ordinance • Section 9.60.08 - Parking Lot Landscaping • Section 9.61.11- Business Signage • Section 9.63 - Site Landscaping • Section 9.79 – Screening of Trash Bins and Dumpsters	Provides site development requirements for projects.
County of Fresno Ordinance Chapter 1, Part VII, Division VI – Zoning Division • Section 875 – Electric Utilities and Services o C. Review Of Electric Transmission Facilities	The section is intended to provide the County of Fresno with a formal means of project review and comment on electric transmission facilities and electric utility facilities which are subject to approval by the California Public Utilities Commission or California Energy Commission. Provision C. includes that routes of proposed electric transmission facilities be submitted to the Director of the Fresno County Department of Public Works and Planning for review either prior to filing an application with a State agency or prior to any property right acquisition or condemnation proceedings; or at least 100 days prior to construction.

SETTING

The proposed Avenal Energy project would be built in the city of Avenal in Kings County, California. The proposed project would be built in the northeastern portion of the city on the east side of the Kettleman Hills (elevation 1,200 feet), two miles east of U.S. Interstate 5 (I-5) on undeveloped property zoned for industrial use that is surrounded by a mosaic of irrigated farmland, orchard, and open space (**Visual Resources Figure 1** – Aerial View Avenal Energy Site and Vicinity).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The California Environmental Quality Act defines a "significant effect on the environment" to mean a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including objects of historic or aesthetic significance" (California Code of Regulations, Title 14, Section 15382).

To determine whether there is a potentially significant visual resources impact generated by a project, Energy Commission staff reviews the project using the CEQA Guidelines Appendix G Environmental Checklist pertaining to "Aesthetics". The checklist questions include the following:

A. Would the project have a substantial adverse effect on a scenic vista?

B. Would the project substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?

C. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

D. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

DIRECT/INDIRECT IMPACTS AND MITIGATION

The impact discussion is presented under the following CEQA headings: scenic vista, scenic resources, visual character or quality, and light or glare.

A. SCENIC VISTA

"Would the project have a substantial adverse effect on a scenic vista?"

There are no publicly designated national, state, or county scenic vistas in the project vicinity; therefore, the project would not cause a significant impact under this criterion. Staff discusses under **C. VISUAL CHARACTER OR QUALITY** (below) the visual impact from selective key observation points.

B. SCENIC RESOURCES

"Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway corridor?"

A scenic resource for the purpose of this analysis includes a unique water feature (waterfall, transitional water, part of a stream or river, estuary); a unique physical geological terrain feature (rock masses, outcroppings, layers or spires); a tree having a unique visual/historical importance to a community (a tree linked to a famous event or person, an ancient old growth tree); historic building; or a designated federal scenic byway or state scenic highway corridor. There are no identified scenic resources on the project site.

Interstate 5 within Kings County is not listed by California Department of Transportation (Caltrans) as a state scenic highway (Caltrans2007). The County of Kings has not designated I-5 or the Avenal Cutoff Road as a county scenic highway.

C. VISUAL CHARACTER OR QUALITY

"Would the project substantially degrade the existing visual character or quality of the site and its surroundings?"

Project

The proposed Avenal Energy would be constructed on an approximate 35-acre (facility site) portion of a 148-acre property (**Visual Resources Figure 2** – Project Elevation View, **Visual Resources Figure 3** – Isometric View Conceptual Design and Major Project Features). Avenal Energy's most publicly visible structures have been identified in **Visual Resources Table 2**.

Visual Resources Table 2
Summary of Proposed Avenal Project
Major Publicly Visible Structures

Project Component	Number of Units	Length, Width, Diameter (approximately)	Height (approximately)	Color and Materials
Heat Recovery Steam Generator Stacks	2	19-foot diameter	145 feet	steel
Air Cooled Condenser	1	278-foot x 258-foot	139 feet	composite
230kV Transmission Pole	43	6-foot diameter	120 feet	steel
Heat Recovery Steam Generator Enclosure	2	125-foot x 35-foot	80 feet	steel
Combustion Turbine Generator Air Inlet	2	60-foot x 45-foot	55 feet	steel
Raw Water/Fire Water Storage Tank	1	65-foot diameter	40 feet	steel

Source: AP 2008a, pg. 6.13-17

Project Viewshed

The viewshed or area of potential visual effect (the area within which the project could potentially be seen) is delineated in **Visual Resources Figure 4** – Project Visibility on Population Density. The applicant's computer-generated analysis viewshed figure is developed from a terrain model base, and does not include trees, structures, and other features in viewers' immediate foreground that might block views toward the project. Orchards, residential landscapes, and farm vehicle storage facilities in the project vicinity could block views toward the project. Because of the generally flat terrain in the project vicinity, the viewshed analysis indicates potential project visibility beyond five miles (AP 2008a, pg. 6.13-23).

There are very few structures located within three miles of the project. The population density in the valley is less than one person per acre, with most of the land used for agricultural production. A few residences are located along Orange Avenue and along Plymouth Avenue over one-mile away from the project. A farm office is located less than one-mile north of the project and visually separated from Avenal Cutoff Road by farm outbuildings and equipment. The remaining land area within three miles of the project is comprised of the PG&E compressor station, San Luis Canal, transmission towers, Kochergan Farms composting facility, roadways, farm-related structures, and various orchards and row crops (AP 2008a, pg. 6.13-23).

Key Observation Point Evaluation

A "Key Observation Point" (KOP) is selected to be representative of the most critical viewsheds from offsite locations where the project would be visible to the public — for example; recreational and residential areas, travel routes, bodies of water, as well as scenic and historic resources. Because it is not feasible to analyze all the views in which a proposed project would be seen, it is necessary to select a KOP that would most clearly display the visual effects of the proposed project. A KOP may also represent a primary viewer group(s) that would potentially be affected by the project. Staff participates with the applicant in the selection of KOPs.

Staff evaluates the existing physical environmental setting, the KOP, and the visual change created by the proposed project to the viewshed.

The applicant has provided KOP photographs that show the existing physical condition without the project, and has prepared photographic simulations to show how the proposed project would appear in the existing condition. See figures attached at the end of this assessment. **Visual Resources Figure 5** shows the locations of the four KOPs used for this analysis:

- KOP 1 – Avenal Cutoff Road Bridge Over U.S. Interstate 5 Looking East;
- KOP 2 – Avenal Cutoff Road Looking East;
- KOP 3 – Entrance To Project Site From Avenal Cutoff Road Looking Southeast; and
- KOP 4 – Avenal Cutoff Road Bridge Over San Luis Canal Looking South.

The project owner provided a discussion, photograph and simulation for a KOP 5 – View from Orange Avenue in the Application for Certification (AFC). KOP 5 is

approximately 1.3 miles from the project site boundary. The KOP was selected to represent a view from the closest residence of four single family residences fronting Orange Avenue. Staff did not include KOP 5 as part of this analysis. Staff reviewed the applicant's KOP 5 information and determined that the project's public visible structures would not be visible at the KOP location due to mature trees surrounding the individual residences and a large acreage amount of orchard (almond trees).

Staff has provided in **APPENDIX VR-1** a list of visual related terms defined by staff that has been used in the KOP evaluation.

KOP 1 – Avenal Cutoff Road Bridge Over U.S. Interstate 5 Looking East

Visual Resources Figure 6 represents the existing view toward the project site along Avenal Cutoff Road approximately two miles southwest of the project site. The KOP was selected to represent an approximate motorist view from the portion of I-5 nearest to the project site. The Avenal Cutoff Road overpass is approximately 25 feet above I-5.

Visual Sensitivity

The most prominent features in the existing view are the Avenal Cutoff Road, orchard, row crops, overhead utility poles and lines in the foreground and middleground, PG&E overhead electric transmission lattice towers in the middleground, and orchard in the background. The estimated public appeal of the visual quality of the KOP 1 view is considered moderately low.

Typically motorists on a freeway system similar to this segment of I-5 would have a moderate to low sensitivity to the visual environment due to their concentration on driving and their focus on their destination.

From this KOP, a motorist traveling along this section of I-5 would have a semi-obstructed view of the project site generated by the earthen support for the elevated overpass and young orchard. The posted speed limit is 70 miles per hour. Views of the project site would be brief from the freeway.

The view towards the project site from the Avenal Cutoff Road bridge can be generally described as a flat checkerboard mosaic of irrigated farmland (row crops such as tomatoes, cotton, and barley) and young orchard (almond and orange trees). From this KOP, a motorist would have a relatively unobstructed view of the project's structures from this elevated position. The visibility of proposed power plant structures at this KOP would be considered moderately high. A viewer at this KOP would consist largely of travelers to the cities of Lemoore and Hanford. The estimated level of viewer concern towards preserving the existing KOP 1 view is considered to be moderately low.

The Average Daily Traffic (ADT) count of vehicle trips along this segment of Avenal Cutoff Road is approximately 5,030 (AP 2008a, pg. 6.13-43). The estimated number of potential motorist exposures is considered moderately high. The legal speed limit along this rural county road is 55 miles per hour. A motorist would have an extended view (longer than two minutes) of the project site from this KOP. The overall viewer exposure is considered to be moderately high.

The overall visual sensitivity (existing view without project) is considered moderate from the KOP 1 location. This assessment is the result of a moderately low visual quality, moderately low viewer concern, and a moderately high overall viewer exposure.

Visual Change

Visual Resources Figure 7 presents a photographic simulation of the proposed project's publicly visible structures after the completion of construction in the KOP 1 view.

The project would introduce to the view geometric forms with vertical and horizontal lines of an industrial character, specifically the two 145-foot tall exhaust stacks, the 40-foot tall raw water/firewater storage tank, the 32-foot tall demineralized water storage tank, and the 139-foot tall ACC unit.

The surrounding orchards as they grow to maturity would help soften the industrial character of the facility in the view.

The degree of contrast (form, line, color, and texture) introduced by the project's publicly visible structures is considered moderate. The contrast would begin to attract attention and begin to dominate the characteristic landscape from this KOP. The project structures are shown in a light color which makes them more visible within the dark color of surrounding orchards. The potential contrast of the structures is considered moderate.

The KOP photo simulation shows that the proportionate size relationship of the visible project structures to other human-made and natural elements would occupy a small portion of the total field-of-view of KOP 1. Project structures would appear subordinate when compared to other elements in the KOP view. The relative visual dominance of the structures as simulated in the KOP 1 view is considered to be low.

The degree of view blockage introduced by project structures is considered to be low. The amount of sky blocked by project structures is considered small. Also, project structures would block a small view of the valley floor. The view blockage is considered to be low.

The overall visual change (visual contrast, visual dominance, view blockage) caused by the introduction of the proposed project's structures into the view is considered to be moderately low as a result of a moderate visual contrast, low visual dominance, and low view blockage.

When considering the moderate overall visual sensitivity and the moderately low overall visual change, staff concludes at KOP 1 the introduction of the proposed project's publicly visible structures to the existing physical environment would create a less than significant visual character and quality impact from this KOP.

KOP 2 – Avenal Cutoff Road Looking East

Visual Resources Figure 8 represents the existing view toward the project site along Avenal Cutoff Road approximately one-mile southwest of the project site. It is also the approximate location of a span of the project's overhead transmission line.

Visual Sensitivity

Avenal Cutoff Road, young orchard, and open space are in the foreground and middleground. A north-south line of overhead transmission towers are in the middleground. The estimated public appeal of the visual quality of the KOP 2 view is considered moderately low.

Avenal Cutoff Road provides access from I-5 to the cities of Lemoore and Hanford. It is a two-lane paved and striped arterial carrying approximately 5,030 vehicles per day. There are no lights or stop signs along this segment of the road. It is not a designated state or county scenic highway. The estimated level of viewer concern towards preserving the existing KOP 2 view is considered to be moderately low.

From this KOP, a motorist would have a relatively unobstructed view of power plant structures on the project site. The visibility of proposed structures at this KOP would be considered high. The legal speed limit along this rural county road is 55 miles per hour. A motorist would have a mid-length duration view (20 seconds to 1 minute) of the project site from this KOP. The overall viewer exposure is considered to be moderately high.

The overall visual sensitivity is considered to be moderate from KOP 2. This assessment is the result of a moderately low visual quality, moderately low viewer concern, and a moderately high overall viewer exposure.

Visual Change

Visual Resources Figure 9 presents a photographic simulation of the proposed project's publicly visible structures after the completion of construction in the KOP 2 view.

The proposed project would introduce geometric forms and vertical and horizontal lines largely associated with the HRSG structures and stacks, and the air cooled condenser (ACC). The structures would not be consistent with existing human-made and natural forms and lines already established in the KOP view.

The project would have a high visibility from this KOP. The project would be seen with minimal filtering by existing vegetation. The exhaust stacks, the HRSGs (heat recovery steam generators) and ACC would be visible above the existing trees. The project would introduce contrasting elements of form, line, and color, particularly in relation to the darker colored surrounding orchards in the foreground and middle ground.

The simulations show the use of a light color surface treatment on major publicly visible project structures. The exhaust stacks and tanks appear to be lighter in color than other structures. The light color structures are noticeable in the view.

The degree of contrast introduced by the project's publicly visible structures is considered moderate. The contrast begins to attract attention and begins to dominate the characteristic landscape from this KOP.

The simulation shows that the proportionate size relationship of the visible project structures to other human-made and natural elements would occupy a small portion of

the total field-of-view of KOP 2. Project structures would appear co-dominate when compared to other elements in the KOP view. The dominance of the structures is considered to be moderately low.

The project structures would block a very small portion of valley floor and sky. The view blockage caused by the proposed project is considered low.

The overall visual change caused by the introduction of the project's structures into the view is considered to be moderately low as a result of a moderate visual contrast, moderately low visual dominance, and low view blockage.

Staff concludes the introduction of project structures would not substantially degrade the existing view at KOP 2. When considering the moderate overall visual sensitivity and the moderately low visual change, staff concludes at KOP 2 the introduction of the proposed project's publicly visible structures to the existing physical environment would create a less than significant visual character and quality impact from this KOP.

KOP 3 – Entrance to Project Site from Avenal Cutoff Road Looking Southeast

Visual Sensitivity

Visual Resources Figure 10 represents the existing view from the entrance to the project site from Avenal Cutoff Road. This KOP is approximately 2,000 feet northwest of the proposed power plant foot print.

The view largely includes unimproved (dirt) roadway and grassland. A portion of the City of Avenal's water treatment plant is visible to the east at the end of the roadway. Orchard is in the background view. There is no visually interesting or engaging feature in the view. The estimated public appeal of the visual quality of the KOP 3 view is considered moderately low visual quality.

From this KOP, a viewer would have an unobstructed view of project structures. The visibility of proposed power plant structures at this KOP would be considered high. The project site is bordered by young orchard on three sides which as they grow to maturity would help to soften the project's view from the road.

At this location the primary viewer would be a motorist traveling along Avenal Cutoff Road. The estimated level of viewer concern towards preserving the existing KOP 3 view is considered to be moderately low.

As previously noted, approximately 5,030 vehicles per day travel along the Avenal Cutoff Road. The estimated number of potential viewer exposures of project structures is considered moderately high. A motorist traveling at 55 miles per hour would have an approximate 10 second view duration of the project. The overall viewer exposure is considered to be moderately high.

The overall visual sensitivity is considered moderate at KOP 3.

Visual Change

Visual Resources Figure 11 presents a photo simulation of the proposed project's publicly visible structures after the completion of construction in the KOP 3 view.

From this KOP, the proposed project would introduce prominent industrial features to the view. The degree of contrast introduced by the project's publicly visible structures would demand attention, would not be overlooked, and would be dominant in the view. The simulation of the completed power plant uses a light gray color surface treatment on major project structures and buildings.

The applicant has provided a conceptual landscape plan (see **Visual Resources Figure 12** – Conceptual Landscape Plan Aerial Photo). The applicant is proposing to landscape undeveloped portions of the 148-acre project site (AP 2008a, pg. 6.13-18). The applicant has provided a photo simulation depicting landscaping at five years of growth on the project site at the KOP. The trees in this view are simulated at heights of 25 feet (see **Visual Resources Figure 13** – KOP 3 Simulation of Project with Landscaping After 5 Years). As landscaping matures, it would reduce the project's visibility while improving the appearance of the project site. As shown in the figure, the right-most approximately one-third of project facilities would be obscured by project-related landscaping when the almond trees lining the access road are approximately four to five years old.

The photo simulation shows that the proportionate size relationship of the visible project structures to other human-made and natural elements would occupy a large portion of the total field-of-view of KOP 3. Project structures would appear dominant when compared to other elements in the KOP view. The dominance of the structures is considered to be high.

The 139-foot tall air cooled condenser and the 145-foot tall HRSG stacks would intrude into the horizon, but do not interfere or block a view of any designated scenic vista or identified scenic resource. The view blockage created by project structures is considered to be moderately low at this KOP.

The overall visual change created by project structures into the KOP 3 view is considered high.

The moderate overall visual sensitivity and the high overall visual change, staff concludes at KOP 3 the introduction of publicly visible structures to the existing physical environment would create a significant visual impact at this KOP.

Mitigation Discussion

Staff has recommended Condition of Certification **VIS-3** as a means to achieve a low degree of color contrast, and **VIS-4**, the formal submittal of a landscaping plan. As the project's landscaping matures, the project's visual character and quality impact would be reduced.

KOP 4 – Avenal Cutoff Road Bridge Over San Luis Canal Looking South

Visual Resources Figure 14 represents the existing view toward the project site from the Avenal Cutoff Road bridge over the San Luis Canal approximately 1/3-mile north north-east of the project site. This KOP was chosen to represent the view for westbound motorists on the Avenal Cutoff Road.

Visual Sensitivity

The KOP view includes the San Luis Canal, dense even order orchards, the tops of structures and tanks at the City of Avenal's water treatment plant in the foreground. Grassland and orchard are in the middleground. In the background is the rolling form silhouette of the Kettleman Hills. The estimated public appeal of the visual quality of the KOP 3 view is considered to be moderate.

From this KOP, a motorist would have a relatively unobstructed view of project structures. The visibility of structures is considered to be high.

Approximately 5,030 vehicles per day travel Avenal Cutoff Road. This estimated number of potential motorist exposures is considered moderately high. The estimated level of viewer concern towards preserving the existing KOP 4 view is considered to be moderately low. A motorist would have a low to moderate duration of view (10 seconds to 20 seconds) of the project site at this KOP. The overall viewer exposure is considered to be moderate.

The overall visual sensitivity is considered moderate at KOP 4.

Visual Change

Visual Resources Figure 15 represents a photo simulation of the proposed project's publicly visible structures after the completion of construction in the KOP 4 view.

From this KOP, the proposed project would introduce unobscured prominent industrial features to the view. The degree of contrast introduced by the project's publicly visible structures would be high.

The simulation of project structures shows that their proportionate size relationship to other human-made and natural elements would be moderate in the KOP 4 view. Structures would be dominant when compared to other elements in the view. The dominance as simulated is considered to be moderately high.

The 145-foot tall HRSG stacks and the 139-foot tall ACC would extend to the ridgeline of the Kettleman Hills in this KOP view. The amount of view blockage created by project structures is considered to be moderately low.

The applicant has provided a photo simulation of landscaping depicting five years of growth on the project site at the KOP 4 location (see **Visual Resources Figure 16 – KOP 4 Simulation of Project With Landscaping After 5 Years**). As the project's landscaping matures, the project's visual character and quality impact would be reduced.

The overall visual change caused by the project's structures is considered to be moderately high.

Staff concludes that the introduction of the project's publicly visible structures would not substantially degrade the existing view at KOP 4. The project structures would create a less than significant visual impact at this KOP.

PROJECT LINEARS

An approximate 6.4-mile long, 230kV transmission line with approximately forty-three 120-foot tall tubular steel poles would connect the project to the PG&E Gates substation. New transmission poles would be located within a new 120-foot wide transmission line easement that would parallel three existing lines of transmission lattice towers. New project transmission lines at road crossings would be noticeable to motorists.

Natural gas would be supplied to the project from the Kettleman Compressor Station by means of a 2.5-mile underground pipeline.

A backup water supply would be provided from Well 24-5 located approximately 2,700 feet west of the site, and Well 18-1 and Well 18-4 approximately 1,000 feet and 3,000 feet north of the project site. The water pipelines are to be underground.

Mitigation Discussion

New transmission poles would introduce contrast along the horizon. Proposed transmission poles would be non-reflective gray colored tubular steel. View blockage created by the transmission poles and overhead wires is anticipated to be low. The installation of the overhead transmission lines is expected to introduce a less than significant visual character and quality impact to the area (see **Visual Resources Figure 17 – Simulation of Transmission Line Tower**).

The project's gas and water pipelines are to be underground.

Staff has proposed Condition of Certification **VIS-1** to ensure the restoration of ground surfaces affected by temporary construction activities and laydown areas, so that these disturbed areas do not become a source of long-term impacts to visual character and quality of the site and its surroundings.

Staff has proposed Condition of Certification **VIS-3** which requires submittal of a surface treatment plan for project structures.

PUBLICLY VISIBLE WATER VAPOR PLUMES

The project will be using an air cool condenser. The air cooled condenser would not introduce publicly visible water vapor plumes.

A small auxiliary boiler[1] is proposed for the project. It could occasionally emit visible water vapor plumes; however, the occasional plumes would be small due to the small size of the boiler. The potential boiler-emitted plumes are not considered visually significant.

CONSTRUCTION IMPACTS

Construction Laydown Area

The approximate total of 35 acres of construction laydown and parking area would be on the 148-acre project site (**Visual Resources Figure 18** – Proposed Construction Parking and Laydown Areas). Construction laydown facilities are to be removed after completion of project construction and the area replanted in row crops.

Construction Activities

Construction activities for the project would occur over an approximate 27-month period. Main activities on the power plant construction site during the construction period include: the installation of the gas turbine generators and power train foundations; erecting of the heat recovery steam generators; the installation of pipe supports, liner plates and baffles and aboveground electrical; exhaust stack fabrication and condenser work; and the installation of the air cooled condenser, aboveground tanks and prefabricated buildings. As project structures are erected that exceed the height of the orchards, they would become publicly visible to viewers.

Construction materials, heavy equipment, trucks, modular offices, and parked vehicles on the construction site and the laydown area would have limited public visibility due to adjacent orchard.

Project construction activities would take place primarily during daylight hours. Lighting that may be required to facilitate nighttime construction activities would, to the extent feasible and consistent with worker safety codes, be directed toward the center of the construction site and shielded to prevent light from straying offsite. Task-specific construction lighting would be used to the extent practical while complying with worker safety regulations. The use of shielded directional exterior lights and fixtures of a non-glare type on the construction site and laydown area would minimize offsite light and glare impacts. Staff has proposed Condition of Certification **VIS-2** formalizing construction lighting measures.

Staff believes the project's proposed construction activities though noticeable from I-5 (KOP 1), and Avenal Cutoff Road (KOPs 2, 3, and 4) with the effective implementation of mitigation measures proposed by the applicant and staff's proposed Conditions of Certification **VIS-1** and **VIS-2**, would generate a less than significant visual effect.

D. LIGHT OR GLARE

"Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?"

[1] The proposed boiler would use 37.4 MMBtu/hr (million British Thermal Units per hour) and operate up to 1,248 hours per year.

Light trespass and glare[2] are quite subjective, they are difficult to eliminate, but they can be minimized through good design practices. In many cases, all that is required is the proper placement of poles, selection of luminaire optics, and shielding accessories.

The proposed project during operation has the potential to introduce light offsite to surrounding properties, and up-lighting to the nighttime sky. If bright exterior lights were not hooded, and lights not directed onsite, they could introduce significant light or glare to the vicinity.

The applicant states the project would introduce new nighttime lighting to the property due to safety and security needs. Lighting would be directed onsite; and would be shielded from public view. Non-glare fixtures and use of switches, sensors, and timers to minimize the time that lights would be needed for safety and security will be specified.

Staff believes that the applicant's description of their proposed light mitigation would reduce offsite light impacts to the area; however, the description does not specifically describe what the mitigation measures may consist of during the project's operation. Staff has proposed Condition of Certification **VIS-5** which requires submittal and approval of a light management plan. With the effective implementation of the proposed light mitigation measures, staff believes that Avenal Energy would not result in a substantial new source of light that could adversely affect existing nighttime views.

The photographic simulations of the completed power plant provided by the applicant show the use of a surface treatment on major project structures and buildings consisting of a light color and a flat finish. The applicant has indicated that all new structures including permanent equipment and fencing would be treated or painted with a non-reflective finish so as to reduce potential glare effects (AP 2008a, pg. 6.13-79). Staff has proposed Condition of Certification **VIS-3** which requires submittal of a surface treatment plan for publicly visible power plant structures and the electric transmission line poles. With effective implementation of **VIS-3**, project structures would not be a source of substantial glare that could adversely affect daytime views.

CUMULATIVE IMPACTS AND MITIGATION

As defined in Section 15355 of the CEQA Guidelines (California Code of Regulations, Title 14), a cumulative impact is created as a result of the combination of the project under consideration together with other existing or reasonably foreseeable projects causing related impacts. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time. In other words, while any one project may not create a significant impact to visual resources, the combination of the new project with all existing or planned projects in an area may create significant impacts. A significant cumulative impact would depend on the degree to which (1) the viewshed is altered; (2) view of a scenic resource is impaired; or (3) visual quality is diminished.

[2] For the purposes of this analysis "direct glare" is used and is defined as the visual discomfort resulting from insufficiently shielded light sources in the field of view.

No planned or foreseeable projects have been identified in the vicinity of the project according to information provided in the AFC and supplements thereto. There is no national, state or county designated scenic vistas, or identified scenic resources in the view that would be impaired by the project.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Staff considers federal, state, and local LORS relevant to aesthetics, or protection and preservation of sensitive visual resources. Staff examines land use planning documents such as a Corridor Management Plan, Local Coastal Plan, General Plan, zoning ordinances, and other government or municipal code sections applicable to the project site and surrounding area pertaining to aesthetics, or protection and preservation of sensitive visual resources.

Visual Resources Table 3 provides an analysis of the applicable LORS pertaining to aesthetics or preservation and protection of sensitive visual resources relevant to the proposed project. Conditions of certification are proposed to make the project conform to a LORS where appropriate.

Visual Resources Table 3
Proposed Project's Consistency with
LORS Applicable to Visual Resources

LORS		Consistency Determination	Basis for Consistency
Source	**Policy and Strategy Descriptions**		
Local			
City of Avenal General Plan, adopted August 11, 2005			
Chapter 6.0 Circulation Element - Policy 6.1 General Circulation and Street System	7. Provide additional landscaping, including street trees, along existing roadways	YES AS PROPOSED	The applicant has provided a conceptual landscape plan aerial photo (see Visual Resources Figure 12) which shows the planting of additional landscaping. The main access road from Avenal Cutoff Road to the facility is to be lined by trees. Broadleaf trees are to be clustered around the edge of the facility.
- Policy 6.2 Parking and Onsite Circulation	3. Soften the impact of expansive parking areas in all land use designations through landscaping and tree planting as prescribed in the City Zoning Ordinance.	YES AS CONDITIONED	Visual Resources Figure 12 shows planting within the parking area. Condition of Certification **VIS-4** would ensure compliance with the provision.
Chapter 7.0 Land Use Element - Policy 7.4 Industrial Land Use	3. Industrial development should not create significant off-site circulation, noise, dust, odor, visual and hazardous materials impacts that cannot be adequately mitigated.	YES AS CONDITIONED	The making of this finding is not limited to the "visual resources" technical section of the FSA, but applies to multiple technical sections within the FSA and is better addressed under those specific sections. The purpose of the Energy Commission's conditions of certification on a project is to prevent adverse effects that a project may generate to the public health, safety and welfare. Conditions of certification are basically comprised of two components; mitigation measures required by CEQA and state or local LORS. For this project, Energy Commission staff reviewed LORS for applicability to the project and proposed conditions of certification on the project to make the project comply or conform accordingly to the identified local LORS

LORS			
Source	**Policy and Strategy Descriptions**	**Consistency Determination**	**Basis for Consistency**
Chapter 8.0 Community Design Element - Policy 8.3 Commercial and Industrial Development	5. Loading and trash facilities shall be located where they may be adequately screened from view (generally at rear of the structures, away from the street).	YES AS CONDTIONED	Although no trash facility areas are depicted on the site plan, staff recommends Condition of Certification **VIS-7** which provides for the screening of commercial sized trash disposal containers.
	6. Long expanses of fence shall be offset and architecturally designed to prevent monotony, and shall include landscape pockets and limited openings.	YES AS CONDITIONED	The project site is 148 acres. The project site plan shows perimeter security fencing (AP 2008a, Figure 2.1-4). The main access road to the facility running half way along the west property boundary is to be lined by trees (see Visual Resources Figure 12). Condition of Certification **VIS-4** would involve the planting of landscaping to break up the monotony of a portion of the perimeter fencing. In addition, offsite orchards border the edge of project site on three sides.
	8. Site design for new industrial development shall consider the following: c. Screening of storage and outdoor work areas and equipment.	YES AS CONDITIONED	The project owner has provided a conceptual landscape plan (see Visual Resources Figure 12). Landscaping proposed along the access road, and the front and side of the facility site would sufficiently screen storage and outdoor work areas and surface level views of equipment from public view.
	d. Landscaping, signage and other features to emphasize the main entrance.	YES AS CONDITIONED	The main access road to the facility is to be lined by trees as shown on Visual Resources Figure 12. No project signage has been presented in the AFC. Staff recommends Condition of Certification **VIS-4** and **VIS-6** to ensure compliance with the city's provision.
	e. Landscaping for all areas not developed for parking, storage, building, etc.	YES AS CONDITIONED	The undeveloped areas on the 148 acre property are to be planted in row crops (e.g., barley, wheat, onions, peppers, lettuce, melons, or tomatoes). The conceptual landscape plan shows the planting of 15-gallon trees at various locations (see Visual Resources Figure 12). Condition of Certification **VIS-6** would ensure that landscaping is installed and maintained in a manner acceptable to the city.

LORS			
Source	**Policy and Strategy Descriptions**	**Consistency Determination**	**Basis for Consistency**
	9. Design elements which are undesirable and should be avoided include: a. Large, blank, flat wall surfaces. b. Exposed, untreated precision block walls. c. Chain link fence and barbed wire. d. False fronts. e. “Struck on” mansard roofs. f. Materials with high maintenance (such as stained wood, shingles or light gauge metal siding). g. Mirror window glazing. h. Loading doors facing the street. i. Exposed roof drains.	YES AS PROPOSED	Project design elements as shown in the photo simulations, site plan, and elevation drawings do not include items identified in a., b., d., e., f., g., h., and i. Regarding c. The project’s security fencing is to consist of seven-foot tall chain link fencing topped with barbed wire (AP 2008f). The applicant’s proposed security fencing involves design elements that may normally not be considered desirable by the city. However, the project site is separated from the residential and commercial districts of the City of Avenal by a distance of about six miles and the intervening topography of the Kettleman Hills. In addition, the site is surrounded by agricultural land, primarily orchard. The City zoned the project site to allow development of an industrial park, in part due to its proximity to I-5 and to the natural gas supply at the PG&E Kettleman compressor station. The site is currently undeveloped, unimproved industrial zoned land that has been in continuous farming pending an industrial project being developed on the site.
	10. Where industrial development abuts non-industrial uses, appropriate buffering techniques shall be employed such as setbacks, screening landscaping, or some combination of these.	YES AS CONDITIONED	The applicant has provided a conceptual landscape plan (see Visual Resources Figure 12). Landscaping is proposed along the access road, and the front and side of the facility site.
	15. When security fencing is required, it should be a combination of solid pillars, or short solid wall segments, wrought iron grillwork and not include barbed wire.	YES AS PROPOSED	The project’s security fencing is to consist of seven-foot tall chain link fencing and barbed wire. No combination of solid pillars, short solid wall segments or wrought iron grillwork is proposed by the applicant. See above response for *9. Design elements which are undesirable and should be avoided.*

LORS		Consistency Determination	Basis for Consistency
Source	**Policy and Strategy Descriptions**		
City of Avenal Municipal Code Title 9 - Zoning Ordinance			
Industrial (M-2)	Heavy industrial use		
Minimum Yard Setbacks	Minimum Front Yard: 25 feet Minimum Side Yard: 10 feet Minimum Rear Yard: 5 feet	YES AS PROPOSED	As depicted on the conceptual landscape plan aerial photo (Visual Resources Figure 12), the project would comply with the yard setbacks for the city's M-2 zone district.
Maximum Structure Height	Maximum Height: None	YES AS PROPOSED	There are no height limitations for industrial buildings within the M-2 zone district.
Section 9.60.08 G	All parking lots shall have one 15-gallon shade tree planted every three (3) parking spaces along parking rows. Fifty percent of the paved parking lot's surface shall be shaded by tree canopies within 10 years of planting.	YES AS CONDITIONED	Visual Resources Figure 12 shows the planting of 15-gallon shade trees within the parking area. The project will be operated and maintained by approximately 25 full-time employees (AP 2008a, page 6.11-21). If one parking space is provided for each employee, the applicant would need to provide 25 parking spaces and plant a minimum of eight 15-gallon shade trees in the parking lot. Condition of Certification **VIS-4** would ensure compliance with the city's provision.
	For all parking lots containing six or more parking spaces, at least 5% of the total ground area of the parking lot shall be landscaped.		
Section 9.60.08 L	All landscape planters shall be provided with an automatic irrigation system.		
Section 9.61. 11	Businesses may have one monument sign up to 64 square feet in size in M-2 zoned areas.	YES AS CONDITIONED	The AFC for the proposed project does not discuss the installation of onsite and offsite signs. Staff has recommended Condition of Certification **VIS-6** to ensure compliance with the city's provision.
	One wall sign is permitted for each business per street frontage. Up to 75 square feet is allowed for the primary frontage and 37.5 square feet per secondary frontage up to an aggregate of 150 square feet.		

LORS		Consistency Determination	Basis for Consistency
Source	**Policy and Strategy Descriptions**		
Section 9.63.01 A	Plant materials consistent with Climate Zones 8 & 9 as identified in the Sunset Western Garden Book shall be used in all landscaping plans. Landscaping plans shall emphasize the use of drought-tolerant species, grouped by similar water usage.	YES AS CONDITIONED	Condition of Certification **VIS-4** would ensure compliance with the city's landscaping requirements, and that landscaping is installed and maintained in a manner acceptable to the city.
Section 9.63.01C	All landscaping as required in the Zoning Ordinance of the city of Avenal shall be reviewed by the Community Development Director as to the type, density of planting and size of plants intended for use.		
Section 9.63.01D	All landscaped areas in commercial, industrial, and multi-family projects shall be surrounded with six-inch high concrete curbing, unless waived by the Community Development Director.		
Section 9.63.07 A	Irrigation plans shall be required to be submitted along with landscape plans. Irrigation plans must show an irrigation conformance calculation with a 10% safety margin.		
Section 9.79.08 N	Trash bins or dumpsters shall be kept within an enclosed building, trash enclosure, or screened from public view to the maximum extent feasible.	YES AS CONDITIONED	No trash facility areas are depicted on the site plan. If trash facilities are proposed Condition of Certification **VIS-7** would ensure compliance with this city provision.
County of Fresno Ordinance Code Division VI Zoning Division			
Section 875 Electric Utilities and Services	C. REVIEW OF ELECTRIC TRANSMISSION FACILITIES The routes of proposed electric transmission facilities shall be submitted to the Director of the Fresno County Department of Public Works and Planning for review either prior to filing an application with a state agency or prior to any property right acquisition or condemnation proceedings; or at least 100 days prior to construction.	YES AS CONDITIONED	Staff has recommended Condition of Certification **VIS-8** which allows review and comment by the Director of the Fresno County Department of Public Works and Planning.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

STAFF RESPONSE TO APPLICANT'S VISUAL COMMENTS ON PRELIMINARY STAFF ASSESSMENT DATED MARCH 4, 2009

New text is underline and bolded and deleted text is shown in strikeout.

1. **Applicant comment** - A revised site layout drawing and revised estimates of disturbed acres are provided with these comments to the PSA. The revised layout should be used in place of the former project layout shown in Visual Resources – Figure 4.

   Staff response – Visual Resources – Figure 4 has been revised for the FSA.

2. **Applicant comment** - Paragraph 7 of the Conclusions section (p. 4.12-20) appears to be inconsistent with the visible plume analysis on PSA pgs. 4.12-13 and 4.12-14.

   Staff response – Paragraph 7 in the PSA Conclusions has been revised in the FSA.

3. **Applicant comment** - Paragraph 8 of the Conclusions section (p. 4.12-20) appears to be an overstatement based on the minority population description on PSA p. 4.8-3.

   Staff response – PSA paragraph 8 has been deleted in the FSA.

4. **Applicant comment** – **PSA Page 4.12-2** - The proposed Avenal Energy would be constructed on an approximate ~~25~~ **34.8**-acre (facility site) portion of a 148-acre property (**Visual Resources Figure 2** – Project Elevation View, **Visual Resources Figure 3** – Isometric View Conceptual Design and Major Project Features).

   Staff response – Staff has revised the facility site acreage in the FSA.

5. **Applicant comment** – **Page 4.12-3** - Transmission Line – An approximate ~~5~~ **6.4**-mile long, 230kV transmission line with approximately forty **three** 120-foot tall tubular steel poles from Avenal Energy to the PG&E Gates Substation.

   Process Water - A backup water supply would be provided from existing **Well 24-5 located approximately 2700 feet west of the site, and** Well 18-1 and Well 18-4 approximately 1,000 feet and 3,000 feet north of the project site. The water pipelines would be installed underground.

   Natural Gas – Natural gas would be supplied from the Kettleman Compressor Station by means of a two **2.5**-mile underground pipeline.

   Construction Laydown **and other temporary disturbances** ~~Area~~ – **In addition to the approximately 34.8 acres of permanent facilities on the site,** ~~The approximate total of 35-acres of~~ construction laydown and parking ~~area~~ **and other short-term disturbances** would ~~be~~ **total 39.3 acres** on the 148-acre project site (**Visual Resources Figure 4** –Proposed Construction Parking and Laydown Areas). Construction laydown facilities are to be removed after completion of project construction and the area is to be replanted in row crops.

Staff response – Staff has revised the linear facilities and laydown area descriptions in the FSA.

6. **Applicant comment** - **Page 4.12-13** - Transmission Lines - An approximate ~~5~~ **6.4**-mile long, 230kV transmission line with approximately forty **three** 120-foot tall tubular steel poles would connect Avenal Energy to the PG&E Gates substation. The new transmission poles would be located within a new 120-foot wide transmission line easement that would parallel three existing lines of transmission lattice towers alignments (see **Visual Resources Figure 10**). Project transmission lines near road crossings would be noticeable to motorists.

   Staff response – Staff has revised the identified numbers in the FSA.

7. **Applicant comment** - **Page 4.12-*22*** - **VIS-3** The project owner shall color and finish the surfaces of all project structures and buildings visible to the public to ensure that they: (1) minimize visual intrusion and contrast by blending with the landscape; (2) minimize glare; and (3) comply with local design policies and ordinances. The transmission line conductors **and insulators** shall be non-specular ~~and non-reflective, and the insulators shall be non-reflective and nonrefractive~~ **with low reflectance**.

   Staff response – Staff has revised Condition of Certification **VIS-3**.

CONCLUSIONS

The visual analysis focused on two main issues. (1) Would construction and operation of the project introduce an aesthetic impact in accordance to CEQA? (2) Would the project comply with applicable LORS pertaining to aesthetics, or preservation and protection of sensitive visual resources?

1. The project is to be constructed on a 148-acre property zoned “Heavy Industrial” by the City of Avenal.

2. There are no publicly designated national, state or county scenic vistas in the views of KOP 1 through KOP 4.

3. There are no identified scenic resources in the KOP 1 through KOP 4 views.

4. The project site does not have frontage on, or traverse a segment of a road recognized as a National Scenic Byway or All American Road, or a State Scenic Highway.

5. At KOP 3, the introduction of the project’s publicly visible structures to the existing physical environment would create a significant visual impact; however, with the effective implementation of recommended Condition of Certification **VIS-3** and **VIS-4,** the project would create a less than significant visual character and quality impact.

6. The project would generate a less than significant new source of light or glare to nighttime or daytime views with the effective implementation of the conditions of certification.

7. The project is to use an air cooled condenser (ACC). The ACC would not introduce publicly visible water vapor plumes. A small auxiliary boiler is proposed for the project which could occasionally emit visible water vapor plumes. The occasional plumes would be small due to the small size of the boiler. The potential boiler-emitted plumes are not considered to create a less than significant impact.

8. The operation of the project would not contribute to a cumulative visual impact in the vicinity of the project.

9. Staff concludes that the project would comply with all applicable laws, ordinances, regulations, and standards pertaining to aesthetics, or preservation and protection of sensitive visual resources.

PROPOSED CONDITIONS OF CERTIFICATION

Staff has drafted conditions of certification (below) for consideration that may be incorporated into the license should a decision to issue a license be made on the project.

SURFACE RESTORATION

VIS-1 The project owner shall remove all evidence of temporary construction activities, and shall restore the ground surface to the original condition or better condition, including the replacement of any vegetation or paving removed during construction where project development does not preclude it. The project owner shall submit to the Compliance Project Manager (CPM) for review and approval a surface restoration plan, the proper implementation of which will satisfy these requirements. The project owner shall complete surface restoration within 60 days after the start of commercial operation.

Verification: At least 60 days prior to the start of commercial operation, the project owner shall submit the surface restoration plan to the CPM for review and approval.

If the CPM notifies the project owner that any revisions of the surface restoration plan are needed, within 30 days of receiving that notification the project owner shall submit to the CPM a plan with the specified revisions.

The project owner shall complete surface restoration within 60 days after the start of commercial operation. The project owner shall notify the CPM within seven days after completion of surface restoration that the restoration is ready for inspection.

CONSTRUCTION ACTIVITY LIGHTING

VIS-2 The project owner shall ensure that lighting for construction of the power plant is used in a manner that minimizes potential night lighting impacts, as follows:

A. All lighting shall be of minimum necessary brightness consistent with worker safety and security;

B. All fixed position lighting shall be shielded/hooded, to direct light downward and toward the area to be illuminated preventing direct

illumination of the night sky and direct light trespass (direct light extending outside the boundaries of the power plant site or the site of construction of ancillary facilities, including any security related boundaries);

C. Wherever feasible and safe and not needed for security, lighting shall be kept off when not in use; and

D. If the project owner receives a complaint about construction lighting, the project owner shall notify the CPM and shall use the complaint resolution form included in the General Conditions section of the Compliance Plan to record each lighting complaint and to document the resolution of that complaint. The project owner shall provide a copy of each complaint form to the CPM.

Verification: Within seven days after the first use of construction lighting, the project owner shall notify the CPM that the lighting is ready for inspection.

If the CPM notifies the project owner that modifications to the lighting are needed to minimize impacts, within 15 days of receiving that notification the project owner shall implement the necessary modifications and notify the CPM that the modifications have been completed.

Within 48 hours of receiving a lighting complaint, the project owner shall provide to the CPM; a) a report of the complaint, b) a proposal to resolve the complaint, and c) a schedule for implementation of the proposal. The project owner shall notify the CPM within 48 hours after completing implementation of the proposal. The project owner shall provide a copy of the completed complaint resolution form to the CPM in the next Monthly Compliance Report.

SURFACE TREATMENT OF PROJECT STRUCTURES AND BUILDINGS

VIS-3 The project owner shall color and finish the surfaces of all project structures and buildings visible to the public to ensure that they: (1) minimize visual intrusion and contrast by blending with the landscape; (2) minimize glare; and (3) comply with local design policies and ordinances. The transmission line conductors and insulators shall be non-specular with low reflectance.

The project owner shall submit a surface treatment plan to the CPM for review and approval. The surface treatment plan shall include:

A. A description of the overall rationale for the proposed surface treatment, including the selection of the proposed color(s) and finishes;

B. A list of each major project structure and building (e.g., building, tank, pipe, and wall; transmission line towers and/or poles; and fencing), specifying the color(s) and finish proposed for each. Colors must be identified by vendor, name, and number; or according to a universal designation system;

C. One set of color brochures or color chips showing each proposed color and finish;

D. A specific schedule for completing the treatment; and

E. A procedure to ensure proper treatment maintenance for the life of the project.

The project owner shall not request vendor surface treatment of any buildings or structures during their manufacture, or perform final field treatment on any buildings or structures, until the project owner has received treatment plan approval by the CPM.

The project owner shall notify the CPM that surface treatment of all listed structures and buildings has been completed and is ready for inspection; and shall submit one set of electronic color photographs from the selected KOP 3 location showing the "as built" surface treated structures and buildings.

Verification: At least 45 days prior to applying vendor color(s) and finish(es) for structures or buildings to be surface treated during manufacture, the project owner shall submit the proposed treatment plan to the CPM for review and approval, and simultaneously to the Director of the City of Avenal Planning and Community Development for review. The project owner shall allow the Director of the City of Avenal Planning and Community Development at least 30 days to provide comment on the submitted surface treatment plan. The project owner shall provide a copy of the Director of the City of Avenal Planning and Community Development comments to the CPM.

The project owner shall provide to the CPM a copy of the transmittal letter submitted to the Director of the City of Avenal Planning and Community Development requesting their review of the submitted surface treatment plan.

If the CPM determines that the plan requires revision, the project owner shall provide to the CPM a plan with the specified revision(s) for review and approval by the CPM before any treatment is applied. Any modifications to the treatment plan must be submitted to the CPM for review and approval.

If the CPM determines that the plan requires revision, the project owner shall provide to the Director of the City of Avenal Planning and Community Development a plan with the specified revision(s) for review before the plan is implemented.

Within ninety (90) days after the start of commercial operation, the project owner shall notify the CPM that surface treatment of all listed structures and buildings has been completed and is ready for inspection; and shall submit one set of electronic color photographs from KOP 3, at the least, showing the "as built" surface treated structures and buildings.

The project owner shall provide a status report regarding surface treatment maintenance in the Annual Compliance Report. The report shall specify a): the condition of the surfaces of all structures and buildings at the end of the reporting year; b) major maintenance activities that occurred during the reporting year; and c) the schedule of major maintenance activities for the next year.

PROJECT LANDSCAPING

VIS-4 The project owner shall provide project site landscaping consistent with the policies and ordinances of the City of Avenal, specifically municipal code sections 9.60 and 9.63, and **Visual Resources Figure 12** - Conceptual Landscape Plan Aerial Photo.

Landscaping shall consist of plant materials consistent with Climate Zones 8 and 9 as identified in the Sunset Western Garden Book. Landscaping plans shall emphasize the use of drought-tolerant species, grouped by similar water usage.

Landscaping in parking lots shall have one 15-gallon shade tree planted every three (3) parking spaces along parking rows. Fifty percent of the paved parking lot's surface shall be shaded by tree canopies within 10 years of planting.

For parking lots containing six or more parking spaces, at least 5% of the total ground area of the parking lot shall be landscaped.

An irrigation plan shall be submitted along with the landscape plan. The irrigation plan shall show an irrigation conformance calculation with a 10% safety margin.

The project owner shall submit to the CPM for approval, and simultaneously to the Director of the City of Avenal Planning and Community Development for review, a landscaping plan whose proper implementation will satisfy these requirements.

The project owner shall not implement the landscape plan until the project owner receives approval of the landscape plan from the CPM. The planting shall be completed by the start of commercial operation, and the planting shall occur during the optimal planting season.

Verification: Prior to commercial operation and at least 45 days prior to installing the landscaping, the project owner shall submit the landscaping plan to the CPM for approval and simultaneously to the Director of the City of Avenal Planning and Community Development for comment. The project owner shall provide a copy of the Director of the City of Avenal Planning and Community Development comments to the CPM prior to the installation of the landscaping.

The project owner shall allow the Director of the City of Avenal Planning and Community Development 30 days to provide comment on the submitted surface treatment plan. The project owner shall provide a copy of the Director of the City of Avenal Planning and Community Development comments to the CPM.

If the CPM determines that the plan requires revision, the project owner shall provide to the CPM and the Director of the City of Avenal Planning and Community Development a plan with the specified revision(s) for review and approval by the CPM before the plan is implemented.

The project owner shall simultaneously notify the CPM and the Director of the City of Avenal Planning and Community Development that the landscaping is ready for inspection within seven days after completing installation of the landscaping.

PERMANENT EXTERIOR LIGHTING

VIS-5 To the extent feasible, consistent with safety and security considerations and commercial availability, the project owner shall design and install all permanent exterior lighting such that:

A. light fixtures do not cause obtrusive spill light beyond the project site;

B. lighting does not cause excessive reflected glare;

C. direct lighting does not illuminate the nighttime sky,

D. illumination of the project and its immediate vicinity is minimized; and,

E. lighting conforms to the lighting requirements of the city of Avenal M-2 zone district, where applicable.

In addition, the project owner shall submit to the CPM for approval a lighting management plan that includes the following:

A. a process for addressing and mitigating lighting related complaints;

B. lighting shall incorporate commercially available fixture hoods/shielding, with light directed downward or toward the area to be illuminated;

C. all lighting shall be of minimum necessary brightness consistent with operational safety and security; and

D. lights in high illumination areas not occupied on a continuous basis (such as maintenance platforms) shall have (in addition to hoods) switches, timer switches, or motion detectors so that the lights operate only when the area is occupied.

Verification: At least 45 days prior to ordering any permanent exterior lighting, the project owner shall contact the CPM to determine the required documentation for the lighting management plan.

At least 60 days prior to ordering any permanent exterior lighting, the project owner shall submit to the CPM for approval a lighting management plan. If the CPM determines that the lighting management plan requires revision, the project owner shall provide to the CPM a plan with the specified revision(s) for approval. The project owner shall not order any exterior lighting until receiving CPM approval of the lighting management plan.

Prior to commercial operation, the project owner shall notify the CPM that the lighting has been installed and is ready for inspection. If after inspection the CPM notifies the project owner that modifications to the lighting are needed, within 30 days of receiving

notification the project owner shall implement the modifications and notify the CPM that the modifications have been completed and are ready for inspection.

Within 10 days of receiving a lighting complaint, the project owner shall provide the CPM with a complaint resolution form report as specified in the Compliance General Conditions including a proposal to resolve the complaint, and a schedule for implementation. The project owner shall notify the CPM within 10 days after completing implementation of the proposal. A copy of the complaint resolution form report shall be submitted to the CPM within 30 days of complaint resolution.

SIGNAGE

VIS-6 The project owner shall install minimal signage visible to the public, which shall a) have unobtrusive colors and finishes that prevent excessive glare; and b) be consistent with the sign policies and ordinances of the City of Avenal. The design of any signs required by safety regulations shall conform to the criteria established by those regulations. The project owner shall submit a signage plan for the project to the CPM for approval and simultaneously to the Director of the City of Avenal Planning and Community Development for comment. The project owner shall not implement the plan until the project owner receives approval of the submittal from the CPM.

Verification: Prior to the start of commercial operation and at least 60 days prior to installing signage, the project owner shall submit the signage plan to the CPM for approval and simultaneously to the Director of the City of Avenal Planning and Community Development for comment. The project owner shall provide a copy of the Director of the City of Avenal Planning and Community Development comments to the CPM.

If the CPM determines that the plan requires revision, the project owner shall provide to the CPM a plan with the specified revision(s) for review and approval by the CPM before any signage visible to the public is installed.

The project owner shall provide the CPM with electronic color photographs after completing installation of signage.

SCREENING OF COMMERCIAL TRASH DISPOSAL CONTAINERS

VIS-7 In accordance to the City of Avenal Municipal Code section 9.79.08 N, commercial trash disposal containers (e.g.; trash bins or dumpsters) shall be visually screened from public view to the maximum extent feasible or stored within an enclosed building or structure.

Verification: Prior to the start of commercial operation, the project owner shall provide to the CPM a site plan showing the permanent location of the commercial disposal container(s) on the project site.

Forty-five (45) days after the start of commercial operation, the project owner shall notify the CPM that the commercial disposal containers have been screened or enclosed from public view and are ready for inspection. If after inspection the CPM notifies the project owner that modifications to the screening or enclosure are needed, within 30 days of

receiving notification the project owner shall implement the modifications and notify the CPM that the modifications have been completed and are ready for inspection.

FRESNO COUNTY REVIEW OF TRANSMISSION LINE TOWERS

VIS-8 Prior to the start of the construction of the transmission line in Fresno County, the project owner shall provide to the Director of the Fresno County Department of Public Works and Planning elevation drawings of the transmission towers and/or poles, a discussion of the surface treatment to be used on the towers or poles, and any landscaping for the individual transmission tower or pole sites for comment, and to the CPM for approval.

Verification: Prior to the start of the construction of the transmission line in Fresno County, the project owner shall submit elevation drawings of towers and/or poles, discussion of surface treatment, and landscaping plans to the Director of the Fresno County Department of Public Works and Planning for comment, and to the CPM for approval.

The project owner shall allow the Director of the Fresno County Department of Public Works and Planning 30 days to provide comment. The project owner shall provide a copy of the Fresno County Department of Public Works and Planning comments to the CPM prior construction.

The project owner shall provide a copy of the submitted transmittal letter to the Director of the Fresno County Department of Public Works and Planning requesting their review.

If the CPM determines that the drawings and/or plans require revision, the project owner shall provide to the CPM drawings and/or plans with the specified revision(s) for review and approval by the CPM.

The project owner shall notify the CPM within 10 days after completing installation of the of the transmission line towers/poles and planting landscaping, if any.

REFERENCES

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AP 2008e – Avenal Power Center, LLC (tn 46779). Applicant's Response to Energy Commission Data Request Set 1, 1 through 74, dated June 20, 2008. Submitted to CEC/Docket Unit on June 20, 2008.

AP 2008f – Avenal Power Center, LLC (tn 48172). Applicant's Response to Energy Commission Data Request Set 2, 75 through 94, dated September 24, 2008. Submitted to CEC/Docket Unit on September 24, 2008.

AP 2009 - Avenal Power Center, LLC. Applicant's Comments to Energy Commission Preliminary Staff Assessment, dated March 4, 2009. Docketed March 5, 2009.

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CFO2004 - County of Fresno Ordinance, Part VII, Division VI, Chapter 1, Section 875 – Electric Utilities and Services, amended March 2, 2004.

COAGP2005 - City of Avenal General Plan, adopted August 11, 2005.

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APPENDIX VR-1

ENERGY COMMISSION VISUAL RESOURCE ANALYSIS EVALUATION CRITERIA FOR KEY OBSERVATION POINTS

VISUAL RESOURCE ANALYSIS WITHOUT PROJECT

When analyzing KOPs of existing conditions without the project, staff considers the following conditions: visual quality, viewer concern, visibility, number of viewers, duration of view. Those conditions are then factored into an overall rating of viewer exposure and viewer sensitivity. Information about each condition and rating follows.

Visual Quality

An expression of the visual impression or appeal of a given landscape and the associated public value attributed to the resource. Visual quality is rated from *high* to *low*. A high rating is generally reserved for landscapes viewers might describe as picture-perfect.

Landscapes rated high generally are memorable because of the way the components combine in a visual pattern. In addition, those landscapes are free from encroaching elements, thus retaining their visual integrity. Finally, landscapes with high visual quality are visually coherent and harmonious when each element is considered as part of the whole. On the contrary, landscapes rated *low* are often dominated by visually discordant human alterations.

Viewer Concern

Viewer concern represents the reaction of a viewer to visible changes in the viewshed — an area of land visible from a fixed vantage point. For example, viewers have a high expectation for views formally designated as a scenic area or travel corridor as well as for recreational and residential areas. Viewers generally expect that those views will be preserved. Travelers on highways and roads, including those in agricultural areas, are generally considered to have moderate viewer concerns and expectations.

However, viewers tend to have low-to-moderate viewer concern when viewing commercial buildings. Industrial uses typically have the lowest viewer concern. Regardless, the level of concern could be lower if the existing landscape contains discordant elements. In addition, some areas of lower visual quality and degraded visual character may contain particular views of substantially higher visual quality or interest to the public.

Visibility

Visibility is a measure of how well an object can be seen. Visibility depends on the angle or direction of views; extent of visual screening; and topographical relationships between the object and existing homes, streets, or parks. In that sense, visibility is determined by considering any and all obstructions that may be in the sightline—trees and other vegetation; buildings; transmission poles or towers; general air quality conditions such as haze; and general weather conditions such as fog.

Number of Viewers

Number of viewers is a measure of the number of viewers per day who would have a view of the proposed project. *Number of viewers* is organized into the following categories: residential according to the number of residences; motorist according to the number of vehicles; and recreationists.

Duration of View

Duration of view is the amount of time to view the site. For example, a high or extended view of a project site is one reached across a distance in two minutes or longer. In contrast, a low or brief duration of view is reached in a short amount of time—generally less than ten seconds.

Viewer Exposure

Viewer exposure is a function of three elements previously listed, *visibility*, *number of viewers*, and *duration of view*. Viewer exposure can range from a *low* to *high*. A partially obscured and brief background view for a few motorists represents a low value; and unobstructed foreground view from a large number of residences represents a high value.

Visual Sensitivity

Visual sensitivity is comprised of three elements previous listed, *visual quality*, *viewer concern*, and *viewer exposure*. Viewer sensitivity tends to be higher for homeowners or people driving for pleasure or engaged in recreational activities and lower for people driving to and from work or as part of their work.

VISUAL RESOURCE ANALYSIS WITH PROJECT

Visual resource analyses with photographic simulations of the project involve the elements of contrast, dominance, view blockage, and visual change. Information about each element follows.

Contrast

Contrast concerns the degree to which a project's visual characteristics or elements (form, line, color, and texture) differ from the same visual elements in the existing landscape. The degree of contrast can range from *low* to *high*. A landscape with forms, lines, colors, and textures similar to those of a proposed energy facility is more visually absorbent; that is, more capable of accepting those characteristics than a landscape in which those elements are absent. Generally, visual absorption is inversely proportional to visual contrast.

Dominance

Dominance is a measure of (a) the proportion of the total field of view occupied by the field; (b) a feature's apparent size relative to other visible landscape features; and (c) the conspicuousness of the feature due to its location in the view.

A feature's level of dominance is lower in a panoramic setting than in an enclosed setting with a focus on the feature itself. A feature's level of dominance is higher if it is

(1) near the center of the view; (2) elevated relative to the viewer; or (3) has the sky as a backdrop. As the distance between a viewer and a feature increases, its apparent size decreases; and consequently, its dominance decreases. The level of dominance ranges from *low* to *high*.

View Blockage

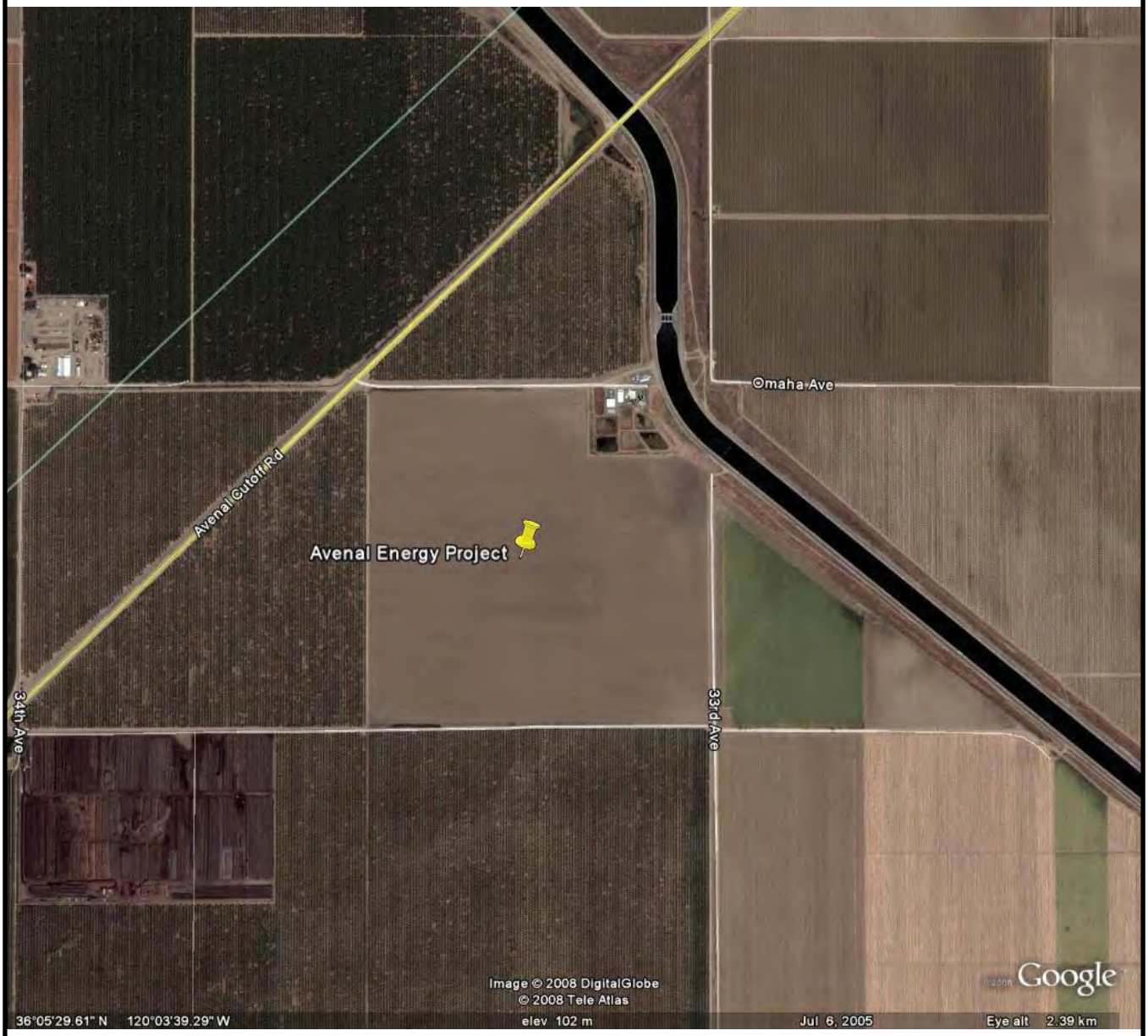
The extent to which any previously visible landscape features are blocked from view constitutes view disruption. The view is also disrupted when the continuity of the view is interrupted. When considering a project's features, higher quality landscape features can be disrupted by lower quality project features, thus resulting in adverse visual impacts. The degree of view disruption can range from *none* to *high*.

Visual Change

Visual change is a function of *contrast*, *dominance*, and *view disruption*. Generally, *contrast* and *dominance* contribute more to the degree of visual change than does *view disruption*.

VISUAL RESOURCES - FIGURE 1

Avenal Energy - Aerial View of Avenal Energy Site and Vicinity

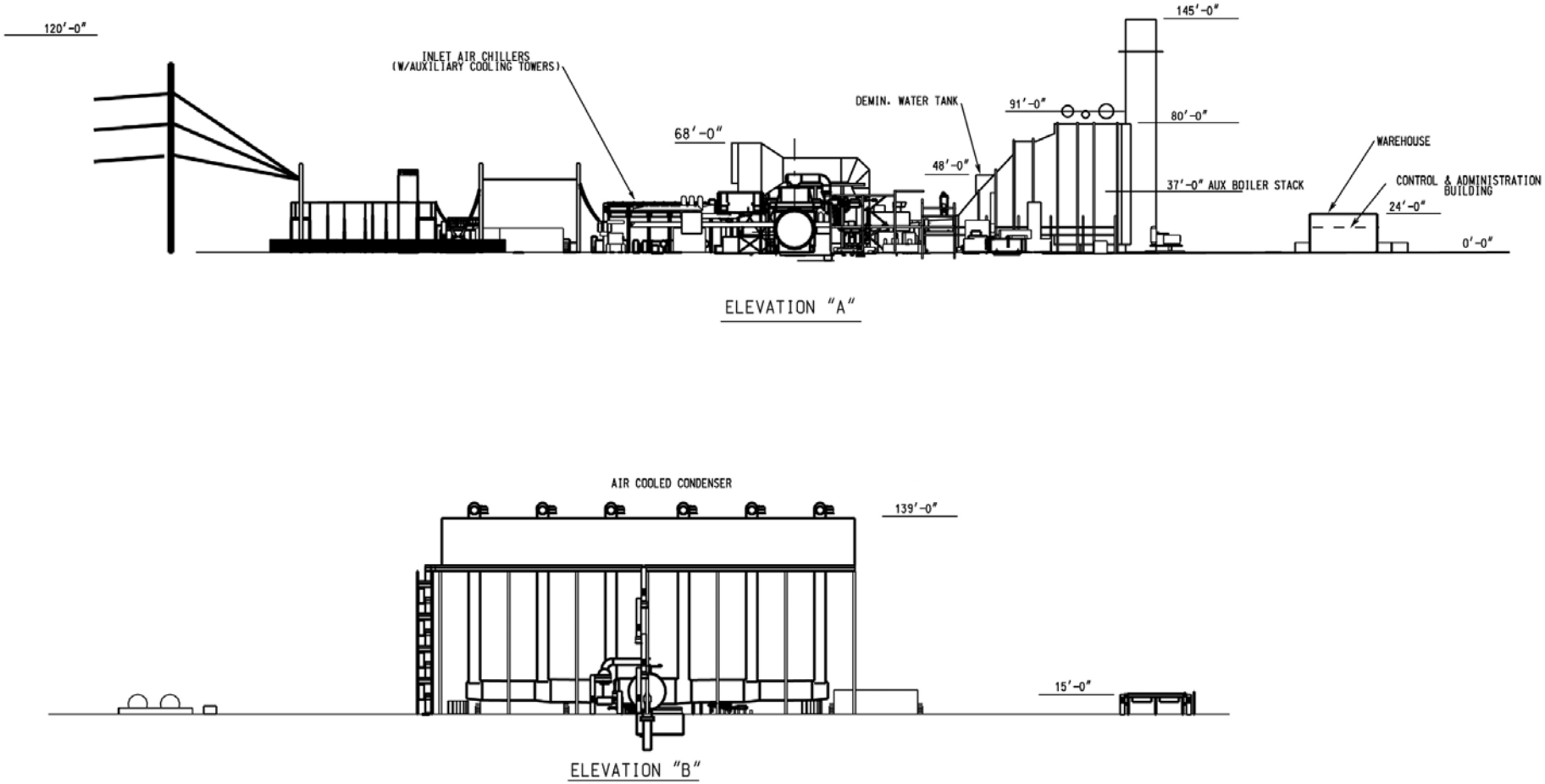


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2009

SOURCE: Google Earth

VISUAL RESOURCES - FIGURE 2

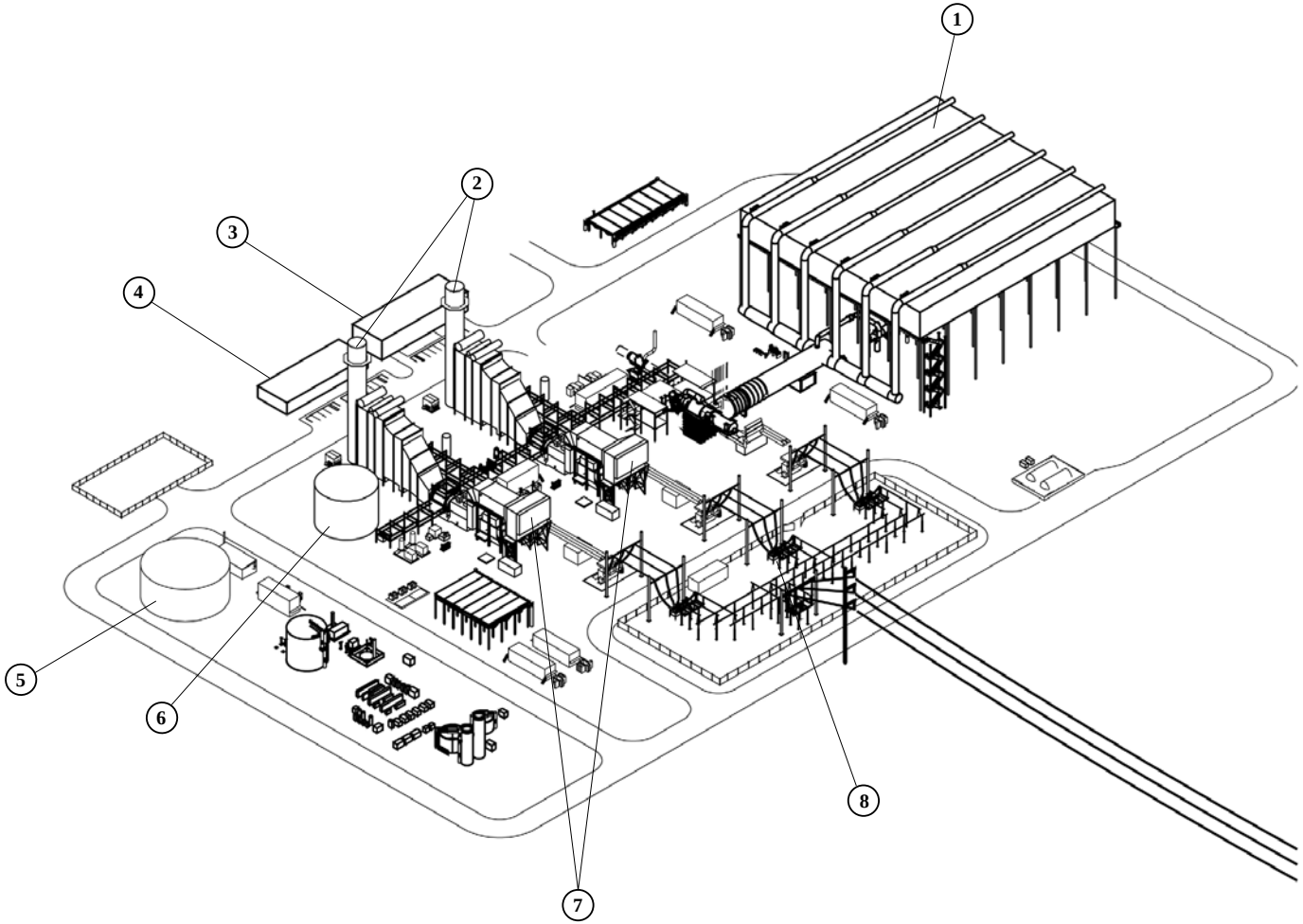
Avenal Energy - Project Elevation View



SOURCE: AFC Figure 6.13-15

VISUAL RESOURCES - FIGURE 3

Avenal Energy - Isometric View Conceptual Design and Major Project Features



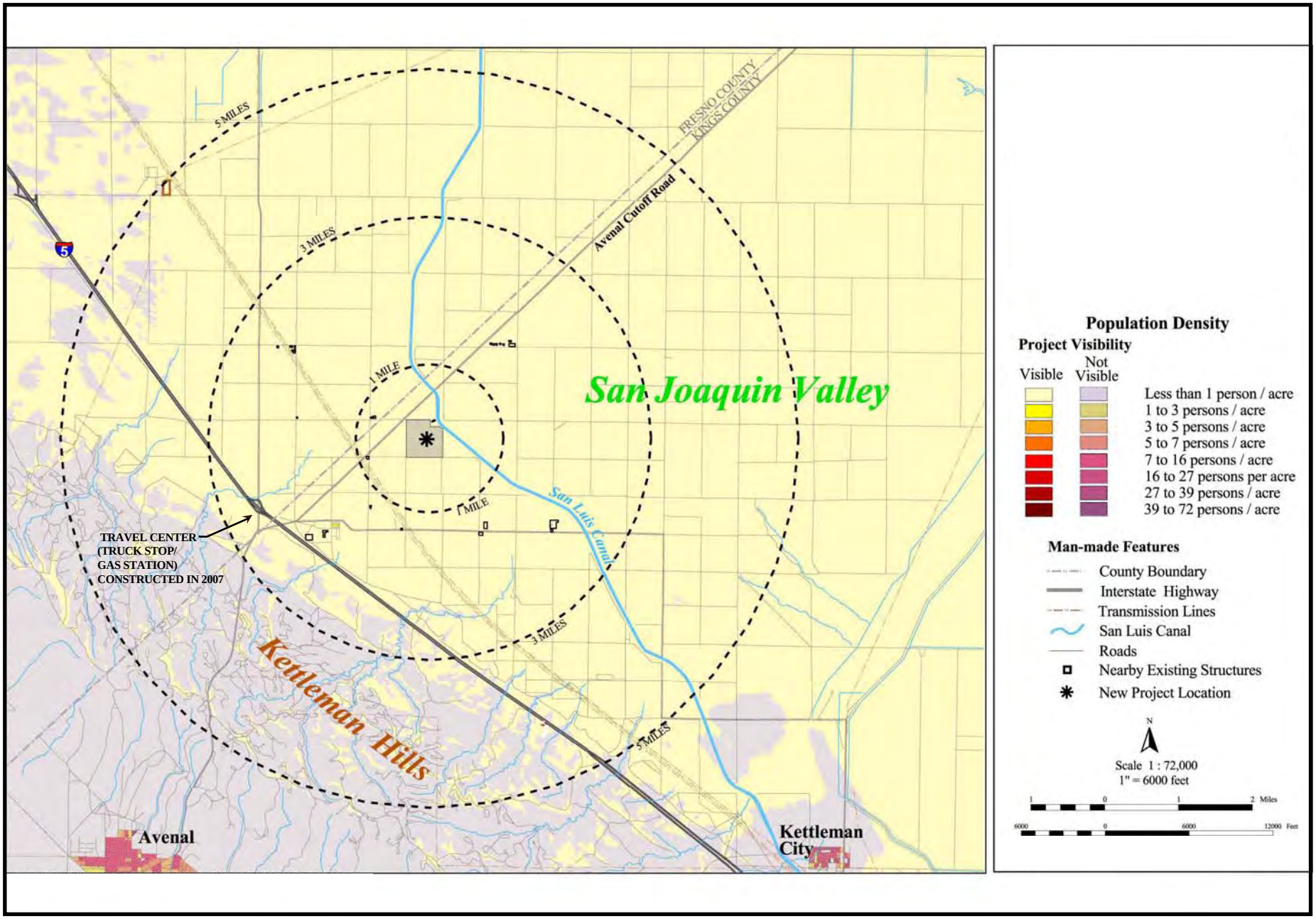
1. **Air Cooled Condenser**
2. **Heat Recovery Steam Generators (HRSGs)**
3. **Warehouse**
4. **Control and Administration Building**
5. **Raw Water / Firewater Storage Tanks**
6. **Demineralized Water Storage Tank**
7. **Combustion Turbine Generator (CTG) Air Inlets**
8. **Switchyard**

Not to Scale

SOURCE: AFC Figure 6.13-16

VISUAL RESOURCES - FIGURE 4

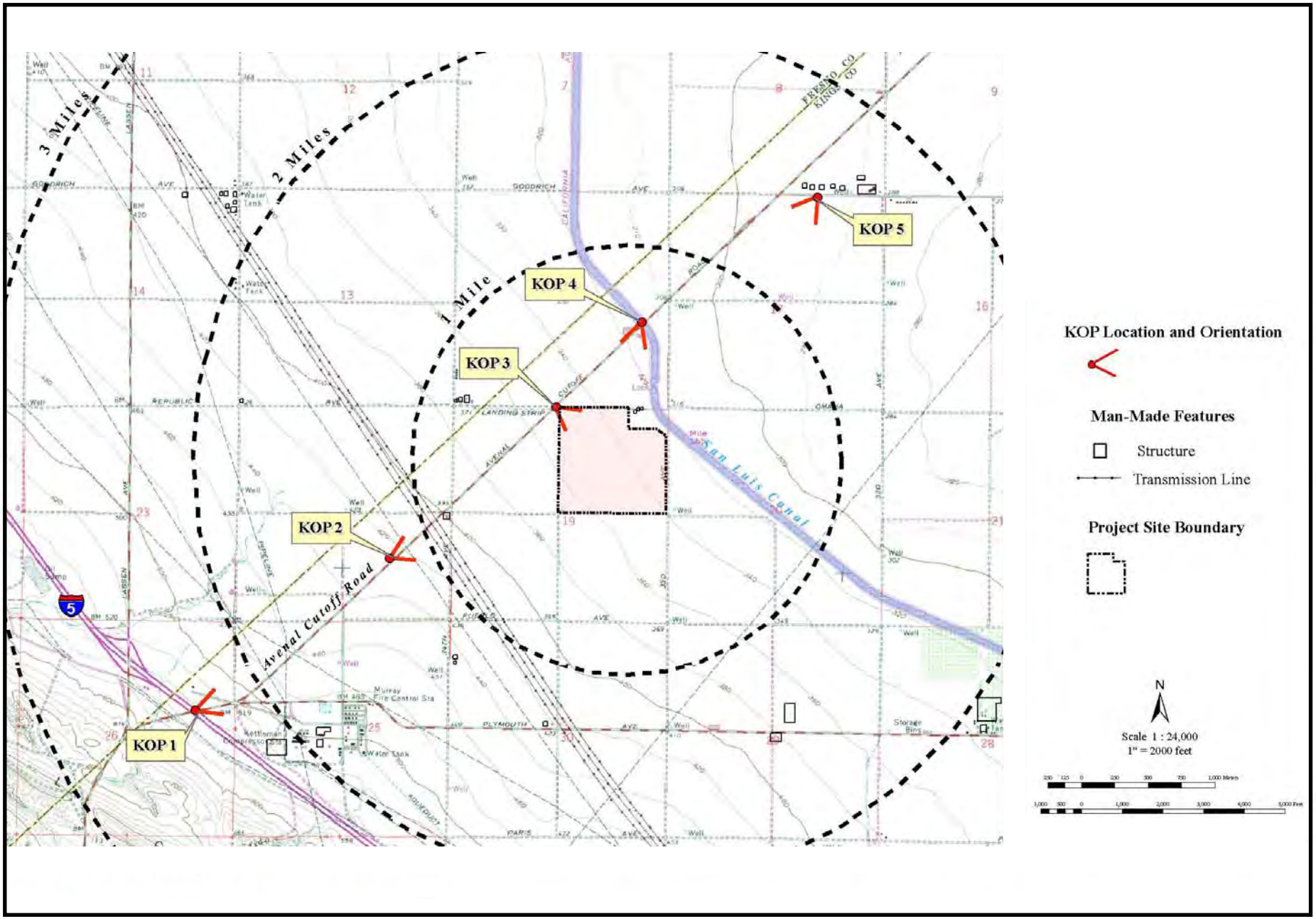
Avenal Energy - Project Visibility On Population Density



SOURCE: AFC Figure 6.13-18

VISUAL RESOURCES - FIGURE 5

Avenal Energy - KOP Locations



SOURCE: AFC Figure 6.13-20

VISUAL RESOURCES - FIGURE 6

Avenal Energy - KOP 1: Avenal Cutoff Road Bridge Over U.S. Interstate 5 Looking East

SOURCE: AFC Figure 6.13-22

VISUAL RESOURCES - FIGURE 7

Avenal Energy - KOP 1: Simulation of Proposed Project After Completion of Construction

SOURCE: AFC Figure 6.13-23

VISUAL RESOURCES - FIGURE 8

Avenal Energy - KOP 2: Existing View Toward the Project Site Along Avenal Cutoff Road Looking East

SOURCE: AFC Figure 6.13-24

VISUAL RESOURCES - FIGURE 9

Avenal Energy - KOP 2: Simulation of Proposed Project After Completion of Construction

SOURCE: AFC Figure 6.13-25

VISUAL RESOURCES - FIGURE 10

Avenal Energy - KOP 3: Entrance to Project Site from Avenal Cutoff Road Looking Southeast

SOURCE: AFC Figure 6.13-26

VISUAL RESOURCES - FIGURE 11

Avenal Energy - KOP 3: Simulation of the Proposed Project After Completion

SOURCE: AFC Figure 6.13-27

VISUAL RESOURCES - FIGURE 12

Avenal Energy - Conceptual Landscape Plan Aerial Photo

SOURCE: AFC Figure 6.13-17

VISUAL RESOURCES - FIGURE 13

Avenal Energy - KOP 3: Simulation of Project With Landscaping After 5 Years

SOURCE: AFC Figure 6.13-28

VISUAL RESOURCES - FIGURE 14

Avenal Energy - KOP 4: Existing View Avenal Cutoff Road Bridge Over San Luis Canal Looking South

SOURCE: AFC Figure 6.13-29

VISUAL RESOURCES - FIGURE 15

Avenal Energy - KOP 4: Simulation of the Proposed Project After Completion

SOURCE: AFC Figure 6.13-30

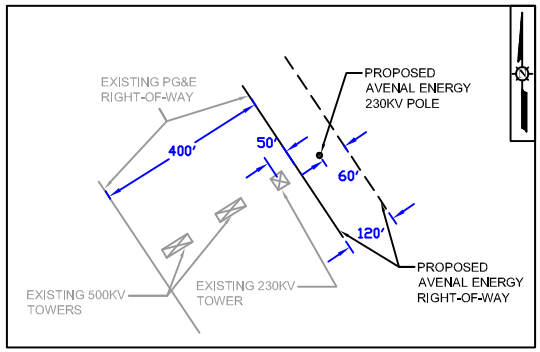
VISUAL RESOURCES - FIGURE 16

Avenal Energy - KOP 4: Simulation of the Project With Landscaping After 5 Years

SOURCE: AFC Figure 6.13-31

VISUAL RESOURCES - FIGURE 17

Avenal Energy - Simulation of Transmission Line Tower

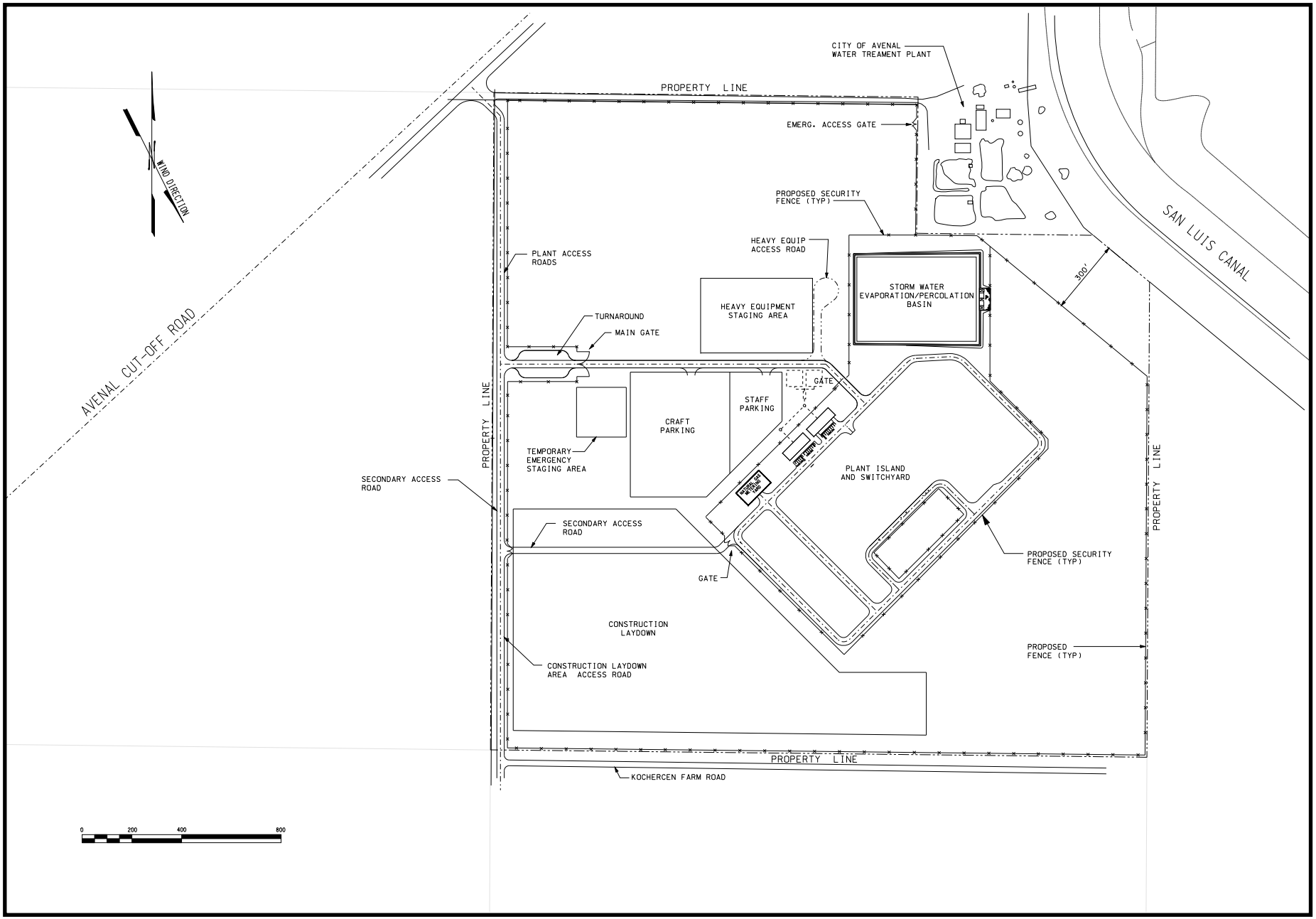


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2009

SOURCE: Applicant's Response to Energy Commission Data Request Set 1, 1 through 74, dated June 20, 2008

VISUAL RESOURCES - FIGURE 18

Avenal Energy - Proposed Construction Parking and Laydown Areas



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

SOURCE: Applicant's Comments to Energy Commission Preliminary Staff Assessment, dated March 4, 2009

WASTE MANAGEMENT

Testimony of Casey Weaver

SUMMARY OF CONCLUSIONS

Staff has not identified any unmitigable significant impacts regarding Waste Management provided the proposed conditions of certification are implemented. The following are staff's conclusions based on its assessment of the proposed Avenal Energy project:

- The Phase I Environmental Site Assessment (ESA) conducted for the project site did not identify any evidence of the presence or likely presence of hazardous substances on the site under conditions that would indicate an existing release, past release, or material threat of release into the ground, groundwater or surface water. This finding indicates that there is limited potential for construction crews to encounter contaminated soil or groundwater at the power plant site;
- The ESA conducted for the project site did not address the potential for persistent legacy agricultural chemicals to remain in site soils. To address the potential for persistent legacy agricultural chemicals remaining in site soils, a soil sampling and analysis program should be conducted;
- An ESA was conducted for the project's linear corridors. The ESA conducted for the water and natural gas line linear corridors did not identify evidence of the presence or likely presence of hazardous substances under conditions that would indicate an existing release, past release, or material threat of release into the ground, groundwater or surface water. However, along the transmission line corridor, the ESA indicated that soil staining was observed on the Carberry Farms property. The ESA considered the history of site use and the observation of stained surface soil and identified the Carberry Farms property as a recognized environmental condition (REC). If project elements are proposed for construction in this area, additional site evaluation should be conducted;

The management of project wastes generated during project construction and operation would not result in significant impacts provided that staff's proposed conditions of certification are implemented; and

- The volume of hazardous and non-hazardous liquid waste will not have a significant impact on existing landfills or transfer and disposal facilities.

INTRODUCTION

This Final Staff Assessment (FSA) presents an analysis of issues associated with wastes generated from the proposed construction and operation of the Avenal Energy project. 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.

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.
- The disposal of project wastes would not result in significant adverse impacts to existing waste disposal facilities.
- Upon project completion, the site is managed in such a way that project wastes and waste constituents would not pose a significant risk to humans or the environment.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local environmental laws, ordinances, regulations, and standards (LORS) have been established to ensure the safe and proper management of both solid and hazardous wastes in order to protect human health and the environment. Project compliance with the various LORS is a major component of staff's determination regarding the significance and acceptability of the Avenal Energy 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.)	The Solid Waste Disposal Act, as amended and revised by the Resource Conservation and Recovery Act (RCRA) et al., establishes requirements for the management of solid wastes (including hazardous wastes), landfills, underground storage tanks, and certain medical wastes. The statute also addresses program administration, implementation and delegation to states, enforcement provisions, and responsibilities, as well as research, training, and grant funding provisions. RCRA Subtitle C establishes provisions for the generation, storage, treatment, and disposal of hazardous waste, including requirements addressing: • Generator record keeping practices that identify quantities of hazardous wastes generated and their disposition; • Waste labeling practices and use of appropriate containers; • Use of a manifest when transporting wastes; • Submission of periodic reports to the United States Environmental Protection Agency (U.S. EPA) or other authorized agency; and • Corrective action to remediate releases of hazardous waste and contamination associated with RCRA-regulated facilities. RCRA Subtitle D establishes provisions for the design and operation of solid waste landfills. RCRA is administered at the federal level by the United States Environmental Protection Agency (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	The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also known as *Superfund*, establishes authority and funding mechanisms for cleanup of uncontrolled or abandoned hazardous waste sites, as well as cleanup of accidents, spills, or emergency releases of pollutants and contaminants into the environment. Among other things, the statute addresses: • Reporting requirements for releases of hazardous substances; • Requirements for remedial action at closed or abandoned hazardous waste sites, and brownfields; • Liability of persons responsible for releases of hazardous substances or waste; and • Requirements for property owners/potential buyers to conduct “all appropriate inquiries” into previous ownership and uses of the property to 1) determine if hazardous substances have been or may have been released at the site, and 2) establish that the owner/buyer did not cause or contribute to the release. A Phase I Environmental Site Assessment is commonly used to satisfy CERCLA “all appropriate inquiries” requirements.

Applicable Law	Description
Title 40, Code of Federal Regulations (CFR), Subchapter I – Solid Wastes	These regulations were established by U.S. EPA to implement the provisions of the Solid Waste Disposal Act and RCRA (described above). Among other things, the regulations establish the criteria for classification of solid waste disposal facilities (landfills), hazardous waste characteristic criteria and regulatory thresholds, hazardous waste generator requirements, and requirements for management of used oil and universal wastes. • Part 257 addresses the criteria for classification of solid waste disposal facilities and practices. • Part 258 addresses the criteria for municipal solid waste landfills. • Parts 260 through 279 address management of hazardous wastes, used oil, and universal wastes (i.e., batteries, mercury-containing equipment, and lamps). U.S. EPA implements the regulations at the federal level. However, California is an 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	These regulations address the United States Department of Transportation (DOT) established standards for transport of hazardous materials and hazardous wastes. The standards include requirements for labeling, packaging, and shipping of hazardous materials and hazardous wastes, as well as training requirements for personnel completing shipping papers and manifests. Section 172.205 specifically addresses use and preparation of hazardous waste manifests in accordance with Title 40, CFR, section 262.20.
State	
California Health and Safety Code (HSC), Chapter 6.5, §25100, et seq. Hazardous Waste Control Act of 1972, as amended	This California law creates the framework under which hazardous wastes must be managed in California. The law provides for the development of a state hazardous waste program that administers and implements the provisions of the federal RCRA program. It also provides for the designation of California-only hazardous wastes and development of standards (regulations) that are equal to or, in some cases, more stringent than federal requirements. The California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC) administers and implements the provisions of the law at the state level. Certified Unified Program Agencies (CUPAs) implement some elements of the law at the local level.

Applicable Law	Description
Title 22, California Code of Regulations (CCR), Division 4.5. Environmental Health Standards for the Management of Hazardous Waste	These regulations establish requirements for the management and disposal of hazardous waste in accordance with the provisions of the California Hazardous Waste Control Act and federal RCRA. As with the federal requirements, waste generators must determine if their wastes are hazardous according to specified characteristics or lists of wastes. Hazardous waste generators must obtain identification numbers; prepare manifests before transporting the waste off site; and use only permitted treatment, storage, and disposal facilities. Generator standards also include requirements for record keeping, reporting, packaging, and labeling. Additionally, while not a federal requirement, California requires that hazardous waste be transported by registered hazardous waste transporters. The standards addressed by Title 22, 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)	The Unified Program consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of the six environmental and emergency response programs listed below. • Aboveground 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 San Bernardino County Fire Department, Hazardous Materials Division is the CUPA for the SGGS project. Note: The Waste Management analysis only considers application of the Hazardous Waste Generator/Tiered Permitting element of the Unified Program.

Applicable Law	Description
Title 27, CCR, Division 1, Sub-division 4, Chapter 1, §15100, et seq. Unified Hazardous Waste and Hazardous Materials Management Regulatory Program	While these regulations primarily address certification and implementation of the program by the local CUPAs, the regulations do contain specific reporting requirements for businesses. • Article 9 – Unified Program Standardized Forms and Formats (§§ 15400-15410). • Article 10 – Business Reporting to CUPAs (§§15600–15620).
Public Resources Code, Division 30, §40000, et seq. California Integrated Waste Management Act of 1989	The California Integrated Waste Management Act (CIWMA) 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. California Integrated Waste Management Board	These regulations implement the provisions of the California Integrated Waste Management Act and set forth minimum standards for solid waste handling and disposal. The regulations include standards for solid waste management, as well as enforcement and program administration provisions. • Chapter 3 – Minimum Standards for Solid Waste Handling and Disposal. • 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	This law was enacted to expand the state's hazardous waste source reduction activities. Among other things, it establishes hazardous waste source reduction review, planning, and reporting requirements for businesses that routinely generate more than 12,000 kilograms (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	These regulations further clarify and implement the provisions of the Hazardous Waste Source Reduction and Management Review Act of 1989 (noted above). The regulations establish the specific review elements and reporting requirements to be completed by generators subject to the act.
Policies	
Kings County, Countywide Integrated Waste Management Plan	This document sets forth the county's goals, policies, and programs for reducing dependence on landfilling solid wastes and increasing source reduction, recycling, and reuse of products and waste, in compliance with the CIWMA. The plan also addresses the siting and development of recycling and disposal facilities and programs within the county.

SETTING

As noted in the **PROJECT DESCRIPTION** section of this document, the proposed Avenal Energy project would consist of the construction and operation of a 600-megawatt (MW) natural gas electrical generation facility and associated linear facilities in the city of Avenal, Kings County. The project site is a 148-acre parcel, of which 34.8 acres would be occupied by the power plant and ancillary facilities.

The Avenal Energy project site and surrounding areas have been used for agricultural production and associated activities since the early 1950s (Avenal Energy 2008a, Table 1.5-1).

The proposed facility power block would consist of two natural gas-fired combustion turbine generators (CTG), two heat recovery steam generators (HRSG), one steam turbine generator (STG) and an air-cooled condenser. The balance of the plant and infrastructure includes raw water filtration and storage system, Zero Liquid Discharge Facility (ZLD), electro-deionization/mixed bed polisher demineralized water system, and administrative and control buildings. In addition to the main power plant, the project would include construction and maintenance of an underground natural gas pipeline, a 6.4 mile long electrical transmission line, and water supply pipelines. Construction laydown areas would be located within the 148 acre Avenal Energy property.

Construction of the Avenal Energy project is estimated to take 27 months (Avenal Energy 2008a, p.2-7). Once constructed, the plant would be capable of operating seven days a week, 24 hours a day, with a planned operational life of 30 years (Avenal Energy 2008a, pp. 1-8 and 2-34).

Operation and maintenance of the plant and associated facilities would generate a variety of wastes, including hazardous wastes. Sanitary wastes would be discharged to a new, on-site septic system and leach field. No operational process wastewater would be generated. To control air emissions from the combustion of the natural gas used to run the turbines, the project would employ selective catalytic reduction (SCR) and oxidation catalyst equipment and chemicals, which generate both nonhazardous and hazardous waste.

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 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 health and the environment from impacts associated with management of both nonhazardous and hazardous wastes. Absent any unusual

[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.

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 volume of waste a facility is permitted to accept.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Existing Site Conditions and Possible Contamination

The Avenal Energy site is located northeast of and downgradient from the Kettleman Compressor Station. The Kettleman Compressor Station is owned by PG&E and has been used to compress natural gas since 1929. Waste water generated at the Kettleman Compressor Station is derived from cooling tower blowdown and site maintenance activities. Waste water from that facility was formerly disposed of in unlined surface impoundments. Chromium-based corrosion inhibitor was added to the cooling tower make up water between 1959 and 1979.

The compressor site is located within the Westside Sub-basin which includes an upper perched aquifer and a deeper regional aquifer system (Avenal Energy 2008a, page 6.5-10). Portions of the aquifer system in the vicinity of the Compressor Station have been contaminated with hexavalent and total chromium due to infiltration from the unlined ponds. Historically, groundwater collected in monitoring wells located down gradient of the disposal ponds has been impacted with chromium constituents. Due to changes in operation at the compressor facility, chromium concentrations in groundwater began decreasing in 1988 and, as of April 1994, neither hexavalent chromium nor total chromium have been detected in groundwater collected from down gradient monitoring wells at concentrations above their respective method detection limits (MDL). There is no indication that contaminated groundwater is present beneath the Avenal Energy site.

A Phase I Environmental Site Assessment (ESA) was conducted by TRC for the proposed Avenal Energy site (Avenal Energy 2008a, Appendix 6.14-1). The ESA stated that agricultural pesticides were applied to the property by airplane, truck and/or hand held sprayer. The County of Kings Department of the Agricultural Commissioner establishes limits for pesticide use. As stated in the Applicant's response to California Unions for Reliable Energy (CURE) Data Request 6 (October 30, 2008), the Department of the Agricultural Commissioner performs under the jurisdiction and direction of the California Department of Pesticide Regulation. The Commissioner enforces pesticide regulation at farms in Kings County. The regulations were established to provide protection to the environment and to human health, including health protection for field workers performing "hand labor." Hand labor is defined in California Code of Regulations Title 3, Division 6, Chapter 1.1.1, Section 6000, **as** "any cultural activity, performed by hand or with hand tools, that causes substantial contact with surfaces (such as plants or soil) that may have pesticide residues."

In August 2008, site agricultural production was certified "organic" by the USDA National Organic Program. To become certified "organic", documentation must be provided to a USDA accredited certifying agent for review and approval. The

documentation must indicate that no synthetic or prohibited substances (pesticides, herbicides, chemical fertilizers) have been applied to the site for a period of three years immediately preceding harvest of a crop. Since organic certification was granted in August 2008, no synthetic or prohibited substances should have been applied after August 2005.

As the current regulations for pesticide use are protective for field workers that are in substantial contact with soils that may contain pesticide residuals in active agricultural areas, and that no synthetic or prohibited substances have been applied to the site at least since 2005, it is not likely that workers would be affected by contemporary agricultural pesticides in site soils during project construction.

The ESA did not identify any recognized environmental conditions (REC) associated with the proposed project site. A REC is considered to be the presence or likely presence of any hazardous substances or petroleum products on a property under the conditions that indicated an existing release, past release, or a material threat of a release of any hazardous substance or petroleum products into structures on the property or in the ground, groundwater, or surface water of the property. However, the ESA did not discuss the possible presence of persistent agricultural chemicals on the site. Staff believes that although the site has been certified organic, it is still possible that persistent agricultural chemicals could be present at the site. Staff concurs with the applicant that several or many half lives of the chemicals researched by the applicant have passed, suggesting there is limited risk. The applicant also acknowledges they have not evaluated all potential chemicals nor does it appear they have evaluated the chemical degradation products that could be present at the site. Given the past land uses and the application of chemicals documented by the applicant, staff believes that evaluation of the presence of any harmful concentrations of residual chemicals should be conducted to ensure there is no risk to public or worker health and safety.

To ensure there is no significant risk to public or worker health and safety, staff proposes the applicant develop and implement a sampling and analysis plan in accordance with **WASTE-1**, so the site can be screened for the presence of agricultural chemicals and evaluated as to whether they are present in hazardous concentrations. In developing and implementing this plan, staff suggests that the applicant be guided by the California Department of Toxic Substances Control (DTSC) “Interim Guidance for Sampling Agricultural Fields for School Sites (Third Revision August 7, 2008)”. The guidance is intended to assist environmental assessors in designing an initial investigation for sites with historical agricultural uses. It is also intended to address characterization of all types of commercial and industrial businesses constructed on agricultural properties.

The results of this preliminary soil sampling and analytical testing would indicate if persistent agricultural chemicals remain in site soils. Residual agricultural chemicals that could be present at the site may include DDT (and degradation products DDD and DDE), arsenic and lead compounds and other persistent chemicals. If these chemicals are detected, their concentrations should be compared to risk-based industrial soil criteria found in CalEPA California Human Health Screening Levels (CHHSLs). If a detected chemical does not have a CHHSL, then the concentration found should be compared to the San Francisco Bay Regional Water Quality Board Environmental

Screening Levels (ESLs). If an ESL has not been prepared for that chemical, the concentration found should be compared to the EPA Region 9 Preliminary Remediation Goals (PRGs). If any screening levels are exceeded, staff proposes that the project owner be required to prepare a human health risk assessment to determine if site remediation or additional protective measures are needed. If they are needed, staff proposes that the project owner be required to prepare and implement a Remedial Action Workplan (RAW). Staff believes that only a limited number of remedial options would be needed to ensure there is no significant risk to the public or workers. These options include soil removal, refined or enhanced airborne dust mitigation measures currently proposed in the **AIR QUALITY** section of this document so as to better control emissions of fugitive dust containing hazardous wastes (such as increased watering frequency, use of a chemical "wetting agent", continuously covering stockpiled soils), workers wearing personal protective equipment for short durations, and a combination of all three measures. Staff believes that sampling and analysis, comparison to screening levels, the preparation of a human health risk assessment, and the preparation of a RAW, can be done in a reasonable time frame of less than six months. Should remedial measures that include some soil removal be necessary, staff anticipates from previous power plant projects that this could be accomplished in less than two months. The implementation of refined and enhanced dust suppression measures and using personal protective equipment can be implemented immediately.

In the event that agricultural chemicals are detected at levels that are considered hazardous, then soil removal or other remediation methods are proposed by staff in Condition of Certification **WASTE-1**. Furthermore, proposed conditions **WASTE -2** and **WASTE -3** would require the project owner to further characterize and remediate the site if other conditions found during site preparation warrant. These three proposed conditions would ensure that any chemicals occurring in hazardous concentrations would be appropriately mitigated in accordance with applicable LORS.

Project Linear Alignment

In accordance with Data Request #89, a Phase I Environmental Site Assessment (ESA) was conducted for the entire lengths of the proposed natural gas line, the proposed water lines and the proposed transmission interconnection. The ESA indicated that no environmentally sensitive operations were identified near the proposed natural gas or water line alignments.

The proposed electric transmission line would cross a portion of the Carberry Farms headquarters property. Historically this property has been subject to storage, use and dispensing of fuels, pesticides and other hazardous substances. These uses may have adversely impacted soil. The ESA indicated that during reconnaissance, soil staining was observed on the Carberry Farms property while viewing the property from outside the perimeter fence. The ESA considered the history of site use and the observation of stained surface soil and identified the Carberry Farms property as a recognized environmental condition (REC). The ESA recommended that, without additional investigation, soil disturbance in this area be avoided. The ESA further recommended that if one or more transmission line poles are to be installed on the Carberry Farms headquarters property, additional investigation should be conducted.

Staff has proposed Conditions of Certification **WASTE-2** and **WASTE-3** to mitigate any previously unrecognized conditions that may be encountered during construction and operation. These proposed conditions of certification require that a registered professional geologist or engineer with experience in remedial investigation and feasibility studies be available for consultation during soil excavation and grading activities. Staff believes implementation of these conditions would address identification and investigation of any soil or groundwater contamination that may be encountered during construction along linear alignments.

Construction Impacts and Mitigation

Site preparation, construction, and startup of the proposed power plant and associated facilities would take approximately 27 months and would generate both nonhazardous and hazardous wastes in solid and liquid forms (Avenal Energy 2008a, Section 6.14.2.1). Before construction can begin, the project owner should be required to develop and implement a Construction Waste Management Plan, per proposed Condition of Certification **WASTE-4**. Staff believes this condition of certification would ensure construction wastes would be handled and disposed of in accordance with applicable LORS.

Nonhazardous Wastes

Nonhazardous solid wastes generated during construction would include approximately 600 tons of construction waste (Avenal Energy 2008a, Table 6.14-2). All non-hazardous wastes would be recycled to the extent possible and nonrecyclable wastes would be collected by a licensed hauler and disposed of in a solid waste disposal facility, per Title 14, California Code of Regulations, section 17200 et seq.

Nonhazardous liquid wastes would also be generated during construction, including sanitary wastes, dust suppression and stormwater drainage, and equipment wash and test water. Sanitary wastes would be collected in portable, self-contained chemical toilets and pumped periodically for disposal at an appropriate facility. Potentially contaminated equipment wash and/or test water would be contained at designated areas, tested to determine if hazardous, and either discharged to the storm water retention basin (if nonhazardous) or transported to an appropriate treatment/disposal facility. Please see the **SOIL AND WATER RESOURCES** section of this document for more information on the management of project wastewater.

Hazardous Wastes

Hazardous wastes that would likely be generated during construction include solvents, waste paint, oil absorbents, used oil, oily rags, batteries, cleaning wastes, spent welding materials, and empty hazardous material containers (Avenal Energy 2008a, Table 6.14-2). The total amount of solid hazardous wastes generated during construction is estimated to be approximately 12.5 tons. The total amount of hazardous or potentially hazardous construction-generated wastes to be disposed of at Class I landfills is 6.75 tons (Avenal Energy 2008a, Section 6.14.2.1).

The total volume of liquid hazardous wastes generated during construction is estimated to be approximately 6,100 gallons. All liquid hazardous waste will be considered for recycling. Liquids not suitable for recycling will be taken to a suitable Treatment, Storage or Disposal Facility for disposal.

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-5**. 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 waste management methods described in the Application for Certification (Avenal Energy 2008a, Section 7.13.2.1), 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, 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. To facilitate continuous project compliance with LORS, staff proposes Condition of Certification **WASTE-6**, requiring the project owner to notify the CPM if and when the owner becomes aware of any project waste management-related enforcement action being initiated or taken by a regulatory agency. Along with the notification, the project owner must also 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. Staff also believes that proposed Conditions of Certification **WASTE-2** and **WASTE-3** would be adequate to address any soil contamination contingency that may be encountered during construction of the project and would further support compliance with LORS.

Operation Impacts and Mitigation

The proposed Avenal Energy project would generate nonhazardous and hazardous wastes in both solid and liquid forms under normal operating conditions. (Table 6.14-3 of the project AFC gives a summary of the anticipated operation waste streams, estimated waste volumes and generation frequency, and management methods proposed.) Before operations can begin, the project owner would be required to develop and implement an Operations Waste Management Plan, pursuant to proposed Condition of Certification **WASTE-7**. Staff believes this condition of certification would ensure construction wastes would be handled and disposed of in accordance with applicable LORS.

Nonhazardous Solid Wastes

Nonhazardous solid wastes generated during project operation could include routine maintenance wastes (such as used air filters, scrap metal, and plastics) and concentrated process waste (salt cake from the Zero Liquid Discharge system (ZLD)

and spent CO oxidation catalyst from the air emissions control equipment), as well as domestic/sanitary and office wastes (such as office paper, newsprint, aluminum cans, glass, and septic system sludge). All nonhazardous wastes would be recycled to the extent possible, and nonrecyclable wastes would be regularly transported off site to a solid waste disposal facility (AFC, Table 6.14-3).

Nonhazardous Liquid Wastes

Nonhazardous liquid wastes generated during operations are limited to wastewater from sanitary use of sinks and toilets. Treatment and disposal of waste water is addressed 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-5**, would be retained and used for hazardous waste generated during facility operation.

Hazardous Solid Wastes

Hazardous solid wastes that may be generated during routine project operation include oil filters and oily rags, spent Selective Catalytic Reduction (SCR) and oxidation catalysts, waste paint and empty containers, as well as universal wastes (batteries, fluorescent light tubes, and similar items) (Avenal Energy 2008a, Table 6.14-3).

Hazardous Liquid Wastes

Hazardous liquid wastes that may be generated during routine project operation include used crankcase oil, used hydraulic oil, chemical cleaning solutions, spent solvents, Combustion Turbine Generator (CTG) wash water and hydrocarbon contaminated water reclaimed from the oil/water separator.

In addition, spills and unauthorized releases of hazardous materials or hazardous wastes may generate contaminated soils or cleanup materials that may 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-8** 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.

The amounts of hazardous wastes generated during the operation of the Avenal Energy project would be modest, 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-6** to notify the CPM whenever the owner becomes aware 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

As discussed above, approximately 600 tons of solid waste would be generated during construction and disposed of in a Class III landfill. The nonhazardous solid wastes generated annually during operation of Avenal Energy would be recycled whenever possible and, if not recycled, disposed of in a Class III landfill.

Table 6.14-1 of the project AFC identifies three nonhazardous (Class III) waste disposal facilities in the vicinity of Avenal Energy that could potentially take the nonhazardous construction and operation wastes generated by the project. The remaining capacity for the three landfill facilities combined is over 45 million cubic yards. Assuming one cubic yard of trash weighs 1.15 tons (85 lbs/cubic foot), the total amount of nonhazardous waste generated from project construction and operation would contribute less than 0.001% of the available landfill capacity. Staff finds that disposal of the solid wastes generated by the Avenal Energy project can occur without significantly impacting the capacity or remaining life of any of these facilities.

Hazardous Wastes

Approximately 6.75 tons of hazardous waste will be generated during construction of the Avenal Energy facility (Avenal Energy 2008a, p 6.14-10) and disposed of in a Class I Landfill. An average of approximately six tons of hazardous waste will be generated per year in the course of operation (Avenal Energy 2008a. p 6.14-11) and disposed of in a Class I Landfill. The hazardous waste generated during operations will total approximately 168 tons over the 30-year project life. Hazardous wastes generated during construction and operation would be recycled to the extent possible and practical. Section 6.14.1.2 and Table 6.14-1 of the project AFC provide information on treatment, storage, or disposal facilities (TSDFs); landfills; recycling facilities; and transfer stations that could be used to manage project wastes. Any wastes that cannot be recycled would be transported off site to a permitted TSDF or landfill.

Three hazardous waste (Class I) disposal facilities are currently accepting waste and could be used to manage Avenal Energy wastes: the Clean Harbors Buttonwillow Landfill in Kern County, the Clean Harbors Westmorland facility in Imperial County and the Chemical Waste Management Kettleman Hills Landfill in Kings County. The Kettleman Hills facility also accepts Class II and Class III wastes. Approximately one million cubic yards of hazardous waste disposal capacity remains at Kettleman Hills alone, and combined, the Buttonwillow and Westmoreland facilities have a capacity of approximately 14 million cubic yards available for disposal of Class I hazardous waste (AFC p6.14-3 and 6.14-4).

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 Avenal Energy

project requiring off-site disposal would be far less than staff's threshold of significance and would therefore not significantly impact the capacity or remaining life of the Class I waste facilities.

CUMULATIVE IMPACTS AND MITIGATION

As proposed, the amount of nonhazardous and hazardous wastes generated during construction and operation of the Avenal Energy project would add to the total quantity of waste generated in the State of California. However, project wastes would be generated in modest quantities, waste recycling would be employed wherever practical, and sufficient capacity is available at several treatment and disposal facilities to handle the volumes of wastes generated by the project. Therefore, staff concludes that the waste generated by the Avenal Energy project would not result in significant cumulative waste management impacts.

COMPLIANCE WITH LORS

Energy Commission staff concludes that the proposed Avenal Energy project would comply with all applicable LORS regulating the management of hazardous and nonhazardous wastes during both facility construction and operation. 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 Avenal Energy project would be required to obtain a hazardous waste generator identification number from U.S. EPA. The Avenal Energy 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 PUBLIC AND AGENCY COMMENTS

During the public comment period, an unidentified member of the public stated that "the state had a responsibility to test the soil for toxic chemicals, if construction workers were going to work there during the building of the plant."

RESPONSE

In conducting due diligence, the applicant conducted an environmental site assessment (ESA), which was presented in the AFC. The ESA discussed past site use and concluded that no additional studies related to contamination are needed at the site. The project site has been used extensively for agricultural production by Kochergen Farms. Chemicals expected to be present in surface soils in agricultural areas typically include herbicides, pesticides and fertilizers.

A Phase I Environmental Site Assessment (ESA) was conducted by TRC for the proposed Avenal Energy site (Avenal Energy 2008a, Appendix 6.14-1). The ESA determined that the site has been a cultivated field since 1967. The report stated that agricultural pesticides were applied to the property by airplane, truck and/or hand held

sprayer. The ESA did not identify any recognized environmental conditions (REC) associated with the proposed project site and recommended that no further action be taken at the site.

However, the ESA did not discuss the possibility of persistent legacy agricultural chemicals. Given the past land uses and proposed site construction, staff believes that evaluation of the presence of any harmful concentrations of residual contaminants should be conducted to ensure any risk to public or worker health and safety will be mitigated to a level of insignificance. In accordance with Condition of Certification **WASTE-1**, staff proposes that the applicant develop and implement a sampling and analysis plan to screen the site for the presence of persistent agricultural chemicals. In the event that agricultural chemicals are present in hazardous concentrations, staff proposes that the project owner be required to prepare a human health risk assessment and develop and implement a plan for site remediation, if appropriate.

CONCLUSIONS

- The ESA conducted for the project site did not identify any evidence of the presence or likely presence of hazardous substances on the site under conditions that would indicate an existing release, past release, or material threat of release into the ground, groundwater or surface water. This finding indicates that there is limited potential for construction crews to encounter contaminated soil or groundwater at the power plant site;
- The ESA conducted for the project site did not address the potential for persistent legacy agricultural chemicals to remain in site soils. To address the potential for persistent legacy agricultural chemicals remaining in site soils, a soil sampling and analysis program should be conducted.
- An ESA was conducted for the project's linear corridors. The ESA conducted for the water and natural gas line linear corridors did not identify evidence of the presence or likely presence of hazardous substances under conditions that would indicate an existing release, past release, or material threat of release into the ground, groundwater or surface water. However, along the transmission line corridor, the ESA indicated that soil staining was observed on the Carberry Farms property. The ESA considered the history of site use and the observation of stained surface soil and identified the Carberry Farms property as a recognized environmental condition (REC). If project elements are proposed for construction in this area, additional site evaluation should be conducted;
- The management of project wastes generated during project construction and operation would not result in significant impacts provided that staff's proposed conditions of certification are implemented;
- The volume of hazardous and non-hazardous liquid waste will not have a significant impact on existing landfills or transfer and disposal facilities.

Staff concludes that management of the waste generated during construction and operation of the Avenal Energy 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 Avenal Energy project AFC and staff's proposed conditions of certification are implemented.

PROPOSED CONDITIONS OF CERTIFICATION

WASTE-1 The project owner shall sample site soil to determine the presence of persistent agricultural chemicals and provide a plan to prevent worker exposure if such chemicals are found and shall submit the following reports to the CPM for review and approval:

1. Sampling and Analysis Plan - A soil sampling and analysis plan to determine the presence of agricultural chemicals. In preparing this plan, the project owner shall use the California Department of Toxic Substances Control (DTSC) "Interim Guidance for Sampling Agricultural Fields for School Sites (Third Revision August 07, 2008)" as guidance. Should contaminants be detected at levels below the risk-based industrial soil criteria, as defined first in the CalEPA California Human Health Screening Levels (CHHSLs), or if no CHHSL has been developed, then by the San Francisco Bay Regional Water Quality Environmental Screening Levels (ESLs), or if no ESL has been developed, then by the EPA Region 9 Preliminary Remediation Goals (PRGs), then no further sampling and mitigation is required.

2. Human Health Rick Assessment - If agricultural chemicals are detected at levels above the risk-based industrial soil criteria, then the project owner shall prepare a human health risk assessment (HRA) and submit this assessment to the CPM for review and approval.

3. Remedial Action Work Plan - If the results of the HRA show there is a significant risk to the off-site public or to site workers (defined as a total cancer risk via all relevant exposure pathways greater than one in one million for the off-site public, a total cancer risk via all relevant exposure pathways greater than 10 in one million for site worker, and a Hazard Index greater than 1.0 for both the off-site public and on-site workers), the project owner shall prepare and submit to the CPM a Remedial Action Workplan (RAW) that will ensure that all risks and hazards posed by all relevant exposure pathways are reduced to less than significant. The RAW shall identify remedial measures that include soil removal, refined or enhanced airborne dust mitigation measures (such as increased watering frequency, use of a chemical "wetting agent", continuously covering stockpiled soils), workers wearing personal protective equipment for short durations, or a combination of these measures.

Verification: At least 30 days prior to soil sampling and analysis for the presence of persistent agricultural chemicals, the project owner shall submit a sampling and analysis plan to the CPM for review and approval. Not later than 60 days after sampling, the project owner shall provide the CPM the results of the sampling and analysis. If the CPM deems it appropriate, the project owner shall prepare and submit to the CPM for

review and approval, a human health risk assessment and a Remedial Action Workplan not later than 60 days after the CPMs direction to prepare such documents.

WASTE-2 The project owner shall provide the resume of an experienced and qualified Professional Engineer or Professional Geologist, who shall be available for consultation during site construction, excavation, and grading activities, to the CPM for review and approval. The resume shall show experience in remedial investigation and feasibility studies.

The Professional Engineer or Professional Geologist shall be given full authority by the project owner to oversee any earth moving activities that have the potential to disturb contaminated soil.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit the resume to the CPM for review and approval.

WASTE-3 If potentially contaminated soil is identified during site construction, excavation, or grading at either the proposed site or along 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.

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

WASTE-4 The project owner shall prepare a Construction Waste Management Plan for all wastes generated during construction of the facility and shall submit the plan to the CPM for review and approval. The plan shall contain, at a minimum, the following:

- A description of all construction waste streams, including projections of frequency, amounts generated and hazard classifications; 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-5 The project owner shall obtain a hazardous waste generator identification number from the United States Environmental Protection Agency prior to generating any hazardous waste during construction and operations.

Verification: The project owner shall keep a copy of the identification number on file at the project site and provide the number to the CPM in the next Monthly Compliance Report.

WASTE-6 Upon becoming aware of any impending waste management-related enforcement action by any local, state, or federal authority, the project owner shall notify the CPM of any such action taken or proposed 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-7 The project owner shall prepare an Operation Waste Management Plan for all wastes generated during operation of the facility and shall submit the plan to the CPM for review and approval. The plan shall contain, at a minimum, the following:

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

WASTE-8 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 management of all unauthorized releases and spills of hazardous substances, hazardous materials, or hazardous wastes that occur on the project property or related linear facilities. The documentation shall include, at a minimum, the following information: location of release; date and time of release; reason for release; volume released; how release was managed and material cleaned up; amount of contaminated soil and/or cleanup wastes generated; if the release was reported; to whom the release was reported; any corrective action and/or 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. A copy of the unauthorized release/spill documentation shall be provided to the CPM within 30 days of the date the release was discovered.

REFERENCES

Avenal Power 2008a – Application for Certification for the Avenal Energy project, Volumes 1 and 2. Submitted to the California Energy Commission, February 21, 2008.

Avenal Power 2008b – Supplement to the Application for Certification for the Avenal Energy project. Submitted to the California Energy Commission, March 27, 2008.

Avenal Power 2008c – Response to California Energy Commission Data Request 1 through 74, submitted to the California Energy Commission, June 20, 2008.

TRC – Response to Cure Data Request Set 1 for Avenal Energy, October 30, 2008.

TRC – Final Comments to Avenal Energy (08-AFC-1) Preliminary Staff Assessment, March 4, 2009.

WORKER SAFETY AND FIRE PROTECTION

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

SUMMARY OF CONCLUSIONS

Staff concludes that if the applicant for the proposed Avenal Energy project provides a Project Construction Safety and Health Program and a Project Operations and Maintenance Safety and Health Program, as required by Conditions of Certification **WORKER SAFETY -1**and **-2** and fulfills the requirements of **WORKER SAFETY -3** through **-5**, the project would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable laws, ordinances, regulations, and standards. The proposed conditions of certification provide assurance that the Construction Safety and Health Program and the Operations and Maintenance Safety and Health Program proposed by the applicant will be reviewed by the appropriate agencies before implementation. The conditions also require verification that the proposed plans adequately assure worker safety and fire protection and comply with applicable laws, ordinances, regulations, and standards.

INTRODUCTION

Worker safety and fire protection is regulated through laws, ordinances, regulations, and standards (LORS), at the federal, state, and local levels. Industrial workers at the facility operate equipment and handle hazardous materials daily and may face hazards that can result in accidents and serious injury. Protection measures are employed to eliminate or reduce these hazards or to minimize the risk through special training, protective equipment, and procedural controls.

The purpose of this Final Staff Assessment (FSA) is to assess the worker safety and fire protection measures proposed by the Avenal Energy project (AE) and to determine whether the applicant has proposed adequate measures to:

- comply with applicable safety LORS;
- protect the workers during construction and operation of the facility;
- protect against fire; and
- provide adequate emergency response procedures.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

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

Applicable Law	Description
Federal	
29 U.S. Code § 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 construction, commissioning, and operations of power plants, as well as safety around electrical components; fire safety; and hazardous materials use, storage, and handling.
24 CCR section 3, et seq.	Incorporates the current addition of the Uniform Building Code.
Health and Safety Code section 25500, et seq.	Risk Management Plan requirements for threshold quantity of listed acutely hazardous materials at a facility.
Health and Safety Code sections 25500 to 25541	Requires a Hazardous Material Business Plan detailing emergency response plans for hazardous materials emergency at a facility.
Local (or locally enforced)	
Uniform Fire Code, Articles 4, 79, & 80	Specify requirements for proper storage and handling of hazardous materials and flammable/combustible liquids. Enforced by Kings County Fire Department (KCFD).
National Fire Protection Association (NFPA) Standards	Contain standards necessary to establish a reasonable level of safety and protect property from fire and explosion hazards. Enforced by the KCFD.

SETTING

The proposed facility would be located in the city of Avenal within an industrial area that is currently served by the local fire department. Fire support services to the site will be under the jurisdiction of the Kings County Fire Department (KCFD). The closest station to the Avenal Energy site would be the city of Avenal Fire Station, located at 5th Street and Skyline Blvd., approximately four miles from the proposed site. Response time from the moment a call is received to arrival at the Avenal Energy site would be about 11 minutes (KCFD 2008). The next closest station would be the Kettleman City Station, located about 10 miles away and the response time would be within 15 minutes to the Avenal Energy site. The KCFD has an automatic aid agreement with the Avenal State Prison Fire Station located at Highway 33 and King Ave. This station would respond in about 18 minutes to the Avenal Energy site (KCFD 2008).

All KCFD firefighters are trained at the level of Emergency Medical Technician Level 1 (EMT-1) and as hazardous materials specialists (KCFD 2008). The KCFD would also be the first responder for hazardous materials incidents. In the event of a large spill, backup support would be provided by the city of Hanford Hazardous Materials Response Team. This is a Regional State Type II Hazmat team which could respond to the Avenal Energy site in about 30 minutes (KCFD 2008). In addition, the applicant has identified two licensed contractors that could be called upon for clean-up in the event of a hazardous materials spill (Avenal Power 2008f Data Response #21).

Worker Safety and Fire Protection Table 2
Equipment and Personnel at KCFD*

KCFD Station	Total Response Time**	Distance to Avenal Energy	EMS/HazMat Capability***
Avenal Station	11 min.	~4 mi	Y/Y
Kettleman Station	15 min.	~10 mi	Y/Y

*Source: phone conversation with Fire Chief Kilner, KCFD (KCFD 2008).
**Total response times are estimated from the moment a 911 call is made to arrival at the site and are dependent upon traffic conditions and other variables.
***All personnel are trained to EMT-1 level and hazardous materials specialists.

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 did not find any “recognized environmental conditions” at the site or adjacent to it (Avenal Power 2008b Section 6.14.1.1 and Appendix 6.14-1). That is, there was no evidence or record of any use, spillage, or disposal of hazardous substances on the site or nearby, nor any other environmental concern that would require remedial action. However, the Phase I ESA did not address the use of agricultural chemicals used on the site prior being certified “organic” by the US Department of Agriculture (USDA) National Organic Program in August 2008. Certified “organic” means that documentation must indicate that no synthetic or prohibited substances (pesticides, herbicides, chemical fertilizers) have been applied to the site for a period of three years immediately preceding harvest of a crop. Since organic certification was granted in August 2008, no synthetic or prohibited substances should have been applied after August 2005. To ensure there is no risk to public or

worker health and safety, from residual pesticides, staff has proposed that the project owner develop and implement a sampling and analysis plan in accordance with **WASTE-1**, so the site can be screened for the presence of agricultural chemicals and evaluated as to whether they are present in hazardous concentrations. Furthermore, to address the possibility that soil contamination could be encountered during construction of Avenal Energy, proposed Conditions of Certification **WASTE-2** and **WASTE-3** 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-Fire Protection:

1. The potential for impacts on the safety of workers during construction and operations activities; and

2. Fire prevention/protection, emergency medical response, and hazardous materials spill response during construction and operations.

Worker safety issues are thoroughly addressed by California Division of Occupational Safety and Health (Cal-OSHA) regulations. If all LORS are followed, workers will be adequately protected. Thus, the standard for staff's review and determination of significant impacts on workers is whether or not the applicant has demonstrated adequate knowledge about and dedication to implementing all pertinent and relevant Cal-OSHA standards.

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

DIRECT/INDIRECT IMPACTS AND MITIGATION

Worker Safety

Industrial environments are potentially dangerous during construction and operation of facilities. Workers at the proposed Avenal Energy would be exposed to loud noises, moving equipment, trenches, and confined space entry and egress problems. The workers may experience falls, trips, burns, lacerations, and numerous other injuries.

They have the potential to be exposed to falling equipment or structures, chemical spills, hazardous waste, fires, explosions, and electrical sparks and electrocution. It is important for Avenal Energy to have well-defined policies and procedures, training, and hazard recognition and control at its facility to minimize such hazards and protect workers. If the facility complies with all LORS, workers will be adequately protected from health and safety hazards.

A Safety and Health Program will be prepared by the applicant to minimize worker hazards during construction and operation. Staff uses the phrase “Safety and Health Program” to refer to the measures that will be taken to ensure compliance with the applicable LORS during the construction and operational phases of the project.

Construction Safety and Health Program

Avenal Energy encompasses construction and operation of a natural gas fired-facility. Workers will be exposed to hazards typical of construction and operation of a gas-fired combined cycle facility.

Construction Safety Orders are published in 8 CCR sections 1502, et seq. These requirements are promulgated by Cal/OSHA and are applicable 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 to 1522)
- Emergency Action Program and Plan

Additional programs outlined in the applicant’s example table of contents for a Construction Health and Safety Program (Avenal Power 2008b Appendix 6.17-1) include:

- **Program Administration:**
    - Safety and Accident Prevention,
    - New Hire Orientation,
    - Accident/Incident Investigations and Reporting,
    - Safety Task Assignment,
    - Safety Monitoring Activities,
    - Emergency Services,
    - Site Emergency Evacuation Plan,
    - Severe Weather Plan,
    - Security,
    - Subcontractor Requirements,
    - Housekeeping,

  - Hazardous Waste Management, and
  - Competent Person Designation.
- **Occupational Health:**
  - Control of Radiation Hazards
  - Hazard Communication Program,
  - Bloodborne Pathogens,
  - Lead Exposure Control Program,
  - Asbestos Handling Procedures,
  - Inorganic Arsenic Exposure Control Program,
  - Heat and Cold Stress, and
  - Decontamination Procedures.
- **Equipment Safety:**
  - Construction Equipment Inspections,
  - Crane Lift Procedure, and
  - Suspended Work Basket/Platform.

The Application for Certification (AFC) includes adequate outlines of each of the above programs (Avenal Power 2008b, Appendices 6.17-1 and 6.17-4). Prior to the start of construction of Avenal Energy, detailed programs and plans will be provided to the California Energy Commission Compliance Project Manager (CPM) and to the KCFD pursuant to Condition of Certification **WORKER SAFETY-1**.

Operations and Maintenance Safety and Health Program

Prior to the start of operations at Avenal Energy, the Operations and Maintenance Safety and Health Program will be prepared. This operational safety program will include the following programs and plans:

- Injury and Illness Prevention Program (8 CCR § 3203),
- Fire Protection and 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 be applicable to the project. Written safety programs for Avenal Energy, which the applicant will develop, will ensure compliance with the above-mentioned requirements. Prior to operation of Avenal Energy, all detailed programs and plans will be provided to the CPM and KCFD 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

- identity of person(s) with authority and responsibility for implementing the program;
- safety and health policy of the plan;
- definition of work rules and safe work practices for construction activities;
- system for ensuring that employees comply with safe and healthy work practices;
- system for facilitating employer-employee communications;
- procedures for identifying and evaluating workplace hazards and developing necessary program(s);
- methods for correcting unhealthy/unsafe conditions in a timely manner;
- specific safety procedures; and
- training and instruction.

The applicant stated that supervisors would be designated to implement and maintain the IIPP in each work area and that a safety coordinator would be assigned to provide ongoing input on the effectiveness of the IIPP and recommend updates or improvements (Avenal Power 2008b, Section 6.17.2.2.3).

Fire Prevention Plan

California Code of Regulations requires an Operations Fire Prevention Plan (8 CCR § 3221). The plan will accomplish the following actions:

- determine general program requirements;
- determine fire hazard inventory, including ignition sources and mitigation;
- develop good housekeeping practices and proper materials storage;
- establish employee alarm and/or communication system(s);
- provide portable fire extinguishers at appropriate site locations;
- locate fixed fire fighting equipment in suitable areas;
- specify fire control requirements and procedures;
- establish proper flammable and combustible liquid storage facilities;
- identify the location and use of flammable and combustible liquids;
- provide proper dispensing and determine disposal requirements for flammable liquids;

- establish and determine training and instruction requirements and programs; and
- identify personnel to contact for information on plan contents.

Staff proposes that the applicant submit a final Fire Prevention Plan to the CPM for review and approval and to the KCFD 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 and first aid supplies whenever hazards are present that due to process, environment, chemicals, or mechanical irritants, can cause injury or impair bodily function as a result of absorption, inhalation, or physical contact (8 CCR §§ 3380 to 3400). The Avenal Energy operational environment will require personal protective equipment.

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 pertaining to the protective clothing and equipment:

- proper use, maintenance, and storage;
- when to use the protective clothing and equipment;
- benefits and limitations; and
- when and how to replace the protective clothing and equipment.

The Personal Protective Equipment Program ensures that employers comply with the applicable requirements for the program and provides employees with the information and training necessary to protect them from potential workplace hazards.

Emergency Action Plan

California regulations require an Emergency Action Plan (8 CCR § 3220). The AFC contains a satisfactory outline for an emergency action plan (Avenal Power 2008b, Appendix 6.17-4).

The plan will accomplish the following:

- establish emergency escape procedures and emergency escape route for the facility;
- determine procedures to be followed by employees who remain to operate critical plant operations before they evacuate;
- provide procedures to account for all employees and visitors after emergency evacuation of the plant has been completed;
- specify rescue and medical duties for assigned employees;
- identify fire and emergency reporting procedures to regulatory agencies;
- develop alarm and communication systems for the facility;

- establish a list of personnel to contact for information on the plan contents;
- provide emergency response procedures for ammonia release; and
- determine and establish training and instruction requirements and programs.

Written Safety Program

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

Safety Training Programs

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

Additional Mitigation Measures

Protecting construction workers from injury and disease is among the greatest challenges in occupational safety and health. The following facts are reported by the National Institute for Occupational Safety and Health (NIOSH):

- More than 7 million persons work in the construction industry, representing 6 percent of the labor force. Approximately 1.5 million of these workers are self employed.
- Of approximately 600,000 construction companies, 90 percent employ fewer than 20 workers. Few have formal safety and health programs.
- From 1980 to 1993, an average of 1,079 construction workers were killed on the job each year, totaling more fatal injuries than in any other industry.
- Falls caused 3,859 construction worker fatalities (25.6 percent) between 1980 and 1993.
- Construction injuries account for 15 percent of workers' compensation costs.
- Assuring safety and health in construction is complex, involving short-term work sites, changing hazards, and multiple operations and crews working in close proximity.
- In 1990, Congress directed NIOSH to undertake research and training to reduce diseases and injuries among construction workers in the United States. Under this mandate, NIOSH funds both intramural and extramural research projects.

The hazards associated with the construction industry are thus well documented. These hazards increase in complexity in the multi-employer work sites typical of large complex industrial-type projects such as the construction of gas-fired power plants. In order to reduce and/or eliminate these hazards, it has become standard industry practice to hire a Construction Safety Supervisor to ensure a safe and healthful environment for all personnel. This has been evident in the audits of power plants under construction 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 for the elimination of the four hazards (falls, electrical, caught in/between and struck-by hazards), which account for the majority of fatalities and injuries in this industry and have been the focus of targeted OSHA inspections; to prevent serious accidents in the construction industry through implementation of enhanced safety and health programs and increased employee training; and to recognize those subcontractors with exemplary safety and health programs.

To date, there are no OSHA or Cal/OSHA requirements that an employer hire or provide for a Construction Safety Officer. OSHA and Cal/OSHA regulations do, however, require that safety be provided by an employer and the term “Competent Person” is used in many OSHA and Ca/-OSHA standards, documents, and directives. A “Competent Person” is usually defined by OSHA as an individual who, by way of training and/or experience, is knowledgeable of standards, is capable of identifying workplace hazards relating to the specific operations, is designated by the employer, and has authority to take appropriate action. Therefore, in order to meet the intent of the OSHA standard to provide for a safe workplace during power plant construction, staff proposes Condition of Certification **WORKER SAFETY-3,** which would require the applicant/project owner to designate and provide for a power plant 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 work sites typical of large complex industrial-type projects such as the construction of gas-fired power plants.

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

- lack of posted confined space warning placards/signs;
- confusing and/or inadequate electrical and machinery lockout/tagout permitting and procedures;
- confusing and/or inappropriate procedures for handing over lockout/tagout and confined space permits from the construction team to commissioning team and then to operations;
- dangerous placement of hydraulic elevated platforms under each other;
- inappropriate placement of fire extinguishers near hotwork;
- dangerous placement of numerous power cords in standing water on the site, thus increasing the risk of electrocution;

- construction of an unsafe aqueous ammonia unloading pad;
- inappropriate and unsecure placement of above-ground natural gas pipelines inside the facility but too close to the perimeter fence; and
- lack of adequate employee or contractor written training programs addressing proper procedures to follow in the event of finding suspicious packages or objects either on or off site.

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

Fire Hazards

During construction and operation of the proposed Avenal Energy, there is the potential for both small fires and major structural fires. Electrical sparks; combustion of fuel oil, natural gas, hydraulic fluid, mineral oil, or insulating fluid at the power plant switchyard; or flammable liquids, explosions, and over-heated equipment may cause small fires. Major structural fires in areas without automatic fire detection and suppression systems are unlikely to develop at power plants. Fires and explosions of natural gas or other flammable gasses or liquids are rare. Compliance with all LORS will be adequate to assure protection from all fire hazards.

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

Construction

During the early phase of construction, hand held and portable fire extinguishers would be placed throughout the site at appropriate intervals and periodically maintained, and a dust-control water truck would be available on site, which can be used for fire suppression in an emergency. During the later phase of construction, the permanent fire water loop would be installed using a temporary source of water to provide additional protection (Avenal Power 2008f, Data Response #71). Safety procedures and training

would be implemented in accordance with the guidelines of the Construction Fire Protection and Prevention Program, and the KCFD would be available to respond if needed.

Operations

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 National Fire Protection Association (NFPA) standards (including Standard 850 addressing fire protection at electric generating plants), and all Cal/OSHA requirements. Fire suppression elements in the proposed plant will include both fixed and portable fire extinguishing systems. The fire water will be provided onsite by a 750,000 gallon storage tank of which 240,000 gallons would be dedicated for fire suppression. An electric motor-driven pump, a diesel-engine pump, and a jockey pump would be provided to maintain the delivery rate of 2,000 gallons per minute of water to the fire protection loop (Avenal Power 2008b, Sections 2.3.7.1 and 2.3.11.5).

A fixed sprinkler system would be installed in areas of risk and in the warehouse and administrative/control buildings in accordance with NFPA requirements. Fire hydrants supplied by the fire loop would be located at appropriate intervals throughout the facility and a deluge firewater system would be installed to protect oil-filled equipment (STG Lube/Hydraulic oil systems and the CTG and STG step-up transformers). A carbon dioxide fire protection system would be provided for the combustion turbine generators and accessory equipment. This system would have fire detection sensors that will trigger alarms, shut down the CTGs, turn off ventilation, close ventilation openings, and automatically actuate the CO_2. In addition to the fixed fire protection system, the appropriate class of service portable extinguishers and fire hydrants would be located throughout the facility at code-approved intervals (Avenal Power 2008b, Section 2.3.11.5 and Avenal Power 2008f, Data Response #72). These systems are standard requirement by the NFPA and the Uniform Fire Code 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 the final Fire Protection and Prevention Program to staff and to the KCFD prior to construction and operation of the project to confirm the adequacy of the proposed fire protection measures.

Emergency Medical Services Response

Staff conducted a statewide survey to determine the frequency of emergency medical services (EMS) response and off-site fire-fighter response for natural gas-fired power plants in California. The purpose of the analysis was to determine what impact, if any, power plants may have on local emergency services. Staff has concluded that incidents at power plants that require fire or EMS response are infrequent and represent an insignificant impact on the local fire departments, except for rare instances where a rural fire department has mostly volunteer firefighting staff. However, staff has determined that the potential for both work-related and nonwork-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 nonwork-related incidences, including those involving 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 automatic external defibrillator (AED); the response from an off-site provider would take longer regardless of the provider location. This fact is also well documented and serves as the basis for the maintenance of on-site cardiac defibrillation devices at many private and public locations (e.g., airports, factories, government buildings). Therefore, staff concludes that, with the advent of modern cost-effective cardiac defibrillation devices, it is proper in a power plant environment to maintain such a device on site to address cardiac arrythmias resulting from industrial accidents or other nonwork-related causes.

Staff proposes a Condition of Certification **WORKER SAFETY-5** which would require that a portable AED be located on site, that all power plant employees on site during operations be trained in its use, and that a representative number of workers on site during construction and commissioning also be trained in its use.

CUMULATIVE IMPACTS AND MITIGATION

Staff reviewed the potential for the construction and operation of Avenal Energy combined with existing industrial facilities and expected new facilities, to result in impacts on the fire and emergency service capabilities of the KCFD. The KCFD stated that if the proposed facility is built as specified by the applicant, including all fire safety features indicated in the AFC, it would have minimal potential to increase the burden on their department. Knowing the safety record of similar projects, the KCFD believes that they would be able to respond adequately to incidents at Avenal Energy. However, the KCFD noted that in the event of a large fire at Avenal Energy, responding to this facility would require all of the department's local resources which could leave Avenal and Kettleman cities vulnerable. According to the KCFD, to ensure that this facility has no impact on their ability to respond to fires in their jurisdiction, the department would have to increase the staffing at the Avenal and Kettleman Stations (KCFD 2008). Staff considered this view and the potential for impacts on the Cities of Huron and Kettleman City in its analysis. However, staff believes that the chances of a major conflagration requiring all the local fire fighting resources to respond to the proposed Avenal Energy would be insignificant due to the following factors:

1. the lack of unique fire hazards associated with a modern gas-fired power plant;

2. the presence of many on-site automated and manual fire detection and suppression systems; and

3. the requirements of Conditions of Certification **WORKER SAFETY-1** and **-2** that the KCFD review both the Construction and Operations Fire Protection and Prevention Plans to ensure adequacy of protection measures.

Therefore, staff has determined that this project will not have any significant incremental burden on the local fire department's ability to respond to a fire, hazardous materials spill, or medical emergency or to the citizens and facilities located in Huron and Kettleman City.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

One comment on worker safety was received from the Center on Race, Poverty & the Environment. The CRPE commented that on-site soils had not been tested “to ensure that construction workers will not be exposed to dangerous amounts of pesticides or other chemicals. “

Response

Staff thanks CRPE for its comments and agrees with it. Although the Phase I Environmental Site Assessment conducted for this site did not find any “recognized environmental conditions” at the site or adjacent to it, the Phase I ESA did not address the use of agricultural chemicals used on the site prior being certified “organic” by the USDA in August 2008. To ensure there is no risk to public or worker health and safety, from residual pesticides, staff has proposed that the project owner develop and implement a sampling and analysis plan in accordance with **WASTE-1**, so the site can be screened for the presence of agricultural chemicals and evaluated as to whether they are present in hazardous concentrations. Furthermore, to address the possibility that other soil contamination could be encountered during construction of Avenal Energy, proposed Conditions of Certification **Waste-2** and **Waste-3** require a registered professional engineer or geologist to be available during soil excavation and grading to ensure proper handling and disposal of contaminated soil. The potential for worker exposure to hazardous wastes is assessed more fully in the **WASTE MANAGEMENT** section of this FSA.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Staff concludes that construction and operation of the AE project would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS) regarding long-term and short-term project impacts in the area of worker safety and fire protection.

CONCLUSIONS

Staff concludes that if the applicant for the proposed Avenal Energy provides a Project Construction Safety and Health Program and a Project Operations and Maintenance Safety and Health Program as required by Conditions of Certification **WORKER SAFETY -1**, and **-2** and fulfills the requirements of Conditions of Certification **WORKER SAFETY-3** through **-5**, the project would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. Staff also concludes that incidents at power plants that require fire or EMS response are infrequent and represent an insignificant direct or cumulative impact on the local fire departments.

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:

1. a Construction Personal Protective Equipment Program;
2. a Construction Exposure Monitoring Program;
3. a Construction Injury and Illness Prevention Program;
4. a Construction Emergency Action Plan; and
5. 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 programs with all applicable Safety Orders. The Construction Emergency Action Plan and the Fire Prevention Plan shall be submitted to the Kings County Fire Department for review and comment prior to submittal to the CPM for approval.

Verification: At least 30 days prior to the start of construction, the project owner shall submit to the CPM for review and approval a copy of the Project Construction Safety and Health Program. The project owner shall provide a copy of a letter to the CPM from the Kings 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:

1. an Operation Injury and Illness Prevention Plan;
2. an Emergency Action Plan;
3. a Hazardous Materials Management Program;
4. an Operation Fire Prevention Program (8 CCR § 3221); and
5. a 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 comment concerning compliance of the programs with all applicable Safety Orders. The Operation Fire Prevention Plan, the Hazardous Materials Management Program, and the Emergency Action Plan shall also be submitted to the Kings County Fire Department for review and comment.

Verification: At least 30 days prior to the start of first-fire or commissioning, the project owner shall submit to the CPM for approval a copy of the Project Operations and Maintenance Safety and Health Program. The project owner shall provide a copy of a letter to the CPM from the Kings 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:

1. have overall authority for coordination and implementation of all occupational safety and health practices, policies, and programs;

2. assure that the safety program for the project complies with Cal/OSHA and federal regulations related to power plant projects;

3. assure that all construction and commissioning workers and supervisors receive adequate safety training;

4. complete accident and safety-related incident investigations and emergency response reports for injuries and inform the CPM of safety-related incidents; and

5. assure that all the plans identified in Conditions of Certification Worker Safety-1 and -2 are implemented.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit to the CPM the name and contact information for the Construction 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:

1. record of all employees trained for that month (all records shall be kept on site for the duration oif the project);

2. summary report of safety management actions and safety-related incidents that occurred during the month;

3. report of any continuing or unresolved situations and incidents that may pose danger to life or health; and

4. 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 Condition of Certification **WORKER SAFETY-3**, implements all appropriate Cal/OSHA and Energy Commission safety requirements. The Safety Monitor shall conduct on-site (including linear facilities) safety inspections at intervals necessary to fulfill those responsibilities.

Verification: 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 use of the AED 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 use of the AED. The training program shall be submitted to the CPM for review and approval.

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

REFERENCES

Avenal Power 2008b – Application for Certification for the Avenal Energy project, Volumes 1 and 2. Submitted to the California Energy Commission, February 21, 2008.

Avenal Power 2008f – Response to California Energy Commission Data Request 1 through 74, submitted to the California Energy Commission, June 20, 2008.

California Fire Code 1998 – Published by the International Fire Code Institute comprised of the International Conference of Building Officials, the Western Fire Chiefs Association, and the California Building Standards Commission. Whittier, CA.

Kings County Fire Department (KCFD) 2008. Record of conversation with Fire Chief Jim Kilner, August 12.

Uniform Fire Code 1997, Vol. 1 – Published by the International Fire Code Institute comprised of the International Conference of Building Officials and the Western Fire Chiefs Association, Whittier, CA.

U.S. OSHA (United States Occupational Safety and Health Administration). 1993 – Process Safety Management / Process Safety Management Guidelines for Compliance. U.S. Department of Labor, Washington, D.C.

ENGINEERING ASSESSMENT

FACILITY DESIGN

Testimony of Steve Baker

SUMMARY OF CONCLUSIONS

Staff concludes that the design, construction and eventual closure of Avenal Energy 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 project. The purpose of the facility design analysis is to:

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

Subjects discussed in this analysis include:

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

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Lists of LORS applicable to each engineering discipline (civil, structural, mechanical, and electrical) are described in the AFC (Avenal Power 2008b, Tables 2.5-1, 2.5-2; Appendices 2-1 through 2-4). The key LORS are listed in **Facility Design Table 1** below.

Facility Design Table 1
Key Engineering Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	Title 29, Code of Federal Regulations, Part 1910, Occupational Safety and Health Standards
State	California Building Standards Code (CBSC) (also known as Title 24, California Code of Regulations)
Local	Kings County regulations and ordinances City of Avenal regulations and ordinances
General	American National Standards Institute American Society of Mechanical Engineers American Welding Society American Society for Testing and Materials

SETTING

Avenal Energy would be located in the City of Avenal, just south of the Fresno County line and approximately two miles east of Interstate 5. 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 (Avenal Power 2008b, Appendices 2-1 through 2-5).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The purpose of this analysis is to ensure that the project is built to the applicable engineering codes to ensure public health and safety. The analysis verifies that the applicable engineering LORS have been identified and that the project and ancillary facilities have been described in sufficient detail. It also evaluates the applicant's proposed design criteria, describes the design review and construction inspection process, and establishes conditions of certification to monitor and ensure compliance with the engineering LORS and any special design requirements. These conditions allow the 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. Staff has assessed the criteria for designing and constructing linear support facilities such as natural gas and electric transmission

interconnections. The applicant proposes to use accepted industry standards; see the AFC (Avenal Power 2008b, Appendices 2-1 through 2-5) for a representative list of applicable industry standards, design practices, and construction methods in preparing and developing the site. Staff concludes that the project, including its linear facilities, would most likely comply with all applicable site preparation LORS, and proposes conditions of certification (see below and **GEOLOGY AND PALEONTOLOGY**) to ensure compliance.

MAJOR STRUCTURES, SYSTEMS, AND EQUIPMENT

Major structures, systems, and equipment are defined as those structures and associated components or equipment that are necessary for power production and are costly or time consuming to repair or replace; are used for the storage, containment, or handling of hazardous or toxic materials; or may become potential health and safety hazards if not constructed according to the applicable engineering LORS. Major structures and equipment will be identified through compliance with proposed Condition of Certification **GEN-2** below.

The AFC contains lists of the civil, structural, mechanical, and electrical design criteria that demonstrate the likelihood of compliance with applicable engineering LORS, and that staff believes are essential to ensuring that the project is designed in a manner that protects public health and safety.

The project 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 using the appropriate lateral force procedure, staff has included Condition of Certification **STRUC-1**, which in part requires review and approval by the CBO of the project owner's proposed lateral force procedures prior to the start of construction.

PROJECT QUALITY PROCEDURES

The AFC (Avenal Power 2008b, §§ 2.3.15.6, 2.3.15.7) describes a project quality program that will be used on Avenal Energy to maximize confidence that systems and components will be designed, fabricated, stored, transported, installed, and tested in accordance with the technical codes and standards appropriate for a power plant. Compliance with design requirements will be verified through an appropriate program of

inspections and audits. Employment of this quality assurance/quality control (QA/QC) program would ensure that the project is actually designed, procured, fabricated, and installed as contemplated 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 local building authority (the City of Avenal or Kings County) or a third party engineering consultant, to act as CBO for the project. When an entity has been identified to perform the duties of CBO, Energy Commission staff will complete a memorandum of understanding (MOU) with that entity that outlines 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 applicant's engineers responsible for the design and construction of the project (proposed Conditions of Certification **GEN-1** through **GEN-8**). Engineers responsible for the design of the civil, structural, mechanical, and electrical portions of the project are required to be registered in California, and to sign and stamp all design plans, calculations, and specifications submitted to the CBO. These conditions require that no element of construction subject to CBO review and approval shall proceed without prior approval from the CBO. They also require that qualified special inspectors be assigned to perform or oversee special inspections required by the applicable LORS.

While the Energy Commission and delegate CBO have the authority to allow some flexibility in scheduling construction activities, these conditions are written to require that no element of construction of permanent facilities subject to CBO review and approval that would be difficult to reverse or correct may proceed without prior approval of plans by the CBO. Those elements of construction that are not difficult to reverse are allowed to proceed without approval of the plans. The applicant shall bear the responsibility to

fully modify those elements of construction to comply with all design changes that result from the CBO's subsequent plan review and approval process.

FACILITY CLOSURE

The removal of a facility from service, or decommissioning, as a result of the project reaching the end of its useful life, may range from "mothballing" to removal of all equipment and appurtenant facilities and restoration of the site. Future conditions that may affect the decommissioning decision are largely unknown at this time.

To assure that decommissioning of the facility will be completed in a manner that is environmentally sound and safe and will protect public health and safety, the applicant shall submit a decommissioning plan to the Energy Commission for review and approval prior to the commencement of decommissioning. The plan shall include a discussion of:

- proposed decommissioning activities for the project and all appurtenant facilities constructed as part of the project;
- all applicable LORS, local/regional plans, and the conformance of the proposed decommissioning activities to the 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.

The above requirements should serve as adequate protection, even in the unlikely event of project abandonment. Staff has proposed general conditions (see **GENERAL CONDITIONS** elsewhere in this PSA) to ensure that these measures are included in the facility closure plan.

CONCLUSIONS

The laws, ordinances, regulations, and standards (LORS) identified in the AFC and supporting documents are those applicable to the project.

Staff has evaluated the proposed engineering LORS, design criteria, and design methods in the record, and concludes that the design, construction, and eventual closure of the project are likely to comply with applicable engineering LORS.

The proposed conditions of certification will ensure that the proposed facilities are designed and constructed in accordance with applicable engineering LORS. This will occur through the use of design review, plan checking, and field inspections, which are to be performed by the CBO or other Energy Commission delegate. Staff will audit the CBO to ensure satisfactory performance.

Whereas future conditions that may 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 **GENERAL CONDITIONS,** prior to the

commencement of decommissioning, the decommissioning procedure is likely to occur in compliance with all applicable engineering LORS.

Energy Commission staff recommends that:

1. the conditions of certification proposed herein be adopted to ensure that the project is designed and constructed to assure public health and safety, and to ensure compliance with all applicable engineering LORS;

2. the project be designed and built to the 2007 CBSC (or successor standard, if such is in effect when the initial project engineering designs are submitted for review); and

3. the CBO shall review the final designs, conduct plan checking, and perform field inspections during construction. Energy Commission staff will 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 drawings 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)**
Combustion Turbine & Generator (CTG) Foundation and Connections	2
Steam Turbine & Generator (STG) Foundation and Connections	1
Heat Recovery Steam Generator (HRSG) & Stack Structure, Foundation and Connections	2
CTG Main Transformer Foundation and Connections	2
STG Main Transformer Foundation and Connections	1
CTG Air Inlet Structure, Foundation and Connections	2
CTG Inlet Air Chiller Foundation and Connections	4
Electrical Auxiliary Transformers Foundation and Connections	2
CEMS Enclosure Structure, Foundation and Connections	2
Air Cooled Condenser Structure, Foundation and Connections	1
Auxiliary Boiler Structure, Foundation and Connections	1
Boiler Feed Water Pump Foundation and Connections	4
Fuel Gas Separator and Heating Foundation and Connections	2
CTG Support Skid Foundation and Connections	2
Power Distribution Center Foundation and Connections	5
Demineralized Water Storage Tank Structure, Foundation and Connections	1
Fire Water Pump Skid Foundation and Connections	1
HRSG Blowdown Tank and Sump Structure, Foundation and Connections	2
Gas Metering and Regulating with Fuel Gas Filter/Separators Foundation and Connections	2
Water Treatment Area Structure, Foundation and Connections	1
Ammonia Storage Tank, Foundation and Connections	1
Ammonia Transfer Pumps Foundation and Connections	3
Raw/Firewater Tank Structure, Foundation and Connections	1
Septic Tank Structure, Foundation and Connections	1
Storage Building Structure Foundation and Connections	2
Condensate Tank and Pumps Foundation and Connections	1
Closed Loop Cooling Water Pumps Foundations and Connections	2
Fin Fan Coolers Structure, Foundation and Connections	2
Ammonia Dilution Skid Foundation and Connections	2
STG Electrical Equipment Foundation and Connections	1
Switchgear Building Structure, Foundation and Connections	1
Unit Auxiliary Transformer Foundation and Connections	2
Generator Breaker Foundation and Connections	2
Air Compressor Skid Foundation and Connections	2
Backup Generator Foundation and Connections	1

Equipment/System	**Quantity (Plant)**
Hydrogen Storage Area Tank Structure, Foundation and Connections	1
Phosphate Feed Skid Foundation and Connections	2
Sample Panel Foundation and Connections	2
Auxiliary Cooling Water Pumps & Heat Exchanger Foundation and Connections	1
Oil/Water Separator Foundation and Connections	1
Control Room/Administration Building Structure, Foundations and Connections	1
STG Lube Oil Skid Foundations and Connections	1
Switchyard Control House Structure, Foundation and Connections	1
Drainage Systems (including sanitary drain and waste)	1 Lot
High Pressure and Large Diameter Piping and Pipe Racks	1 Lot
HVAC and Refrigeration Systems	1 Lot
Temperature Control and Ventilation Systems (including water and sewer connections)	1 Lot
Building Energy Conservation Systems	1 Lot
Switchyard, Buses and Towers	1 Lot
Electrical Duct Banks	1 Lot
Zero Liquid Discharge System Structures, Foundation and Connections	1

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.

Verification: At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible civil engineer, soils (geotechnical) engineer, and engineering geologist assigned to the project.

At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of construction, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible design engineer, mechanical engineer, and electrical engineer assigned to the project.

The project owner shall notify 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.

Verification: At least 15 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of an activity requiring special inspection, the project owner shall submit to the CBO for review and approval, with a copy to 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.

Verification: The project owner shall transmit a copy of the CBO's approval of any corrective action taken to resolve a discrepancy to the CPM in the next monthly

compliance report. If any corrective action is disapproved, the project owner shall advise the CPM, within five days, of the reason for disapproval and the revised corrective action to obtain CBO's approval.

GEN-8 The project owner shall obtain the CBO's final approval of all completed work that has undergone CBO design review and approval. The project owner shall request the CBO to inspect the completed structure and review the submitted documents. The project owner shall notify the CPM after obtaining the CBO's final approval. The project owner shall retain one set of approved engineering plans, specifications, and calculations (including all approved changes) at the project site or at 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.

Verification: Within 15 days of the completion of any work, the project owner shall submit to the CBO, with a copy to the CPM, in the next monthly compliance report, (a) a written notice that the completed work is ready for final inspection, and (b) a signed statement that the work conforms to the final approved plans. After storing the final approved engineering plans, specifications, and calculations described above, the project owner shall submit to the CPM a letter stating both that the above documents have been stored and the storage location of those documents.

Within 90 days of the completion of construction, the project owner shall provide to the CBO three sets of electronic copies of the above documents at the project owner's expense. These are to be provided in the form of "read only" 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.

Verification: If a discrepancy is discovered in any of the above data, the project owner shall, within five days, prepare and submit an NCR describing the nature of the discrepancies and the proposed corrective action to the CBO, with a copy of the transmittal letter to the CPM (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).

Verification: On a schedule suitable to the CBO, the project owner shall notify the CBO of the intended filing of design changes and shall submit the required number of sets of revised drawings and the required number of copies of the other above-mentioned documents to the CBO, with a copy of the transmittal letter to the CPM. The project owner shall notify the CPM, via the monthly compliance report, when the CBO has approved the revised plans.

STRUC-4 Tanks and vessels containing quantities of toxic or hazardous materials exceeding amounts specified in the 2007 CBC, Chapter 3, Table 307.1(2), shall, at a minimum, be designed to comply with the requirements of that chapter.

Verification: At least 30 days (or within a project owner- and CBO-approved alternate time frame) prior to the start of installation of the tanks or vessels containing the above specified quantities of toxic or hazardous materials, the project owner shall submit to the CBO for design review and approval final design plans, specifications, and calculations, including a copy of the signed and stamped engineer's certification.

The project owner shall send copies of the CBO approvals of plan checks to 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 B31.2 (Fuel Gas Piping Code);
- ANSI B31.3 (Chemical Plant and Petroleum Refinery Piping Code);
- ANSI B31.8 (Gas Transmission and Distribution Piping Code);
- Title 24, California Code of Regulations, Part 5 (California Plumbing Code);
- Title 24, California Code of Regulations, Part 6 (California Energy Code, for building energy conservation systems and temperature control and ventilation systems);
- Title 24, California Code of Regulations, Part 2 (California Building Code); and
- Kings County 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).

Verification: At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of construction of any HVAC or refrigeration system, the project owner shall submit to the CBO the required HVAC and refrigeration calculations, plans, and specifications, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with the CBC and other applicable codes, with a copy of the transmittal letter to 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.

Verification: At least 30 days (or within a project owner- and CBO-approved alternative time frame) prior to the start of each increment of electrical construction, the project owner shall submit to the CBO for design review and approval the above-listed documents. The project owner shall include in this submittal a copy of the signed and stamped statement from the responsible electrical engineer attesting compliance with the applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

REFERENCES

Avenal Power 2008b – Application for Certification for the Avenal Energy project, Volumes 1 and 2. Submitted to the California Energy Commission, February 21, 2008.

GEOLOGY AND PALEONTOLOGY

Testimony of Dal Hunter, Ph.D., C.E.G.

SUMMARY OF CONCLUSIONS

The proposed Avenal Energy project is located in an active geologic area of the southwestern Great Valley Geomorphic Province in western Kings County, California. Because of its geologic setting, the site could be subject to intense levels of earthquake-related ground shaking. The effects of strong ground shaking must be mitigated, to the extent practical, through structural designs required by the California Building Code (CBC 2007) and the project geotechnical report. The California Building Code (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 required for the project by the CBC, and proposed Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1**, in the **FACILITY DESIGN** section of this document, would present standard engineering design recommendations for mitigation of seismic shaking and site soil conditions.

There are no known viable geologic or mineralogical resources at the site. Regionally, paleontological resources have been documented within Quaternary older alluvium similar to deposits that underlie the project site, but no significant fossils were found during cursory field explorations at the proposed plant site. Potential impacts would also 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, California Energy Commission (Energy Commission) staff believes that the potential is low for significant adverse 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. It is staff's opinion that Avenal Energy could be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards 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 Avenal Energy site as well as 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

Applicable laws, ordinances, regulations, and standards (LORS) are listed in the application for certification (AFC) (Avenal Power, 2008b). 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 project is not located on federal land. There are no federal LORS for geologic hazards and resources for this site.
State	
California Building Code (CBC), 2007	The CBC (2007) includes a series of standards that are used in project investigation, design, and construction (including grading and erosion control).
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. No portions of the site and proposed ancillary facilities are located within designated Alquist-Priolo Fault Zones.
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.
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.
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	None

SETTING

Avenal Energy would be constructed on 148 acres of privately owned vacant land within the Avenal city limits in Kings County, California. The proposed project site is located in an industrially-zoned area and its development is consistent with City of Avenal land use plans and zoning.

Avenal Energy would be a primary power generating facility capable of producing 600 MW of electricity from a combined cycle natural gas fired combustion turbine generator and steam turbine generator system. Ancillary facilities would include a 2.5-mile natural gas pipeline, and a 6.4-mile above-ground electrical transmission connection to the existing PG&E electrical grid west of the site. Primary water supply would be provided by the City of Avenal via the San Luis Canal located adjacent to the site with two backup water supply pipelines connecting to existing water supply wells in the project area. Other onsite improvements would include a water supply treatment plant, control and administrative buildings, a zero liquid discharge system for treatment of process water, a septic system, and various smaller outbuildings and facilities.

REGIONAL SETTING

The Avenal Energy site is located in the southwestern San Joaquin Valley, which is part of the Great Valley geomorphic province of California. The Great Valley is approximately 400 miles long and 60 miles wide, bounded on the north by low-lying hills; on the northeast by the volcanic plateau of the Cascade Range; on the west by the Coast Ranges; on the east by the Sierra Nevada; and on the south by the Coast Ranges and the Tehachapi Mountains. The northern one-third of the valley is known as the Sacramento Valley, while the southern two-thirds are known as the San Joaquin Valley. The Great Valley is characterized by dissected uplands, and relatively undeformed low alluvial plains and fans, river flood plains and channels, and lake bottoms. In the late Cenozoic era much of the San Joaquin Valley was occupied by shallow brackish and freshwater lakes. Much of the valley fill alluvium is underlain by marine and non-marine sedimentary rocks and crystalline basement which have undergone anticlinal and synclinal folding and faulting related to regional tectonism. This tectonism has been uplifting the Coast Ranges since the middle Jurassic period. Major oil fields have been developed in the southern portion of the valley, primarily to the east of the site.

PROJECT SITE DESCRIPTION

The Avenal Energy site is presently undeveloped and consists of land that has been extensively disturbed by agricultural activities for at least the past 50 years. The property is located at elevation ranging from approximately 320 to 360 feet above sea level with the projected finished power block elevation of 340 feet. Located at approximately 36.09 degrees north latitude by 120.06 degrees west longitude, the project site is in the northeast quarter of Section 19, Township 21 South, Range 18 East of the Mount Diablo Baseline and Meridian in western Kings County, near the Fresno County border, and east of the Kettleman Hills. The 148-acre site is in a planned industrial park within the City of Avenal, approximately two miles east of Interstate 5, west of Avenue 33D and southeast of Avenal Cutoff Road. While the potential site is located within the city limits, it is separated

from the residential and commercial districts by the topographically high ground of the Kettleman Hills and a distance of about six miles. The parcel is identified by the Kings County Assessors Office as Parcel Number (APN) 36-170-035.

Site surface soils are thought to be comprised of a permeable sandy loam (USDA 1986). The depth to ground water can vary from 200 to 250 feet below existing grade (Westlands Water District, 2001). Site near-surface geology consists of alluvial fan deposits of Holocene age underlain by Pliocene-Pleistocene aged non-marine clastic sediments of the Tulare Formation (Page, 1983). Beneath the site, these units together extend to depths of 2,000 to 2,800 feet below the surface (Bertoldi, et al., 1991; Jennings and Strand, 1992). The parcel is not crossed by any known active faults and does not lie within a designated Alquist-Priolo special studies zone (ICBO 1988). A number of major, active faults lie within 70 miles of the site. These faults are discussed in detail under the **GEOLOGICAL HAZARDS** section of this analysis.

Existing grade at the proposed power plant site slopes approximately 1% to the northeast (USGS 1978). The existing site drainage is probably by a combination of infiltration and overland sheet flow. A more complete discussion of on-site drainage is included in the **WATER RESOURCES** section of this staff assessment.

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. The California Building Standards Code (CBSC) and CBC (2007) provide geotechnical and geological investigation and design guidelines, which engineers must follow when designing a facility. As a result, the criteria used to assess the significance of a geologic hazard include evaluating each hazard's potential impact on the design and construction of the proposed facility. Geologic hazards include faulting and seismicity, liquefaction, dynamic compaction, hydrocompaction, subsidence, expansive soils, landslides, tsunamis, and seiches. Other site-specific geologic hazards, such as abandoned mine shafts, are evaluated as appropriate.

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 operations could adversely affect geologic and mineralogic resources.

Staff reviewed existing paleontologic information and requested records searches from the San Bernardino County Museum and the Natural History Museum of Los Angeles County for the site area. Site-specific information generated by the applicant for the proposed site and ancillary facilities was also reviewed. 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, are proposed as part of the requirements for project approval.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Ground shaking represents the main geologic hazard at this site. This potential hazard can be effectively mitigated through facility design and recommendations which should be presented in a project site specific geotechnical report. Proposed Conditions of Certification **GEN-1, GEN-5,** and **CIVIL-1** in the **FACILITY DESIGN** section should also mitigate these impacts to a less than significant level.

The Avenal Energy site is not located within an established Mineral Resource Zone (MRZ) and no economically viable mineral deposits are known to be present. The site is in proximity to producing oil and gas fields, however these are located beneath the structural anticlines of the Kettleman and Gurjaral Hills to the west and northwest. The potential for oil or gas production from beneath the site is considered to be low (CDC 2008).

No important paleontological resources were observed on the site during the cursory paleontological field survey conducted for the AFC (Avenal Power, 2008b). The site near-surface formation is composed to an unknown and probably variable depth by unconsolidated Holocene alluvial deposits. Given their recent age, (<10,000 years), these deposits are unlikely to contain significant paleontologic resources. Older Quaternary alluvium of Pleistocene age, which underlies the Holocene deposits, is known regionally to contain significant fossil resources, primarily terrestrial vertebrates. Likewise, lakebed deposits which range in age from recent to Pleistocene have potential to contain significant fossil resources, particularly as they increase in age with depth.

Overall, staff considers the probability that paleontological resources will be encountered during site construction activities to be low. However, if construction includes significant amounts of grading or deep foundation excavation and utility trenching the potential for exposure of paleontological resources will increase with depth and volume of the excavations. This assessment is based on SVP criteria and the paleontological report appended to the AFC (Avenal Power, 2008b). Proposed Conditions of Certification **PAL-1** to **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 (a paleontologic resource specialist, or 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, can be mitigated to reduce impacts to a less than significant level.

GEOLOGICAL HAZARDS

The AFC (Avenal Power, 2008b) provides documentation of potential geologic hazards at the proposed site, including site-specific subsurface information. Review of the AFC, coupled with staff's independent research, indicates that the potential for geologic hazards to impact the plant site during its practical design life is low if recommendations for mitigation of seismic shaking are implemented and followed. Geologic hazards related to seismic shaking should be addressed in a project geotechnical report per CBC (2007) requirements.

Staff's independent research included the review of available geologic maps, reports, and related data of the Avenal Energy site. Geological information was available from the California Geological Survey (CGS), California Division of Mines and Geology (CDMG, now know as CGS), the U.S. Geological Survey (USGS), the American Geophysical Union, the Geologic Society of America, and other organizations.

Faulting and Seismicity

Energy Commission staff reviewed numerous CGS and USGS publications, (CGS 2002a and b; CGS 2007; Jennings 1992; Jennings and Strand 1992; Matthews and Burnett 1991; Smith, 1992; USGS 2006), informational websites, and analytical and database software (Blake, 2000a and 2000b) in order to gather data on the location, recency, and type of faulting in the project area. Type A and B faults within 70 miles of the site under consideration are listed in **Geology and Paleontology Table 2**. Type A faults have slip-rates of $\geq$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. The fault type, potential magnitude, and distance from the proposed site are summarized in Table 2.

Type C and otherwise undifferentiated faults which are more than 20 miles from the site are not discussed here because they are unlikely to undergo movement or generate seismicity which could affect the project.

Eighteen Type A and B faults and fault segments were identified within 70 miles of the site. The closest are segments 14 and 13 of the Great Valley Blind Thrust Fault System which are 1.1 and 6.1 miles away, respectively. Three other segments of the Great Valley System (12, 11, and 10) are also within 70 miles of the site. The Great Valley Blind Thrust is a blind ramp thrust fault system that occurs at depth throughout the site vicinity. In the proposed project area the Great Valley Fault System is characterized by west-dipping low angle (approximately 15 degrees) reverse (thrust) fault segments which vary from

approximately 10 to 20 miles in length. At the site, the ramp thrust fault is approximately 4.5 miles below the ground surface. This segment of the Great Valley Blind Thrust has been assigned a maximum moment magnitude of 6.4 (ICBO 1998). Three earthquakes in the Richter magnitude range of 5.6 to 6.7 have occurred along this fault zone between 1983 and 1985. This includes the magnitude 5.8 Kettleman Hills earthquake, (also referred to as the Avenal earthquake), which occurred on August 4, 1985 with an epicenter six miles northwest of the site. The Richter magnitude scale, which was in use for many years, has generally been replaced with moment magnitude which considers the area of the fault surface rupture and is more precise for large earthquakes than the Richter scale. This system change accounts for the apparent inconsistency between the projected and measured earthquake magnitude along this segment of the Great Valley Blind Thrust fault. The same is true for the San Andreas Fault, discussed below.

Numerous smaller earthquakes continue to occur throughout the site area, most commonly with epicenters at or below the thrust ramp (4.5 miles) and with magnitudes of less than 4.0 (SCEDC 2008). Surface and subsurface deformation along the Great Valley Fault System thrust belt has resulted in formation of the northwest trending ridges and valleys which characterize the terrain along the eastern and southern boundaries of the Great Valley east of the San Andreas Fault (Namson and Davis, 1988).

The San Andreas Fault is the dominant active tectonic feature of the Coast Ranges and represents the boundary of the North American and Pacific plates. Right-lateral strike-slip motion occurs along the San Andreas Fault at an average rate of 2.5 centimeters per year. The San Andreas Fault is divided into several segments in this region. The Parkfield segment is closest to the site at about 25.3 miles and is capable of a moment magnitude earthquake of 6.5. The Cholame segment of the San Andreas Fault ruptured in 1857 (Fort Tejon Earthquake) with an estimated Richter magnitude 7.9. The Cholame segment has been assigned a maximum moment magnitude of 7.3, and the northern end of the segment extends to within about 27 miles southwest of the site.

Because blind thrust faults do not intersect the surface, there is no known hazard related to surface rupture. Strong ground shaking can occur due to movement along these deeply buried faults. The CBC will require that project structures be designed with adequate strength to withstand the lateral dynamic displacements induced by the Design Basis Ground Motion, which the CBC defines as the earthquake ground motion that has 2% chance of being exceeded in 50 years. Mapping by the CDMG (1999) indicates that there is a 10% probability that a bedrock ground acceleration of 0.30 to 0.40 g (30-40% of the acceleration of gravity) will be exceeded in any 50-year interval. This is based on movement along the Great Valley Blind Thrust Fault, which underlies the site area at a depth of approximately 4.5 miles. The applicant estimates that the peak horizontal ground acceleration for the design earthquake (with a 10% probability in 50 year return interval) is 0.47g (Avenal Power, 2008b). This is based on an M 6.4 earthquake on the ramp thrust fault that occurs below the site. A peak horizontal ground acceleration of this intensity could cause instability of the Avenal Energy power plant foundation soils, depending on the soil conditions actually present. Seismic concerns will be addressed as a result of proposed Facility Design Condition of Certification **GEN-1**. Proper design in accordance with this condition should adequately mitigate seismic hazards to the current standards of practice.

Geology and Paleontology Table 2
Active Faults in the Project Area

Fault Name	Distance From Site (miles)	Maximum Earthquake Magnitude (Mw)	Estimated Peak Site Acceleration (g)	Movement and Strike	Slip Rate mm/yr	Fault Type
Great Valley 14	1.1	6.4	0.401	Reverse (West) Blind Thrust	1.5	B
Great Valley 13	6.1	6.5	0.254	Reverse (West) Blind Thrust	1.5	B
Great Valley 12	23.5	6.3	0.088	Reverse (West) Blind Thrust	1.5	B
San Andreas - Parkfield	25.3	6.5	0.076	Right-Lateral Strike Slip (Northwest)	34.0	A
San Andreas – Whole M-1a	27.0	8.0	0.160	Right-Lateral Strike Slip (Northwest)	34.0	A
San Andreas – Cholame M-1c-1	27.0	7.3	0.111	Right-Lateral Strike Slip (Northwest)	34.0	A
San Andreas – Cho-Moj M-1b-1	27.0	7.8	0.144	Right-Lateral Strike Slip (Northwest)	34.0	A
San Andreas (creeping)	28.6	6.2	0.059	Right-Lateral Strike Slip (Northwest)	34.0	A
San Juan	31.3	7.1	0.089	Right-Lateral Strike Slip (Northwest)	1.0	B
Great Valley 11	34.7	6.4	0.069	Reverse (West) Blind Thrust	1.5	B
Rinconada	48.5	7.5	0.078	Right-Lateral Strike Slip (Northwest)	1.0	B
Great Valley 10	49.4	6.4	0.053	Reverse (West) Blind Thrust	1.5	B
San Andreas - Carrizo M-1c-2	54.7	7.4	0.068	Right-Lateral Strike Slip (Northwest)	34.0	A
Great Valley 9	62.7	6.6	0.049	Reverse (West) Blind Thrust	1.5	B
Ortigalita	64.3	7.1	0.051	Right-Lateral Strike Slip (Northwest)	1.0	B
San Luis Range (South Margin)	67.0	7.2	0.063	Reverse (North)	0.2	B
Los Osos	67.2	7.0	0.057	Reverse (Southwest)	0.5	B
Hosgri	70.1	7.5	0.059	Right-Lateral Strike Slip (Northwest)	2.5	B

Based on previous drilling and on the soil profile generated for this site by 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 0.88 times the acceleration of gravity (0.88g) for bedrock acceleration based on 2% probability of exceedence in 50 years under 2007 CBC criteria. For a Class D site, the soils profile amplifies the acceleration of the ground surface to 1.94g (USGS 2008).

Liquefaction

Liquefaction is a condition in which a cohesionless or even slightly plastic soil may lose shear strength due to a sudden increase in pore water pressure caused by ground shaking during an earthquake. Four of the parameters used to assess the potential for liquefaction are soil density, soil texture, depth to ground water, and the peak horizontal ground acceleration estimated for the site. The depth to ground water at the project is approximately 200 to 250 feet below existing grade (Westlands Water District, 2001). Consequently, liquefaction cannot be a hazard to the Project. Geotechnical studies would be conducted as part of Project siting design to confirm the low potential for liquefaction. Liquefaction potential on the proposed site should be addressed in the project geotechnical report per CBC (2007) and Condition of Certification **GEN-1** requirements.

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—that is, a nearby steep hillside or deeply eroded stream bank, etc.—but can also occur on gentle slopes such as are present at the project site. 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. Because the proposed site is not subject to liquefaction, the potential for lateral spreading of the site surface during seismic events is negligible.

Dynamic Compaction

Dynamic compaction of soils results when relatively unconsolidated granular materials experience vibration associated with seismic events. The vibration causes a decrease in soil volume, as the soil grains tend to rearrange into a more dense state (an increase is soil density). The decrease in volume can result in settlement of overlying structural improvements. Site specific geotechnical investigation should be conducted to verify the alluvial deposits in the site subsurface are generally too dense to allow significant dynamic compaction.

Hydrocompaction

Hydrocompaction (also known as hydro-collapse) is generally limited to young soils that were deposited rapidly in a saturated state, most commonly by a flash flood. The soils dry quickly, leaving an unconsolidated, low density deposit with a high percentage of voids. Foundations built on these types of compressible materials can settle excessively, particularly when landscaping irrigation dissolves the weak cementation that is preventing the immediate collapse of the soil structure. Hydrocompaction is the process of the loss of soil volume upon the application of water. The potential for significant compaction due to hydrocompaction is considered remote because the site area has been irrigated and

cultivated extensively. Site specific geotechnical investigation should be conducted to verify the subsurface alluvial deposits which underlie the site are generally too dense to experience significant hydrocompaction.

Subsidence

Subsidence of surficial and near surface soil units may be induced at the site by strong ground shaking due to a large nearby earthquake, by consolidation of loose or soft soils due to heavy loading of the soils by large structures, or by the extraction of fluids from the subsurface. Earthquake and load induced consolidation will be addressed by the project geotechnical investigation, as required by Facility Design Conditions of Certification **GEN-5** and **CIVIL-1.** Subsidence due to ground water withdrawal was a problem throughout much of the San Joaquin Valley in the decades prior to the 1970's (Ireland, Poland, and Riley, 1984; USGS 2000). Regional ground subsidence is typically caused by petroleum or ground water withdrawal that increases the effective unit weight of the soil profile, which in turn increases the effective stress on the deeper soils. This results in consolidation or settlement of the underlying soils. Petroleum and gas fields are located in the project site area and throughout the southern portion of the Great Valley Geomorphic Province (CDC 2008). However, since the 1970's, the availability of a surface water supply and decrease in ground water pumping has reduced ground water overdraft and water levels in the aquifer have recovered, stabilizing the primary subsidence mechanism. The project will not increase ground water withdrawal and, consequently, will not result in subsidence due to ground water pumping. The Applicant has stated that no known subsidence problems exist in the project area, though the presence of loose or soft soils at the site has not yet been determined. The potential site is not located in an area of known historic subsidence (Kings County, 2004).

Expansive Soils

Soils that contain a high percentage of expansive clay minerals are prone to expansion, if subjected to an increase in water content. Expansive soils are usually measured with an index test such as the expansive index potential. In order for a soil to be a candidate for testing, the soil must have high clay content and the clay must have a high shrink-swell potential and a high plasticity index**.** Soils in the project vicinity are expected to consist of a sandy loam, which would not pose any expansive soil hazard (USDA 1986). The project geotechnical study would verify that expansive soils are not present, or provide recommendations to mitigate their effects, if such soils are found.

Facility Design Conditions of Certification **GEN-1, GEN-5** and **CIVIL-1** should mitigate the above hazards to a less than significant level.

Landslides

The proposed site is essentially flat excepting a gentle slope towards the northeast, and is located approximately two miles from the nearest mountain. This subdued site topography is not susceptible to landslides or other forms of slope instability.

Flooding

The proposed site and linear facilities are located outside the 100-year flood zone as designated by the Federal Emergency Management Agency (FEMA 2000).

Tsunamis and Seiches

The proposed project and associated linear facilities are not located near any significant surface water bodies and therefore there is no potential for impacts due to tsunamis and seiches.

GEOLOGIC, MINERALOGIC, AND PALEONTOLOGIC RESOURCES

Energy Commission staff has reviewed applicable geologic maps, reports, and on-line resources for this area (CDMG 2003; CDMG 1999; CDMG 1998; CDMG 1994; CDMG 1990; and CDMG 1965). Staff did not identify any geological or mineralogical resources at the proposed energy facility location. The site is in proximity to producing oil and gas fields, however these are located beneath the structural anticlines of the Kettleman and Gurjaral Hills west and northwest of the site and the potential for production from beneath the site is considered to be low (CDC 2008).

Energy Commission staff reviewed the paleontological resources assessment in Section 5.9 and Appendix H of the AFC (Avenal Power, 2008b). No paleontological resources have been documented on the plant site.

Although Quaternary alluvial and lakebed deposits, like those which underlie the project site, are known to contain a wide variety of vertebrate fossils, none have been identified at the site or within a 1-mile radius of the site. There is some potential to encounter significant vertebrate fossils if drilled shaft foundations or deep excavations are required to support heavily loaded structures. Any fossil brought to the surface by drilling operations would be badly disturbed and out of context as well.

This assessment is based on SVP criteria, the paleontological report appended to the AFC (LSA 2001), and the independent paleontological assessment of McLeod (2008). Proposed Conditions of Certification **PAL-1** to **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 (a paleontologic resource specialist, or 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.

Construction Impacts and Mitigation

The design-level geotechnical investigation, required for the project by the CBC (2007) and proposed Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1** of the **FACILITY DESIGN** section of this document should provide standard engineering design recommendations for mitigation of earthquake ground shaking and excessive settlement.

As noted above, no viable geologic or mineralogic resources are known to exist in the vicinity of the proposed construction site. No paleontologic resources have been identified at the potential site although older alluvium and lakebed deposits beneath the site are considered to have a high sensitivity for paleontologic impacts. Construction of the proposed project will include grading, foundation excavation, and utility trenching. Based on the soils profile, SVP assessment criteria, and the depth of the potentially fossiliferous geologic units, staff considers the probability of encountering paleontological resources to be low, particularly above a depth of five feet. Utility trenching or large turbine-generator foundations, extending five feet or more below existing grade, would be the most likely situation where meaningful fossils could be found.

Proposed Conditions of Certification **PAL-1 to PAL-7** are designed to mitigate any paleontological resource impacts, as discussed above, to a less than significant level. Essentially, these conditions require a worker education program in conjunction with monitoring of earthwork activities by qualified professional paleontologists (paleontologic resource specialist, or PRS). Earthwork is halted any time potential fossils are recognized by either the paleontologist or the worker. When properly implemented, the Conditions of Certification yield a net gain to the science of paleontology since fossils that would not otherwise have been discovered can be collected, identified, studied, and properly curated. A paleontological resource specialist is retained, for the project by the applicant, to produce a monitoring and mitigation plan, conduct the worker training, and provide the monitoring. During the monitoring, the PRS can and often does petition the Energy Commission 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 project, the applicant proposes monitoring and mitigation measures for construction of Avenal Energy. 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, during project design life, and that impacts to vertebrate fossils encountered during construction can be mitigated to levels of insignificance.

Operation Impacts and Mitigation

Operation of the proposed new gas-fired peaker generating facility should not have any adverse impact on geologic, mineralogic, or paleontologic resources.

CUMULATIVE IMPACTS AND MITIGATION

The proposed project is situated in a seismically active geologic environment. Strong ground shaking potential must be mitigated through foundation and structural design as required by the CBC (2007). Compressible soils and areas within and near building footprints which may undergo subsidence due to tension cracking and fissuring must be mitigated in accordance with a design-level project geotechnical investigation and proposed Conditions of Certification **GEN-1, GEN-5, and CIVIL-1** under **FACILITY DESIGN**. No paleontological resources have been documented in the general area of the

project or in sediments similar to those that are present on the site. The potential impacts to paleontological resources due to construction activities will be mitigated as required by proposed Conditions of Certification **PAL-1 to PAL-7**.

Staff believes that the potential for significant adverse cumulative impacts to the proposed project from geologic hazards, during the project's design life, is low, and that the potential for isolated and cumulative impacts to geologic, mineralogic, and paleontologic resources is very low.

The proposed Conditions of Certification allow the Energy Commission CPM and the applicant to adopt a compliance 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, paleontologic, or mineralogic resources since no such resources are known to exist at the project location. 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

Avenal Energy would comply with all applicable LORS, provided that the proposed Conditions of Certification identified below are followed. The design and construction of the project would have no adverse, isolated, or cumulative impacts 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 paleontological Conditions of Certification follow. It is staff's opinion that the likelihood of encountering paleontologic resources is low at the plant site. Staff will consider reducing monitoring intensity, at the recommendation of the project paleontologic resource specialist, following examination of sufficient, representative deep excavations.

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. If the footprint of the project or its linear facilities changes, 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.

Verification:

1. At least 30 days prior to the start of ground disturbance, the project owner shall provide the maps and drawings to the PRS and CPM.

2. If there are changes to the footprint of the project, revised maps and drawings shall be provided to the PRS and CPM at least 15 days prior to the start of ground disturbance.

3. If there are changes to the scheduling of the construction phases, the project owner shall submit a letter to the CPM within five 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 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 Condition of Certification **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
Avenal Energy Project (08-AFC-1)

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

Testimony of Erin Bright

SUMMARY OF CONCLUSIONS

Avenal Energy, if constructed and operated as proposed, would generate 600 megawatts (MW) (nominal net output) of electric power at an overall project fuel efficiency of 50.5% lower heating value (LHV). While it would consume substantial amounts of energy, it would do so in the most efficient manner practicable. It would not create significant adverse effects on energy supplies or resources, would not require additional sources of energy supply, and would not consume energy in a wasteful or inefficient manner. No energy standards apply to the project. Staff therefore concludes that the project would present no significant adverse impacts upon energy resources.

INTRODUCTION

The California Energy Commission (Energy Commission) makes findings as to whether energy use by Avenal Energy would result in significant adverse impacts on the environment, as defined in the California Environmental Quality Act (CEQA). If the Energy Commission finds that Avenal Energy's consumption of energy creates a significant adverse impact, it must determine whether there are any feasible mitigation measures that could eliminate or minimize the impact. In this analysis, staff addresses the issue of 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 exist that would eliminate the 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

Avenal Power Center, LLC proposes to construct and operate a 600-MW (nominal net output) combined cycle power plant in the city of Avenal, Kings County, California. Avenal Energy would be configured in a two-on-one combined cycle train consisting of two General Electric (GE) frame 7FA combustion turbine generators (CTGs) with mechanical inlet air chillers, two multi-pressure heat recovery steam generators (HRSGs) with duct burners, and one reheat steam turbine generator (STG) with an air cooled condenser for exhaust steam cooling (Avenal Power 2008b, AFC §§ 1.5.2, 2.3.2, 2.3.5.1, 2.3.6). For air emissions control, the CTGs would be equipped with dry low-NOx

combustors and the HRSGs with selective catalytic reduction (SCR) systems. Natural gas would be delivered to the project site through a new 2.5 mile, 20-inch diameter pipeline connecting to existing Pacific Gas & Electric gas lines (Avenal Power 2008b, AFC §§ 1.5.4, 2.3.14.1; Table 1.5-1).

ASSESSMENT OF IMPACTS

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE OF ENERGY RESOURCES

CEQA Guidelines state that the environmental analysis "…shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy" (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 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 will consume large amounts of energy. Under normal conditions, Avenal Energy would burn natural gas at a nominal rate of 3,236 million British thermal units (MMBtu) per hour, LHV, during base load operation at average ambient conditions (Avenal Power 2008b, AFC Appendix 2-6). The estimated fuel consumption at the same conditions with duct firing is 4,055 MMBtu per hour, LHV. This is a substantial rate of energy consumption and holds the potential to impact energy supplies. Under expected project conditions, electricity would be generated at a full load efficiency of approximately 50.5% LHV (Avenal Power 2008b, AFC, Appendix 2-6).

ADVERSE EFFECTS ON ENERGY SUPPLIES AND RESOURCES

The applicant has described its sources of supply of natural gas for the project (Avenal Power 2008b, AFC §§ 1.5.4, 2.3.14). Natural gas for Avenal Energy would be supplied from the existing PG&E system via a new pipeline connection. The PG&E system is capable of delivering the required quantity of gas to the project. The PG&E natural gas

supply represents a reliable source of natural gas for this project. Therefore, it appears unlikely that the project could pose a substantial increase in demand for natural gas in California.

ADDITIONAL ENERGY SUPPLY REQUIREMENTS

Natural gas fuel would be supplied to the project by PG&E via a new pipeline connection (Avenal Power 2008b, AFC §§ 1.5.4, 2.3.14.1; Table 1.5-1). There appears to be no real likelihood that Avenal Energy would require the development of additional energy supply capacity, since PG&E's regional supplies are considered plentiful.

COMPLIANCE WITH ENERGY STANDARDS

No standards apply to the efficiency of Avenal Energy or other non-cogeneration projects.

ALTERNATIVES TO REDUCE WASTEFUL, INEFFICIENT, AND UNNECESSARY ENERGY CONSUMPTION

Avenal Energy could be deemed to create significant adverse impacts on energy resources if alternatives existed that would reduce the project's use of fuel. Evaluation of alternatives to the project that could reduce wasteful, inefficient, or unnecessary energy consumption first requires examination of the project's energy consumption. Project fuel efficiency, and therefore its rate of energy consumption, is determined by the configuration of the power producing system and by the selection of equipment used to generate power.

Project Configuration

Avenal Energy would be configured as a combined cycle power plant, in which electricity is generated by two gas turbine generators and additionally by a reheat steam turbine generator that operates on heat energy recovered from the gas turbines' exhaust (Avenal Power 2008b, AFC §§ 1.5.2, 2.3.2, 2.3.6). 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. Such a configuration is well suited to the large, steady loads met by a base-load plant intended to supply energy efficiently for long periods of time.

The applicant proposes to use mechanical inlet air chillers, HRSG duct burners (re-heaters), multi-pressure HRSGs, and a steam turbine unit with an air cooled condenser to cool steam exhaust (Avenal Power 2008b, AFC §§ 1.5.2, 2.3.4, 2.3.6). Staff believes these features contribute to meaningful efficiency enhancement of Avenal Energy. The two-train CTG/HRSG configuration also allows for high efficiency during unit turndown because one CTG can operate at a more efficient full load while the other is shut down, rather than operating two CTGs at an inefficient 50% load.

Avenal Energy includes HRSG duct burners to augment heat to the STG cycle during high ambient temperatures when CTG capacity drops and for added power output. Duct firing also provides a number of operational benefits such as load following and balancing and optimizing the operation of the STG cycle.

Equipment Selection

The F-class advanced heavy duty gas turbines to be employed in Avenal Energy represent some of the most modern and efficient such machines now available. The applicant would employ two GE Frame 7FA combustion turbine generators in a two-on-one combined cycle power train nominally rated at 530 MW and 56.5% maximum full load efficiency LHV at International Organization for Standardization (ISO) conditions (GTW, 2008).

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. Another alternative is the Alstom Power KA24-2, nominally rated at 560 MW with an efficiency rating of 57.3% LHV at ISO conditions (GTW, 2008).

Any differences among the GE 7FA, SCC6-5000F, and Alstom KA24 in actual operating efficiency would be insignificant. Machine selection among these options is thus based on other factors, such as generating capacity, cost, commercial availability, and ability to meet air pollution limitations.

Efficiency of Alternatives to the Project

The project objectives include generation of base-load electricity and ancillary services to serve energy needs throughout California (Avenal Power 2008b, AFC §1.1).

Alternative Generating Technologies

Alternative generating technologies for Avenal Energy are considered in the AFC (Avenal Power 2008b, AFC §§1.7, 5.6). Fossil fuels, nuclear, solar, biomass, hydroelectric, wind, and geothermal technologies are all considered. Given the project objectives, location, air pollution control requirements, and commercial availability of the above technologies, staff agrees with the applicant that only natural gas-burning technologies 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 thus strongly motivated to purchase fuel-efficient machinery.

Modern gas turbines embody the most fuel-efficient electric generating technology available today. Currently available, large combustion turbine models can be grouped into three categories including conventional, advanced, and next generation. Advanced combustion turbines offer advantages for Avenal Energy. Their higher firing temperatures offer higher efficiencies than conventional turbines. They offer proven technology with numerous installations and extensive run time in commercial operation. Emission levels are also proven, and guaranteed emission levels have been reduced based on operational experience and design optimization by the 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 employs partial steam cooling to allow slightly higher temperatures, yielding slightly greater efficiency. In actual operation, one would expect to see the difference in efficiency narrow, as the larger capacity G-class turbines would run at less than optimum (full) output more frequently than the 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, the applicant's decision to purchase F-class machines is a reasonable one.

Another possible alternative to the F-class advanced gas turbine is an H-class next generation machine with a claimed fuel efficiency of 60% LHV at ISO conditions. This high efficiency is achieved through a higher pressure ratio and higher firing temperature, made possible by cooling the initial turbine stages with steam instead of air. This first Frame 7H application is currently undergoing startup 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 employ F-class machines.

Capital cost is also important in 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 made available machines that not only offer the lowest available fuel costs, but at the same time sell for the lowest per-kilowatt capital cost.

Inlet Air Cooling

A further choice of alternatives involves the selection of gas turbine inlet air cooling methods. The two commonly used techniques are the evaporative cooler, or fogger, and the chiller. Both devices increase power output by cooling the gas turbine inlet air. A mechanical chiller can offer greater power output than the evaporative cooler on hot, humid days, but it consumes electric power to operate its refrigeration process, thus slightly reducing overall net power output and, thus, overall efficiency. An absorption chiller uses less electric power but necessitates the use of a substantial inventory of ammonia. An evaporative cooler or a fogger boosts power output best on dry days; it uses less electric power than a mechanical chiller, possibly yielding slightly higher operating efficiency. The difference in efficiency among these techniques is relatively insignificant.

Given the climate at the project site and the relative lack of clear superiority of one system over the other, staff agrees that the applicant's choice of a mechanical chiller for gas turbine inlet air cooling would yield no significant adverse energy impacts.

In conclusion, the project configuration (combined cycle) and generating equipment (F-class gas turbines) chosen appear to represent the most efficient feasible combination to satisfy the project objectives. The two-train CTG/HRSG configuration also allows for high efficiency during unit turndown because one CTG can be shut down, leaving one fully loaded, efficiently operating CTG instead of having two CTGs operating at an

inefficient 50% load. This offers an efficiency advantage over the larger machines during unit turndown. There are no alternatives that could significantly reduce energy consumption.

Staff, therefore, believes Avenal Energy would not constitute a significant adverse impact on energy resources.

CUMULATIVE IMPACTS

There are no nearby power plant projects that hold the potential for cumulative energy consumption impacts when aggregated with the project. Staff knows of no other projects that could result in cumulative energy impacts.

Staff believes that construction and operation of the project would not bring about indirect impacts, in the form of additional fuel consumption, that would not have occurred but for the project. The older, less efficient power plants consume more natural gas to operate than the new, more efficient plants such as Avenal Energy. Since natural gas would be burned by the power plants that are most competitive on the spot market, the most efficient plants would likely run the most. The high efficiency of the proposed Avenal Energy project should allow it to compete very favorably, running at a high capacity factor, replacing less efficient power generating plants in the market, and therefore not impacting or even reducing the cumulative amount of natural gas consumed for power generation.

NOTEWORTHY PUBLIC BENEFITS

The applicant proposes to enhance power supply reliability in the California electricity market by meeting the needs of the state's energy demand and contributing to the electricity reserves in the region. By doing so in this most fuel-efficient manner, that is, employing the most modern F-class gas turbine generator available, Avenal Energy would provide a benefit to the electric consumers of California.

AGENCY AND PUBLIC COMMENTS

No agency or public comments were received regarding project efficiency.

CONCLUSIONS AND RECOMMENDATIONS

The project, if constructed and operated as proposed, would generate 600 MW (nominal gross output) of electric power at an overall project fuel efficiency of 50.5% LHV. While it would consume substantial amounts of energy, it would do so in the most efficient manner practicable. It would not create significant adverse effects on energy supplies or resources, would not require additional sources of energy supply, and would not consume energy in a wasteful or inefficient manner. No energy standards apply to the project. Staff therefore concludes that the project would present no significant adverse impacts upon energy resources.

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.

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Avenal Power 2008b – Application for Certification for the Avenal Energy project, Volumes 1 and 2. Submitted to the California Energy Commission, February 21, 2008.

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POWER PLANT RELIABILITY

Testimony of Erin Bright

SUMMARY OF CONCLUSIONS

Avenal Power Center, LLC (Avenal Power), the applicant, predicts an equivalent availability factor of 92-96%, which staff believes is achievable. Based on a review of the proposal, staff concludes that Avenal Energy would be built and operated in a manner consistent with industry norms for reliable operation. This should provide an adequate level of reliability. No conditions of certification are proposed.

INTRODUCTION

In this analysis, California Energy Commission (Energy Commission) staff addresses the reliability issues of the project to determine if the power plant is likely to be built in accordance with typical industry norms for reliability of power generation. Staff uses this level of reliability as a benchmark because it ensures that the resulting project would likely not degrade the overall reliability of the electric system it serves (see “Setting” 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 reliability of power generation. While the applicant has predicted an equivalent availability factor of 92-96% for Avenal Energy (see below), staff uses typical industry norms as a benchmark, rather than Avenal Power’s projection, to evaluate the project’s reliability.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

No federal, state, or local/county laws, ordinances, regulations, and 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), that purchase, dispatch, and sell electric power throughout the state. How the California ISO and other control area operators will ensure system reliability is an ongoing process; protocols are still being developed and put in place that will allow sufficient reliability to be maintained under the competitive

market system. “Must-run” power purchase agreements and “participating generator” agreements are two mechanisms being employed to ensure an adequate supply of reliable power.

In September 2005, California AB 380 (Núñez, Chapter 367, Statutes of 2005) became law. This modification to the Public Utilities Code requires the California Public Utilities Commission to consult with the California ISO to establish resource adequacy requirements for all load-serving entities (basically, public and privately owned utility companies). These requirements include maintaining a minimum reserve margin (extra generating capacity to serve in times of equipment failure or unexpected demand) and maintaining sufficient local generating resources to satisfy the load-serving entity’s peak demand and operating reserve requirements.

In order to fulfill this mandate, the California ISO has begun to establish specific criteria for each load-serving entity under its jurisdiction. These criteria guide each load-serving entity in deciding how much generating capacity and ancillary services to build or purchase, after which the load-serving entity issues power purchase agreements to satisfy these needs. As a load-serving entity, Avenal Power is obligated to satisfy these criteria, which include maintaining a 15% reserve margin and increasing local generation to reduce reliance on imported power.

The California ISO’s mechanisms to ensure adequate power plant reliability apparently have been devised under the assumption that the individual power plants that compete to sell power into the system will each exhibit a level of reliability similar to that of power plants of past decades. However, there is cause to believe that, under free market competition, financial pressures on power plant owners to minimize capital outlays and maintenance expenditures may act to reduce the reliability of many power plants, both existing and newly constructed (McGraw-Hill, 1994). It is possible that, if significant numbers of power plants were to exhibit individual reliability sufficiently lower than this historical level, the assumptions used by California ISO to ensure system reliability would prove invalid, with potentially disappointing results. Until the restructured competitive electric power system has undergone an adequate shakeout period, and the effects of varying power plant reliability are thoroughly understood and compensated for, staff will recommend that power plant owners continue to build and operate their projects to the level of reliability to which all in the industry are accustomed.

As part of its plan to provide needed reliability, the applicant proposes to operate the 600-megawatt (MW) (nominal gross output) Avenal Energy project, a combined cycle power plant, providing additional reactive power capability in the region and operating flexibility (that is, ability to start up, shut down, turn down, and provide load following and spinning reserve) so that operations may be readily adapted to changing conditions in the energy and ancillary services markets (Avenal Power 2008b, AFC §§ 1.2, 2.2.3.2). The project is expected to achieve an equivalent availability factor (EAF) in the range of 92-96% (Avenal Power 2008b, AFC § 2.3.15.1). The applicant expects to operate the plant at a capacity factor of 80% with 25% duct firing during each year of its operating life (Avenal Power 2008b, AFC § 2.3.16).

ASSESSMENT OF IMPACTS

METHOD FOR DETERMINING RELIABILITY

The Energy Commission must make findings as to the manner in which the project is to be designed, sited, and operated to ensure safe and reliable operation (Title 20, CCR §1752[c]). Staff takes the approach that a project is acceptable if it does not degrade the reliability of the utility system to which it is connected. This is likely the case if the project exhibits reliability at least equal to that of other power plants on that system.

The availability factor for a power plant is the percentage of the time that it is available to generate power; both planned and unplanned outages subtract from its availability. Measures of power plant reliability are based on the plant's actual ability to generate power when it is considered available and are based on 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 (Avenal Power 2008b, AFC § 2.3.15), Avenal Energy will be expected to perform reliably. Power plant systems must be able to operate for extended periods without shutting down for maintenance or repairs. Achieving this reliability is accomplished by ensuring 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 the project and compares them to industry norms. If they compare favorably, staff can conclude that Avenal Energy will be as reliable as other power plants on the electric system and will therefore not degrade system reliability.

EQUIPMENT AVAILABILITY

Equipment availability will be ensured by use of appropriate quality assurance/quality control (QA/QC) programs during design, procurement, construction and operation of the plant and by providing for adequate maintenance and repair of the equipment and systems (discussed below).

Quality Control Program

The applicant describes a QA/QC program (Avenal Power 2008b, AFC §§ 2.3.15.6, 2.3.15.7) typical of the power industry. Equipment would be purchased from qualified suppliers based on technical and commercial evaluations. Suppliers' personnel, production capability, past performance, QA programs and quality history would be evaluated. The project owner would perform receipt inspections, test components, and administer independent testing contracts. Staff expects implementation of this program to yield typical reliability of design and construction. To ensure such implementation, staff has proposed appropriate conditions of certification under the portion of this document entitled **FACILITY DESIGN**.

PLANT MAINTAINABILITY

Equipment Redundancy

A generating facility called on to operate in base-load service for long periods of time must be capable of being maintained while operating. A typical approach for achieving this is to provide redundant examples of those pieces of equipment most likely to require service or repair.

The applicant plans to provide appropriate redundancy of function for the project (Avenal Power 2008b, AFC § 2.3.15.2; Appendix 2-7). The fact that the project would consist of two combustion turbine generators operating in parallel as independent equipment trains provides inherent reliability. A single equipment failure cannot disable more than one train, thus allowing the plant to continue to generate (at reduced output). Further, all plant ancillary systems are also designed with adequate redundancy to ensure continued operation in the face of equipment failure. Staff believes that equipment redundancy would be sufficient for a project such as this.

Maintenance Program

The applicant proposes to establish a preventive plant maintenance program typical of the industry (Avenal Power 2008b, AFC § 2.3.15; Table 2.3-4). Equipment manufacturers provide maintenance recommendations with their products; the applicant would base its maintenance program on these recommendations. The program will encompass preventive and predictive maintenance techniques. Maintenance outages will be planned for periods of low electricity demand. In light of these plans, staff expects that the project would be adequately maintained to ensure acceptable reliability.

FUEL AND WATER AVAILABILITY

For any power plant, the long-term availability of fuel and of water for cooling or process use is necessary to ensure reliability. The need for reliable sources of fuel and water is obvious; lacking long-term availability of either source, the service life of the plant may be curtailed, threatening the supply of power as well as the economic viability of the plant.

Fuel Availability

Avenal Energy would burn natural gas supplied by Pacific Gas and Electric Company (PG&E) from the PG&E system. Natural gas fuel would be supplied to the project via a new 20-inch diameter, 2.5 mile-long interconnection from the existing PG&E lines southwest of the site (Avenal Power 2008b, AFC §§ 1.5.4, 2.3.14.1; Table 1.5-1). This natural gas system represents a resource of considerable capacity and offers access to adequate supplies of gas from the Rocky Mountains, Canada, and the Southwest. Staff agrees with the applicant's prediction that there would be adequate natural gas supply and pipeline capacity to meet the project's needs.

Water Supply Reliability

Avenal Energy would obtain raw water from the City of Avenal's water treatment facility, supplied by the San Luis Canal, and treat the raw water on the project site to suit project needs for steam cycle makeup water and fire and service water. The applicant would also obtain potable water from the City of Avenal, which would be used as domestic water, including drinking water (Avenal Power 2008h, data response 92). The applicant

has also identified a backup source of raw water in case of supply interrupt from their primary water source. A 750,000 gallon raw water/firewater storage tank would also allow the plant to continue operating in case of an interrupt in water supply (Avenal Power 2008b, AFC §§ 2.3.7.1, 2.3.7.7). Water usage would be minimized by employing an air cooled condenser as the ultimate heat sink and a zero liquid discharge system (Power 2008b, AFC §§ 2.2.2, 2.3.6.4). Staff believes these sources, combined with the on-site storage capacity, yield sufficient likelihood of a reliable supply of water. (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), seiches (waves in inland bodies of water), and flooding would not likely represent a hazard for this project, but seismic shaking (earthquake) may present a credible threat to reliable operation.

Seismic Shaking

The site lies within Seismic Zone 4 (Power 2008b, AFC § 6.3.1.5); see the "Faulting and Seismicity" portion of the **GEOLOGY AND PALEONTOLOGY** section of this document. The project would be designed and constructed to the latest appropriate LORS (Power 2008b, AFC Tables 6.3-3; Appendix 2-2). Compliance with current LORS applicable to seismic design represents an upgrading of performance during seismic shaking compared to older facilities due to the fact that these LORS have been periodically and continually upgraded. By virtue of being 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 that portion of this document entitled **FACILITY DESIGN**. In light of the historical performance of California power plants and the electrical system in seismic events, staff believes there is no special concern with power plant functional reliability affecting the electric system's reliability due to seismic events.

Flooding

The site does not receive stormwater runoff from off site and is not within a 100-year flood zone (Power 2008b, AFC § 6.5.1.2). Staff believes there are no 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 many other related reliability data) are kept by the North American Electric Reliability Corporation (NERC). NERC continually polls utility companies throughout the North American continent on project reliability data through its Generating Availability Data System (GADS) and periodically

summarizes and publishes the statistics on the Internet [http://www.nerc.com]. NERC reports the following summary generating unit statistic for the years 1999 through 2003 (NERC, 2005):

For combined cycle units (All MW sizes):

Availability Factor = 89.00%

The gas turbines that will be employed in the project have been on the market for many years now and can be expected to exhibit typically high availability. The applicant's prediction of an annual availability factor of 92-96% (Power 2008b, AFC §§ 2.3.15.1) appears reasonable compared to the NERC figure 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 the NERC statistics. Further, since the plant would consist of two parallel gas turbine generating trains, maintenance can be scheduled during those times of year when the full plant output is not required to meet market demand, typical of industry standard maintenance procedures. The applicant's estimate of plant availability, therefore, appears realistic. The stated procedures for assuring design, procurement, and construction of a reliable power plant appear to be in keeping with industry norms, and staff believes they are likely to yield an adequately reliable plant.

NOTEWORTHY PROJECT BENEFITS

The applicant proposes to enhance power supply reliability in the California electricity market by meeting the needs of the state's energy demand, contributing to the electricity reserves in the region, and providing operating flexibility (that is, ability to start up, shut down, turn down, and provide load following and spinning reserve) (Avenal Power 2008b, AFC §§ 1.2, 2.2.3.2). 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, thus allowing the plant to continue to generate (at reduced output).

The gas turbines that would be employed in the project have been on the market for many years and can be expected to exhibit typically high availability. The applicant's prediction of an equivalent availability factor of 92-96% appears achievable. Staff believes this should provide an adequate level of reliability.

AGENCY AND PUBLIC COMMENTS

No agency or public comments were received regarding project reliability.

CONCLUSION

Avenal Power predicts an equivalent availability factor of 92-96%, which staff believes is achievable. Based on a review of the proposal, staff concludes that the plant would be built and operated in a manner consistent with industry norms for reliable operation. This should provide an adequate level of reliability. No conditions of certification are proposed.

PROPOSED CONDITIONS OF CERTIFICATION

No conditions of certification are proposed.

REFERENCES

Avenal Power 2008b – Application for Certification for the Avenal Energy project, Volumes 1 and 2. Submitted to the California Energy Commission, February 21, 2008.

Avenal Power 2008h – Supplemental Information Regarding a Buffer Along the San Luis Canal for Avenal Energy, 08-AFC-1, October 6, 2008.

McGraw-Hill (McGraw-Hill Energy Information Services Group). 1994. Operational Experience in Competitive Electric Generation. Executive report.

NERC (North American Electric Reliability Council). 2005. 1999–2003 Generating Availability Report.

TRANSMISSION SYSTEM ENGINEERING

Testimony of Ajoy Guha, P. E. and Mark Hesters

SUMMARY OF CONCLUSIONS

The proposed interconnecting facilities including the Avenal Energy project (Avenal Energy) 230 kV switchyard, the single circuit 230 kV overhead tie line to the existing Pacific Gas and Electric (PG&E) Gates 230 kV substation and its terminating facilities are adequate in accordance with industry standards and good utility practices, and are acceptable to staff. Construction of the new switching bays at the Gates substation would involve extension of the substation 230 kV bus and fence line on the east side.

- The System Impact Study (SIS) performed by Navigant Consulting Inc. (Navigant) demonstrates that the addition of Avenal Energy would cause some adverse impacts on the PG&E system. New overloads occur on nine transmission lines under certain emergency contingency conditions. In view of PG&E's response to Navigant that the ratings of the identified overloaded lines are now based on standard 2 feet/second wind speed and there are other lines in the study area that are rated at 4 feet/second wind speed, staff concurs with the SIS that re-rating the lines with overload criteria violations during 2013 summer peak system conditions for higher emergency ratings is a feasible mitigation option according to PG&E re-rating guidelines.
- The mitigation plan, therefore, according to the SIS would be adequate to eliminate the identified new overloads. For the single contingency (N-1) overloads on two 230 kV lines and one 70 kV line, the mitigation option includes re-rating the lines for higher emergency rating. For double or category C contingency (N-2 or more) overload violations, the mitigation options include re-rating for higher emergency rating or installing Special Protections System (SPS) for curtailing Avenal Energy generation for two 230 kV and one 115 kV lines, SPS or operation procedure for two 230 kV lines and operation procedure for one 70 kV line.
- During a May 4, 2009 conference call between PG&E, the California Independent System Operator (California ISO), the applicant and staff, PG&E indicated that there is certain amount of uncertainty about interconnecting the Avenal Energy at the PG&E Gates substation due to lack of room in the substation. In absence of written confirmation from PG&E or the California ISO about any change in the interconnection point, consideration of speculative changes to the proposed interconnection would be premature at this time since staff believes that there are high probabilities the proposed interconnection is feasible with expansion of the Gates substation 230 kV bus. The Interconnection Feasibility study dated March 24, 2008 performed by the California ISO and PG&E also had identified the proposed interconnection as feasible. Nevertheless, if any changes to the interconnection are necessary, they would be identified in the California ISO Phase 1 Interconnection study under cluster window process which could be completed as early as July, 2009. The applicant has agreed to provide timely information in case the interconnection to the PG&E system changes from the Gates substation to a different location.

- On completion of the Phase 1 & Phase 2 Interconnection study the California ISO would proceed for the execution of a Large Generator Interconnection Agreement (LGIA) with the applicant before interconnecting Avenal Energy to the California ISO grid.

Avenal Energy would meet the requirements and standards of all applicable LORS, would not result in any significant adverse impacts for interconnecting directly into the PG&E Gates substation and upon compliance with staff's proposed Conditions of Certification.

INTRODUCTION

The Transmission System Engineering (TSE) analysis examines whether or not the facilities associated with the proposed interconnection conform to all applicable LORS required for safe and reliable electric power transmission. Staff's analysis evaluates the power plant switchyard, outlet line, termination and downstream facilities identified by the applicant. Additionally, under the CEQA, the Energy Commission must conduct an environmental review of the "whole of the action," which may include facilities not licensed by the Energy Commission (California Code of Regulations, title 14, §15378). Therefore, the Energy Commission must identify the system impacts and necessary new or modified transmission facilities downstream of the proposed interconnection that are required for interconnection and represent the "whole of the action." The downstream network upgrade mitigation measures that will be required to maintain system reliability for the addition of the power plant, are used to identify the requirement for any additional CEQA analysis.

Energy Commission staff normally relies on the interconnecting authority, California ISO or the interconnecting utility (in this case PG&E) for the analysis of impacts on the transmission grid as well as the identification and approval of required new or modified facilities downstream from the proposed interconnection. The California ISO's generator interconnection process is transitioning from a queue or serial study process to a cluster window process for Phase 1 and Phase 2 Interconnection studies. As a result of the California ISO's Generator Interconnection Process Reform (GIPR) activities, the PG&E/California ISO Phase 1 interconnection study of the Avenal Energy will not be available until July 2009 and this transition has also caused significant delays in the interconnection studies for several projects. The Energy Commission in the Marsh Landing Energy Center made the decision to allow applicants to file "third party" or non-California ISO or utility studies during the California ISO's transition period in order to allow the Application for Certification (AFC) process to continue throughout the California ISO's transition period. The third party SIS must be sufficient for the Energy Commission to determine whether or not a proposed project interconnection would comply with reliability LORS and allow the identification of any additional or modified downstream facilities that might be required to ensure compliance with the CEQA. The applicant, Avenal Power Center, LLC, has provided a third party SIS for the Avenal Energy addition.

PG&E AND CALIFORNIA ISO'S ROLE

PG&E and the California ISO are responsible for ensuring electric system reliability in the PG&E system for addition of the proposed generating plant. The project will not be

allowed to interconnect to the California ISO controlled grid without completion of the California ISO Large Generator Interconnection Process (LGIP) and the execution of a Large Generator Interconnection Agreement (LGIA). If the current California ISO GIPR schedule is met, the applicant would not obtain a California ISO Phase 1 Interconnection study until July 2009 and would not have a signed LGIA until the third or fourth quarter of 2010. Both PG&E and the California ISO would review the Phase 1 and Phase 2 Interconnection studies and would both be parties to the LGIA. Condition of Certification 5 f) requires that the project owner provide the executed LGIA to the Energy Commission before starting construction on any transmission facilities. The California ISO would not provide, in this case, any written or verbal testimony at the Energy Commission's process, because the Phase 1 Interconnection study has not been completed at this time.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

- California Public Utilities Commission (CPUC) General Order 95 (GO-95), "Rules for Overhead Electric Line Construction," formulates uniform requirements for construction of overhead lines. Compliance with this order ensures adequate service and safety to persons engaged in the construction, maintenance and operation or use of overhead electric lines and to the public in general.
- California Public Utilities Commission (CPUC) General Order 128 (GO-128), "Rules for Construction of Underground Electric Supply and Communications Systems," formulates uniform requirements and minimum standards to be used for underground supply systems to ensure adequate service and safety to persons engaged in the construction, maintenance and operation or use of underground electric lines and to the public in general.
- The National Electric Safety Code, 1999 provides electrical, mechanical, civil and structural requirements for overhead electric line construction and operation.
- NERC/WECC Planning Standards: The Western Electricity Coordinating Council (WECC) Planning Standards are merged with the North American Electric Reliability Council (NERC) Planning Standards and provide the system performance standards used in assessing the reliability of the interconnected system. These standards require the continuity of service to loads as the first priority and preservation of interconnected operation as a secondary priority. Certain aspects of the NERC/WECC standards are either more stringent or more specific than the NERC standards alone. These standards provide planning for electric systems so as to withstand the more probable forced and maintenance outage system contingencies at projected customer demand and anticipated electricity transfer levels, while continuing to operate reliably within equipment and electric system thermal, voltage and stability limits. These standards include the reliability criteria for system adequacy and security, system modeling data requirements, system protection and control, and system restoration. Analysis of the WECC system is based to a large degree on Section I.A of the standards, "NERC and WECC Planning Standards with Table I and WECC Disturbance-Performance Table" and on Section I.D, "NERC and WECC Standards for Voltage Support and Reactive Power". These standards require that the results of power flow and stability simulations verify defined performance levels. Performance levels are defined by specifying the allowable

variations in thermal loading, voltage and frequency, and loss of load that may occur on systems during various disturbances. Performance levels range from no significant adverse effects inside and outside a system area during a minor disturbance (loss of load or a single transmission element out of service) to a level that seeks to prevent system cascading and the subsequent blackout of islanded areas during a major disturbance (such as loss of multiple 500 kV lines along a common right of way, and/or multiple generators). While controlled loss of generation or load or system separation is permitted in certain circumstances, their uncontrolled loss is not permitted (WECC 2006).

- North American Reliability Council (NERC) Reliability Standards for the Bulk Electric Systems of North America provide national policies, standards, principles and guidelines to assure the adequacy and security of the electric transmission system. The NERC Reliability Standards provide for system performance levels under normal and contingency conditions. With regard to power flow and stability simulations, while these Reliability Standards are similar to NERC/WECC Standards, certain aspects of the NERC/WECC Standards are either more stringent or more specific than the NERC Standards for Transmission System Contingency Performance. The NERC Reliability Standards apply not only to interconnected system operation but also to individual service areas (NERC 2006).
- California ISO Planning Standards also provide standards, and guidelines to assure the adequacy, security and reliability in the planning of the California ISO transmission grid facilities. The California ISO Grid Planning Standards incorporate the NERC/WECC and NERC Reliability Planning Standards. With regard to power flow and stability simulations, these Planning Standards are similar to the NERC/WECC or NERC Reliability Planning Standards for Transmission System Contingency Performance. However, the California ISO Standards also provide some additional requirements that are not found in the WECC/NERC or NERC Standards. The California ISO Standards apply to all participating transmission owners interconnecting to the California ISO controlled grid. They also apply when there are any impacts to the California ISO grid due to facilities interconnecting to adjacent controlled grids not operated by the California ISO (California ISO 2002a).
- California ISO/FERC Electric Tariff provides guidelines for construction of all transmission additions/upgrades (projects) within the California ISO controlled grid. The California ISO determines the “Need” for the proposed project where it will promote economic efficiency or maintain system reliability. The California ISO also determines the Cost Responsibility of the proposed project and provides an Operational Review of all facilities that are to be connected to the California ISO grid (California ISO 2007a).

PROJECT DESCRIPTION

Avenal Energy would be located in a 148-acre site in the southwestern San Joaquin Valley within the Avenal city limits of Kings County about two miles east of Interstate 5. The Avenal Energy plant will consist of two natural gas-fired combustion turbine generator (CTG) units (General Electric PG7241model, 7FA class) and a steam turbine generator (STG) unit operating with a total 600 MW nominal output. Each CTG unit rated at 205 MVA, 18 kV would be connected through an 8,000-ampere segregated bus

duct and a 7,500-ampere, 18 kV breaker to the low voltage terminal of a dedicated 132/176/220 MVA, 18/230 kV generation step-up (GSU) transformer with a specified impedance of 9.00% @132 MVA. The STG unit rated 373 MVA, 18 kV would be connected through a 13,000-ampere bus duct to the low voltage terminal of a dedicated 234/312/390 MVA, 18/230 kV GSU transformer with a specified impedance of 9% @ 234 MVA (AP 2008a, section 1.5, Page 1-6; section 2.3.6, pages 2-13 to 2-15; Figure 2.3-6).

SWITCHYARD AND INTERCONNECTION FACILITIES

The new Avenal Energy 230 kV switchyard is proposed as a 2,000-ampere single bus arrangement with three 2,000-ampere 230 kV circuit breakers (with 63 kA short circuit rating) and four 2,000-ampere disconnect switches. Each of the three breakers with a disconnect switch would be connected by short overhead conductors to the high voltage terminals of the respective GSU transformer. A 2,000-ampere disconnect switch would be used for the new 230 kV overhead transmission line connecting to the existing PG&E Gates 230 kV substation.

The new Avenal Energy 230 kV switchyard would be interconnected to PG&E's Gates substation 230 kV bus by building a new 6.4-mile long single circuit overhead line with a bundled 954 kcmil ACSR conductor on 120-foot high tubular steel poles within a new 120-foot right-of-way on public and private lands adjacent to existing PG&E 230 and 500 kV transmission lines. The applicant will build, own and operate the Avenal Energy 230 kV switchyard and the overhead tie line (AP 2008a, section 2.4, pages 2-53 to 2-55, Figures 2.4-3 & 2.4-4).

The generator tie line would be terminated to the 230 kV double bus of Gates substation after extending its existing bus section E for additional 2-3 switching bays through a 3,000-ampere breaker (with 63 kA short circuit rating) and two 2,000-ampere disconnect switches (with 40 kA short circuit rating). PG&E would build and operate the terminating facilities at the Gates substation. According to a previous, and no longer valid, Facilities study completed October 27, 2003, construction of the new additional switching bays would involve extension of the substation fence line on the east side by more or less about 240 ft. west-east and 360 ft. north-south. The results of the Facilities study will be updated in the Phase 1 Interconnection study currently being performed by PG&E for the California ISO.

During a May 4, 2009 conference call between PG&E, the California Independent System Operator (California ISO), the applicant and staff, PG&E indicated that there is certain amount of uncertainty about interconnecting the Avenal Energy at the PG&E Gates substation due to lack of room in the substation. In absence of written confirmation from PG&E or the California ISO about any change in the interconnection point, consideration of speculative changes to the proposed interconnection would be premature at this time since staff believes that there are high probabilities the proposed interconnection is feasible with expansion of the Gates substation 230 kV bus. The Interconnection Feasibility study [1]dated March 24, 2008 performed by the California ISO

[1] The Feasibility study conducted by the PTO and California ISO is primarily intended to evaluate alternate interconnection points in the system and methods, and then determine a preferred one conveniently feasible to minimize interconnection facilities and downstream system impacts.

and PG&E also had identified the proposed interconnection as feasible. Any changes to the interconnection could be identified in the California ISO Phase 1 Interconnection study under cluster window process which would be completed as early as July, 2009. The applicant has agreed to provide timely information in case the interconnection to the PG&E system changes from the Gates substation to a different location (CEC 2009d, conference call on May 4, 2009).

As currently proposed the configuration of the Avenal Energy 230 kV switchyard, the generator 230 kV tie line to the existing PG&E Gates substation and its terminating facilities are adequate in accordance with industry standards and good utility practices, and are acceptable to staff (AP 2008e, Response to Data Requests).

TRANSMISSION SYSTEM IMPACT ANALYSIS

For the interconnection of a proposed generating unit or transmission facility to the grid, the interconnecting utility and the control area operator are responsible for ensuring grid reliability. For Avenal Energy, PG&E and California ISO are responsible for ensuring grid reliability. In accordance with the FERC/California ISO/Utility Tariffs, Interconnection Feasibility study (IFS), SIS and Facilities study (FS) are normally conducted by the participating transmission owner (PTO), PG&E and the California ISO to determine the preferred and alternate interconnection methods to the grid, the downstream transmission system impacts and the mitigation measures needed to ensure system conformance with performance levels required by the utility reliability criteria, NERC planning standards, WECC reliability criteria, and California ISO reliability criteria. In this case in order to allow the AFC to proceed, the SIS was performed by a third party (Navigant consulting Incorporated) at the request of the applicant. This third party study is consistent with the Energy Commission decision in the Marsh Landing Energy Center data adequacy determination. The Avenal Energy project will still be required to complete the California ISO Large Generator Interconnection Process before being allowed to connect to the California ISO controlled grid. Staff relies on the studies and any review conducted by the responsible agencies to determine the effect of the project on the transmission grid and to identify any necessary downstream facilities or indirect project impacts required to bring the transmission network into compliance with applicable reliability standards (NERC2006, WECC 2006, California ISO 2002a and 2007a).

The SIS and FS analyze the grid with and without the proposed project under conditions specified in the planning standards and reliability criteria. The standards and criteria define the assumptions used in the study and establish the thresholds by which grid reliability is determined. The studies must analyze the impact of the project for the proposed first year of operation and thus are based on a forecast of loads, generation and transmission. Load forecasts are developed by the interconnected utility. 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 causes the grid to be out of compliance with reliability standards, the study will then identify mitigation alternatives

or ways in which the grid could be brought into compliance with reliability standards. If the interconnecting utility determines that the only feasible mitigation includes transmission modifications or additions which require CEQA review as part of the "whole of the action," the Energy Commission must analyze those modifications or additions according to CEQA requirements.

SCOPE OF SYSTEM IMPACT STUDY (SIS)

The September 18, 2008 SIS and November 11, 2008 supplemental SIS were prepared by Navigant at the request of the applicant to evaluate impacts of the proposed Avenal Energy generation on the PG&E transmission system. The SIS was derived from the WECC full-loop base cases used for the PG&E Feasibility Study and were prepared with and without Avenal Energy 600 MW generation output assuming June 1, 2012 operation date for Avenal Energy:

- A 2013 summer peak base case developed from PG&E 2007 base case series and has 1-in -10 year extreme weather load level (PG&E load 28,118 MW) for the greater Fresno area.
- A 2013 summer off-peak base case with the load in the greater Fresno area at 50% of the summer peak load level (PG&E load 13,995 MW) and two units at the Helms pump storage plant in pumping mode.
- A 2013 spring peak base case developed with typical spring season load conditions (PG&E load 22,792 MW) and high hydro generation available.

In each of the cases northern California generation and critical seasonal power flows in WECC Paths 15, 26, 65 and 66 were maintained within limits. Each of the cases included planned California ISO approved transmission upgrades that would be operational by 2013, and all queue generation (total 4,500 MW) higher than Avenal Energy in the vicinity of the project and its affected area except the queue project #47 (200 MW), which has withdrawn from the queue (Avenal Power 2008h,SIS, Tables 4-1 & 4-2).

The study included analyses for power flow, short circuit, transient stability, post-transient voltage and reactive power deficiency. The study also provided preliminary scope of work and cost estimates for the project interconnection facilities including downstream reliability network upgrades in the PG&E system, assuming PG&E would engineer, construct, own and maintain the interconnecting facilities within the Gates substation (except the proposed Avenal Energy switchyard and the generator overhead tie line) and the downstream reliability network upgrades and changes (TRC 2008d & 2008h, SIS reports).

POWER FLOW STUDY RESULTS AND MITIGATION

The SIS indicates that the Avenal Energy generation output would cause two new normal (N-0) overloads on the Wilson-Storey #1 230 kV line and the Los Banos-Wesley 230 kV line during the 2013 spring peak and 2013 summer peak system conditions respectively. However, the addition of Avenal Energy also exacerbates pre-project normal overloads on both the transmission lines during the other 2013 seasonal conditions. The queue projects above Avenal Energy are responsible for mitigation of the pre-project overloads on these lines, which would eliminate new normal overloads

caused by Avenal Energy. Avenal Energy, therefore, should not be responsible for mitigating the Wilson-Story #1 230 kV line and the Los Banos-Wesley 230 kV line overloads. The Power flow study results for normal overloads are tabulated in Tables 6-1 & 10-1 of the SIS (TRC 2008d, SIS).

Avenal Energy addition causes seven new emergency overloads for category B (N-1, L-1 & G-1) outages and fifteen new emergency overloads for category C (N-2 or more) outages during certain 2013 seasonal conditions. Avenal Energy aggravates four pre-project category B overloads and nine category C overloads. Queue projects above Avenal Energy in the California ISO interconnection should be responsible for mitigation of these pre-project overloads. However, three new overloads for category B contingencies and six new overloads for category C contingencies are found exclusively due to the addition of Avenal Energy. Avenal Energy should, therefore, be responsible for mitigating three new category B emergency overloads and six new category C emergency overloads. The Power flow study results for emergency overloads under category B contingencies are tabulated in Tables 6-2 & 10-2 and under category C in Tables 6-3 & 10-4 of the SIS (TRC 2008d &2008h, SIS).

The SIS identified the following new overloads due to the addition of the proposed Avenal Energy under certain contingencies and corresponding mitigation measures for which Avenal Energy should be responsible:

- Melones-Cottle A 230 kV line: The line loading increases from 93.6-101.4% of its emergency rating due to the addition of Avenal Energy during 2013 summer peak system conditions under the single (N-1) contingency of the Warnerville-Wilson 230 kV line.

  Mitigation: Re-rating the line for higher emergency rating according to PG&E re-rating guidelines as other lines in the study area are re-rated. Staff considers mitigation option acceptable.

- Panoche-Dos Amigos 230 kV line: The loading on the line increases from 86.4-103.4% of its emergency rating for the addition of Avenal Energy during 2013 summer peak system conditions due to the single (N-1) contingency of the Gates substation 500/230 kV transformer bank #1.

  Mitigation: Re-rating the line for higher emergency rating according to PG&E re-rating guidelines as other lines in the study area are re-rated. Staff considers mitigation option acceptable.

- Mendota-Tomatak 70 kV line: The loading on the line increases from 99.2-102.7% of its emergency rating for the addition of Avenal Energy during 2013 summer peak system conditions due to the single (N-1) contingency of the Oro Loma substation 115/70 kV transformer bank #2.

  Mitigation: Re-rating the line with higher emergency rating according to PG&E re-rating guidelines as other lines in the study area are re-rated. Staff considers mitigation option acceptable.

- Gates-Panoche #1 230 kV line: The loading on the line increases from 92.9-106.7% of its emergency rating for the addition of Avenal Energy during 2013 summer off-peak system conditions due to the Category C contingency of the Panoche substation 230 kV bus section #2.

Mitigation: Installing a SPS or operation procedure for curtailing Avenal Energy generation output by about 210 MW. Staff considers the mitigation options acceptable.

- Los Banos-Dos Amigos 230 kV line: The loading on the line increases from 97-101.4% of its emergency rating for the addition of Avenal Energy during 2013 summer off-peak system conditions due to the double (N-2) contingencies of the Los Banos-Midway and Los Banos-Gates 500 kV lines. For the same double contingencies the loading on the line increases from 86.9-100.4% of its emergency rating during 2013 summer peak system conditions.

  Mitigation: Installing an SPS or operation procedure for curtailing Avenal Energy generation output by about 74 MW. Staff considers mitigation acceptable.

- Oro Loma-El Nido 115 kV line: The loading on the line increases from 97.3-104.4% of its emergency rating for the addition of Avenal Energy during 2013 summer peak system conditions due to the double (N-2) contingencies of the Wilson-Borden #1 and #2 230 kV lines.

  Mitigation: Re-rating the line according to PG&E re-rating guidelines or operation procedure. Staff considers the mitigation options acceptable.

- Panoche-Los Banos #1 230 kV line: The loading on the line increases from 93.6-107.2% of its emergency rating for the addition of Avenal Energy during 2013 summer peak system conditions due to the double (N-2) contingencies of the Panoche-Los Banos #2 and Panoche-Dos Amigos 230 kV lines.

  Mitigation: Re-rating the line according to PG&E re-rating guidelines or installing an SPS and curtailing Avenal Energy generation output by about 321 MW. Staff considers the mitigation options acceptable.

- Panoche-Los Banos #2 230 kV line: The loading on the line increases from 92.3-107.9% of its emergency rating for the addition of Avenal Energy during 2013 summer peak system conditions due to the Category C contingency of the Los Banos substation 230 kV bus section #2.

  Mitigation: Re-rating the line according to PG&E re-rating guidelines or installing an SPS and curtailing Avenal Energy generation output by about 346 MW. Staff considers the mitigation options acceptable.

- Coppermine-River Rock 70 kV line: The loading on the line increases from 99.2-100.4% of its emergency rating for the addition of Avenal Energy during 2013 summer off-peak system conditions due to the Category C contingency of the Sanger substation 115 kV bus.

  Mitigation: Operation procedure, if necessary. Staff considers the mitigation option acceptable.

NOTES:

1. PG&E's response to Navigant confirms that the ampere ratings (normal and emergency) of the above identified overloaded lines are based on 2 feet/second wind speed and there are other lines in the study area that are rated at a wind speed of 4 feet /second. According to PG&E, typically re-rating a line based on 3 or 4

feet/second wind speed would normally increase the emergency ampere rating of the line by about 10 or 20% respectively (TRC 2009d: PG&E response dated 4-10-09 to Navigant's email).

2. Staff, therefore, concurs with Navigant's conclusion in the SIS that re-rating most of the above impacted lines during summer peak system conditions for higher ampere rating is a feasible mitigation option as other similar lines are re-rated in the study area based on higher wind speed according to PG&E re-rating guidelines. However, re-rating the lines is valid for summer daylight hours only and would be subject to PG&E re-rate study guidelines including detailed study and cost estimates.

3. The new overload as stated above on the Coppermine-River Rock 70 kV line under category C contingency is marginal.

4. This SIS is valid only for the AFC process for interconnection of Avenal Energy at the PG&E Gates substation and would ***not*** apply if the interconnection of the project changes from the Gates substation to a different location.

SHORT CIRCUIT STUDY RESULTS

Three line-to-ground (3LG) faults were simulated with and without Avenal Energy to determine if there are any overstressed circuit breakers in PG&E substations in the project vicinity caused by the addition of the project. Single line-to-ground (SLG) fault analysis was not performed due to non-availability of necessary data.

The study results for 3LG fault analysis indicate the following short circuit duty violations at the following substation buses for the addition of Avenal Energy:

- McCall substation 230 kV bus B1: The pre-project fault current (20,566 amperes) increases to 20,636 amperes (increment of 0.34%), which exceeds the circuit breaker fault interrupting rating of 12,551 amperes.
- Midway substation 230 kV bus D: The pre-project fault current, 63,267 amperes increases to 63,573 amperes (increment of 0.48%), which exceeds the circuit breaker fault interrupting rating of 63,000 amperes.

However, the circuit breakers at both the above substations are already overstressed during pre-project conditions, and the fault current increments (0.34 and 0.48%s) due to the addition of Avenal Energy are much less than the 5% increment criteria followed by PG&E, the transmission owner, to make the project responsible for the violations. The study, therefore, determined that circuit breaker fault duty violations for any pre or post-project conditions are not attributable to Avenal Energy. Staff concurs with the conclusion. The short circuit analysis results are shown in Table 6-1 of the supplemental SIS (TRC 2008h, supplemental SIS).

TRANSIENT STABILITY STUDY RESULTS

Transient stability analysis is performed to determine whether the transmission system would remain stable with the addition of Avenal Energy. Navigant performed the analysis for the 2013 summer peak system conditions with simulated faults under selected critical Category B & C contingencies. Both the SIS results concluded that the

transmission system would remain stable for all contingency simulations studied. The transient stability plots are shown in Appendix E of the SIS (Avenal Power 2008d, SIS).

POST-TRANSIENT VOLTAGE ANALYSIS RESULTS

The post-transient voltage analysis with governor power flow was performed with 2013 summer peak case for pre and post-project system conditions under selected category B and C contingencies. The analysis did not identify any voltage criteria violations at PG&E substation buses for the addition of Avenal Energy. The results are shown in Tables 5-1 & 5-2 of the supplemental SIS (TRC 2008h, supplemental SIS).

REACTIVE POWER DEFICIENCY ANALYSIS RESULTS

The reactive power deficiency analysis was performed with 2013 summer peak and off-peak cases for pre and post-project system conditions under category B and C contingencies of critical 500 kV lines in northern California and with outage of two generating units of Diablo nuclear generating station. The results indicate that the addition of Avenal Energy increases the reactive margins at the critical bus, which are positive and are well in excess of 400 MVAR. The study determined that the addition of Avenal Energy does not contribute to any reactive power margin violations following selected contingencies. The analysis results are shown in Tables 4-1 and 4-2 of the supplemental SIS (TRC 2008h, supplemental SIS).

DOWNSTREAM FACILITIES

Besides the interconnection facilities which include the new Avenal Energy 230 kV switchyard, the proposed new 230 kV overhead tie line between the Avenal Energy 230 kV switchyard and the Gates 230 kV substation and its terminating facilities, accommodating the interconnection of Avenal Energy at the Gates substation 230 kV bus would not require any new lines or reconductoring of the existing PG&E lines.
To maintain reliability in the PG&E transmission network for the addition of Avenal Energy, a majority of the impacted lines would be eligible for re-rating with higher ampere ratings based on higher wind speed. The remaining work for SPS installation according to the mitigation plan would be done by PG&E within the fence line of their substations.

CUMULATIVE IMPACTS

Since Avenal Energy is proposed to be connected to the Gates 500/230/115 kV substation, an important junction of northern California bulk power system, staff believes that the Avenal Energy generation could create some cumulative effects in the California ISO network.

The cumulative impacts due to Avenal Energy, as identified in the SIS which includes all generators with a higher California ISO queue position, would be mitigated. Staff also believes that there would be some positive impacts because Avenal Energy, as local generation, would meet the increasing load demand in the Fresno and Kings Counties, would provide additional reactive power and voltage stability support in the network, enhance reliability and may reduce system losses in the PG&E system.

ALTERNATIVE TRANSMISSION ROUTES

The following three alternative routes for Avenal Energy 230 kV overhead tie line were considered by the applicant:

1. Selected route: A 6.4-mile line on agricultural lands mostly along the existing PG&E 230 & 500 kV transmission line corridor and away from Avenal Cutoff Road.

2. Route A: A 5-mile line initially traverses towards west across Avenal Cutoff Road, and then merges with the selected route.

3. Route B: A 5-mile line on separate agricultural lands and about 0.4-mile apart from the existing PG&E transmission line corridor.

Route A was not considered as it would be close to a developed road and increase visual impacts. Route B was not considered as it would create a separate, new transmission line corridor. The selected route was chosen by the applicant as it would minimize environmental impacts and be an extension of the existing transmission corridor. Staff considers the selected route acceptable (Avenal Power 2008b, AFC, Section 5.5, Figure 5.5-1).

CONFORMANCE WITH LORS AND CEQA REVIEW

The proposed interconnection facilities including the Avenal Energy 230 kV switchyard, the generator overhead 230 kV tie line to the existing PG&E Gates substation and its terminations, are adequate in accordance with NESC standards, GO-95 Rules and good utility practices, and are acceptable to staff.

The SIS demonstrates that there would be some adverse impacts on the PG&E system for the addition of Avenal Energy to the Gates 230 kV substation. The mitigation plan for the identified overloaded lines includes re-rating the lines with higher emergency ampere rating and/or installation of SPS or operation procedure for curtailing Avenal Energy generation. The recommended mitigation plan would be adequate to eliminate the adverse impacts.

The Avenal Energy would meet the requirements and standards of all applicable LORS and would not result in any significant adverse impacts upon satisfactory compliance with the Conditions of Certifications.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

No agency or public comments related to the TSE discipline have been received.

CONCLUSIONS AND RECOMMENDATIONS

1. The proposed interconnection facilities including, the Avenal Energy 230 kV switchyard, the generator overhead 230 kV tie line to the existing PG&E Gates

substation and its terminating facilities, are adequate in accordance with NESC standards, GO-95 Rules and good utility practices, and are acceptable to staff according to engineering LORS.

Construction of the new additional switching bays at the Gates substation would involve extension of the substation 230 kV bus and fence line on its east side.

2. The SIS performed by Navigant demonstrates that the addition of Avenal Energy would cause some adverse impacts on the PG&E's system for new overloads on nine transmission lines during emergency contingency conditions for which Avenal Energy should be responsible. PG&E's response to Navigant confirms that the ampere ratings (normal and emergency) of the identified overloaded lines are based on 2 feet/second wind speed and there are other lines in the PG&E study area that are rated at a wind speed of 4 feet /second. Staff concurs with the conclusion in the SIS that according to PG&E re-rating guidelines re-rating the lines with identified overloads during 2013 summer peak system conditions for higher ampere ratings based on higher wind speed is a feasible mitigation option and preferable to the alternate option of reconductoring the lines. However, re-rating the lines is valid for summer daylight hours only and would be subject to PG&E re-rate study guidelines including detailed study and cost estimates.

3. The mitigation plan, therefore, according to the final SIS report would be adequate to eliminate the adverse impacts. For single (N-1) contingency overload violations on three transmission lines, the mitigation option includes re-rating two 230 kV and one 70 kV transmission lines for higher emergency ampere ratings. The study identified six lines that overload under double or category B contingency (N-2 or more) conditions. The mitigation options include re-rating for higher emergency rating or installing SPS for curtailing Avenal Energy generation for two 230 kV and one 115 kV lines, SPS or operation procedure for two 230 kV lines and operation procedure for one 70 kV line.

4. During a May 4, 2009 conference call between PG&E, the California Independent System Operator (California ISO), the applicant and staff, PG&E indicated that there is certain amount of uncertainty about interconnecting the Avenal Energy at the PG&E Gates substation due to lack of room in the substation. In absence of written confirmation from PG&E or the California ISO about any change in the interconnection point, consideration of speculative changes to the proposed interconnection would be premature at this time since staff believes that there are high probabilities the proposed interconnection is feasible with expansion of the Gates substation 230 kV bus. The Interconnection Feasibility study dated March 24, 2008 performed by the California ISO and PG&E also had identified the proposed interconnection as feasible. Any changes to the interconnection could be identified in the California ISO Phase 1 Interconnection study under cluster window process which would be completed as early as July, 2009. The applicant has agreed to provide timely information in case the interconnection to the PG&E system changes from the Gates substation to a different location.

On completion of the Phase 1 & Phase 2 Interconnection studies, the California ISO would then proceed for the execution of a LGIA with the applicant before interconnecting Avenal Energy to the California ISO grid.

5. Avenal Energy would meet the requirements and standards of all applicable LORS, would not result in any significant adverse impacts for interconnecting directly into PG&E Gates substation and upon compliance with staff's proposed Conditions of Certification.

6. Avenal Energy, as local generation, would meet the increasing load demands in the Fresno and Kings Counties, provide additional reactive power and voltage support in the local network, enhance reliability in the grid and may reduce system losses in the PG&E system.

RECOMMENDATIONS

If the Energy Commission approves the project, staff recommends the following Conditions of Certification to ensure system reliability and conformance with LORS.

CONDITIONS OF CERTIFICATIONS FOR TSE

TSE-1 The project owner shall furnish to the CPM and to the CBO a schedule of transmission facility design submittals, a Master Drawing List, a Master Specifications List, and a Major Equipment and Structure List. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment. To facilitate audits by Energy Commission staff, the project owner shall provide designated packages to the CPM when requested.

Verification: At least 60 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of construction, the project owner shall submit the schedule, a Master Drawing List, and a Master Specifications List to the CBO and to the CPM. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment (see a list of major equipment in **Table 1: Major Equipment List** below). Additions and deletions shall be made to the table only with CPM and CBO approval. The project owner shall provide schedule updates in the Monthly Compliance Report.

Table 1: Major Equipment List
Breakers
Step-up Transformer
Switchyard
Busses
Surge Arrestors
Disconnects and Wave-traps
Take off facilities
Electrical Control Building
Switchyard Control Building
Transmission Pole/Tower
Insulators and Conductors
Grounding System

TSE-2 Prior to the start of construction the project owner shall assign an electrical engineer and at least one of each of the following to the project: A) a civil engineer; B) a geotechnical engineer or a civil engineer experienced and knowledgeable in the practice of soils engineering; C) a design engineer, who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; or D) a mechanical engineer. (Business and Professions Code Sections 6704 et seq., require state registration to practice as a civil engineer or structural engineer in California.)

The tasks performed by the civil, mechanical, electrical or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (e.g., proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California registered electrical engineer. The civil, geotechnical or civil and design engineer assigned in conformance with Facility Design condition **GEN-5**, may be responsible for design and review of the TSE facilities.

The project owner shall submit to the CBO for review and approval, the names, qualifications and registration numbers of all engineers assigned to the project. If any one of the designated engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer. This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform with predicted conditions used as a basis for design of earthwork or foundations.

The electrical engineer shall:

1. Be responsible for the electrical design of the power plant switchyard, outlet and termination facilities; and

2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, the names, qualifications and registration numbers of all the responsible engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

TSE-3 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend corrective action (1998 CBC, Chapter 1, Section 108.4, Approval Required; Chapter 17, Section 1701.3, Duties and Responsibilities of the Special Inspector; Appendix Chapter 33, Section 3317.7, Notification of Noncompliance). The discrepancy documentation shall become a controlled document and shall be submitted to the CBO for review and approval and shall reference this condition of certification.

Verification: The project owner shall submit a copy of the CBO's approval or disapproval of any corrective action taken to resolve a discrepancy to the CPM within 15 days of receipt. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action required to obtain the CBO's approval.

TSE-4 For the power plant switchyard, outlet line and termination, the project owner shall not begin any increment of construction until plans for that increment have been approved by the CBO. These plans, together with design changes and design change notices, shall remain on the site for one year after completion of construction. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. The following activities shall be reported in the Monthly Compliance Report:

A. receipt or delay of major electrical equipment;

B. testing or energization of major electrical equipment; and

C. the number of electrical drawings approved, submitted for approval, and still to be submitted.

Verification: At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of each increment of construction, the project owner shall submit to the CBO for review and approval the final design plans,

specifications and calculations for equipment and systems of the power plant switchyard, outlet line and termination, including a copy of the signed and stamped statement from the responsible electrical engineer attesting to compliance with the applicable LORS, and send the CPM a copy of the transmittal letter in the next Monthly Compliance Report.

TSE-5 The project owner shall ensure that the design, construction and operation of the proposed transmission facilities will conform to all applicable LORS, including the requirements listed below. The project owner shall submit the required number of copies of the design drawings and calculations to the CBO as determined by the CBO.

A. The power plant switchyard and outlet line shall meet or exceed the electrical, mechanical, civil and structural requirements of CPUC General Order 95 or National Electric Safety Code (NESC), Title 8 of the California Code and Regulations (Title 8), Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders", California ISO standards, National Electric Code (NEC) and related industry standards.

B. Breakers and busses in the power plant switchyard and other switchyards, where applicable, shall be sized to accommodate full output from the project and to comply with a short-circuit analysis.

C. Outlet line crossings and line parallels with transmission and distribution facilities shall be coordinated with the transmission line owner and comply with the owner's standards.

D. The project conductors shall be sized to accommodate the full output from the project.

E. Termination facilities shall comply with applicable PG&E interconnection standards.

F. The project owner shall provide to the CPM:

1. Confirmation that Avenal Energy will be interconnecting directly into the PG&E Gates substation.

2. The Special Protection System (SPS) sequencing and timing if applicable,

3. A letter stating that the mitigation measures or projects selected by the transmission owners for each criteria violation are acceptable,

4. The Phase 1 and Phase 2 interconnection study reports from the California ISO and/or PG&E, and

5. A copy of the executed LGIA signed by the California ISO and the project owner.

Verification: At least 60 days prior to the start of construction of transmission facilities (or a lesser number of days mutually agreed to by the project owner and CBO), the project owner shall submit to the CBO for approval:

A. Design drawings, specifications and calculations conforming with CPUC General Order 95 or NESC, Title 8, Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders", NEC, applicable interconnection standards and related industry standards, for the poles/towers, foundations, anchor bolts, conductors, grounding systems and major switchyard equipment.

B. For each element of the transmission facilities identified above, the submittal package to the CBO shall contain the design criteria, a discussion of the calculation method(s), a sample calculation based on "worst case conditions"[2] and a statement signed and sealed by the registered engineer in responsible charge, or other acceptable alternative verification, that the transmission element(s) will conform with CPUC General Order 95 or NESC, Title 8, California Code of Regulations, Articles 35, 36 and 37 of the, "High Voltage Electric Safety Orders", NEC, applicable interconnection standards, and related industry standards.

C. Electrical one-line diagrams signed and sealed by the registered professional electrical engineer in responsible charge, a route map, and an engineering description of equipment and the configurations covered by requirements **TSE-5** a) through f) above.

D. Confirmation that Avenal Energy will be interconnecting directly into the PG&E Gates substation.

E. The Special Protection System (SPS) sequencing and timing if applicable shall be provided concurrently to the CPM.

F. A letter stating that the mitigation measures or projects selected by the transmission owners for each criteria violation are acceptable.

G. The Phase 1 and Phase 2 interconnection study reports from the California ISO and/or PG&E.

H. A copy of the executed LGIA signed by the California ISO and the project owner.

TSE-6 The project owner shall inform the CPM and CBO of any impending changes that may not conform to requirements **TSE-5** a) through f), and have not received CPM and CBO approval, and request approval to implement such changes. A detailed description of the proposed change and complete engineering, environmental, and economic rationale for the change shall accompany the request. Construction involving changed equipment or substation configurations shall not begin without prior written approval of the changes by the CBO and the CPM.

[2] Worst case conditions for the foundations would include for instance, a dead-end or angle pole.

Verification: At least 60 days prior to the construction of transmission facilities, the project owner shall inform the CBO and the CPM of any impending changes that` may not conform to requirements of **TSE-5** and request approval to implement such changes.

TSE-7 The project owner shall provide the following Notice to the California Independent System Operator (California ISO) prior to synchronizing the facility with the California Transmission system:

1. At least one week prior to synchronizing the facility with the grid for testing, provide the California ISO a letter stating the proposed date of synchronization; and

2. At least one business day prior to synchronizing the facility with the grid for testing, provide telephone notification to the California ISO Outage Coordination Department.

Verification: The project owner shall provide copies of the California ISO letter to the CPM when it is sent to the California ISO one week prior to initial synchronization with the grid. The project owner shall contact the California ISO Outage Coordination Department, Monday through Friday, between the hours of 0700 and 1530 at (916) 351-2300 at least one business day prior to synchronizing the facility with the grid for testing. A report of conversation with the California ISO shall be provided electronically to the CPM one day before synchronizing the facility with the California transmission system for the first time.

TSE-8 The project owner shall be responsible for the inspection of the transmission facilities during and after project construction, and any subsequent CPM and CBO approved changes thereto, to ensure conformance with CPUC GO-95 or NESC, Title 8, CCR, Articles 35, 36 and 37 of the, "High Voltage Electric Safety Orders", applicable interconnection standards, NEC and related industry standards. In case of non-conformance, the project owner shall inform the CPM and CBO in writing, within 10 days of discovering such non-conformance and describe the corrective actions to be taken.

Verification: Within 60 days after first synchronization of the project, the project owner shall transmit to the CPM and CBO:

A. "As built" engineering description(s) and one-line drawings of the electrical portion of the facilities signed and sealed by the registered electrical engineer in responsible charge. A statement attesting to conformance with CPUC GO-95 or NESC, Title 8, California Code of Regulations, Articles 35, 36 and 37 of the, "High Voltage Electric Safety Orders", and applicable interconnection standards, NEC, related industry standards, and these conditions shall be provided concurrently.

B. An "as built" engineering description of the mechanical, structural, and civil portion of the transmission facilities signed and sealed by the registered engineer in responsible charge or acceptable alternative verification. "As built" drawings of the electrical, mechanical, structural, and civil portion of the transmission facilities shall be maintained at the power plant and made available, if requested, for CPM audit as set forth in the "Compliance Monitoring Plan".

C. A summary of inspections of the completed transmission facilities, and identification of any nonconforming work and corrective actions taken, signed and sealed by the registered engineer in charge.

REFERENCES

California ISO (California Independent System Operator) 1998a. California ISO Tariff Scheduling Protocol posted April 1998, Amendments 1,4,5,6, and 7 incorporated.

California ISO (California Independent System Operator) 1998b. California ISO Dispatch Protocol posted April 1998.

California ISO (California Independent System Operator) 2002a. California ISO Planning Standards, February 7, 2002.

California ISO (California Independent System Operator) 2007a. California ISO, FERC Electric Tariff, First Replacement Vol. No. 1, March, 2007.

CEC (California Energy Commission) 2009d. Conference call on May 4, 2009 between PG&E, California ISO, CEC Staff and the Applicant.

AP 2008a: Application for Certification (AFC) for the Avenal Energy Project (Avenal Energy). Submitted on February 21, 2008.

AP 2008b: Supplement to Application for Certification (AFC) for the Avenal Energy Project (Avenal Energy). Submitted on March 28, 2008.

AP 2008e: Response to CEC Data Requests 1 thru 74. Submitted on June 20, 2008.

TRC 2008d: System Impact Study report dated September 18, 2008 for the Avenal Energy interconnection performed by NCI. Submitted on September 19, 2008.

TRC 2008h: System Impact Study supplemental report dated November 11 & 21, 2008 for the Avenal Energy interconnection performed by NCI. Submitted on November 12 & 21, 2008.

TRC 2009d: PG&E response to Navigant's email correspondences dated April 10, 2009.

NERC (North American Electric Reliability Council) 2006. Reliability Standards for the Bulk Electric Systems of North America, May 2 2006.

WECC (Western Electricity Coordinating Council) 2006. NERC/WECC Planning Standards, August 2006.

DEFINITION OF TERMS

ACSR	Aluminum cable steel reinforced.
AAC	All Aluminum conductor.
Ampacity	Current-carrying capacity, expressed in amperes, of a conductor at specified ambient conditions, at which damage to the conductor is nonexistent or deemed acceptable based on economic, safety, and reliability considerations.
Ampere	The unit of current flowing in a conductor.
Kiloampere	(kA) 1,000 Amperes
Bundled	Two wires, 18 inches apart.
Bus	Conductors that serve as a common connection for two or more circuits.
Conductor	The part of the transmission line (the wire) that carries the current.
Congestion Management	Congestion management is a scheduling protocol, which provides that dispatched generation and transmission loading (imports) would not violate criteria.
Emergency Overload	See Single Contingency. This is also called an L-1.
Hertz	The unit for System Frequency.
Kcmil or KCM	Thousand circular mil. A unit of the conductor's cross sectional area, when divided by 1,273, the area in square inches is obtained.
Kilovolt (kV)	A unit of potential difference, or voltage, between two conductors of a circuit, or between a conductor and the ground. 1,000 Volts.
Loop	An electrical cul-de-sac. A transmission configuration that interrupts an existing circuit, diverts it to another connection and returns it back to the interrupted circuit, thus forming a loop or cul-de-sac.
MVAR or Megavars	Megavolt Ampere-Reactive. One million Volt-Ampere-Reactive. Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system.
Megavolt Ampere (MVA)	A unit of apparent power, equals the product of the line voltage in kilovolts, current in amperes, the square root of 3, and divided by 1000.
Megawatt (MW)	A unit of power equivalent to 1,341 horsepower.

Normal Operation/ Normal Overload	When all customers receive the power they are entitled to without interruption and at steady voltage, and no element of the transmission system is loaded beyond its continuous rating.
N-1 Condition	See Single Contingency.
Outlet	Transmission facilities (circuit, transformer, circuit breaker, etc.) linking generation facilities to the main grid.
Power Flow Analysis	A power flow analysis is a forward looking computer simulation of essentially all generation and transmission system facilities that identifies overloaded circuits, transformers and other equipment and system voltage levels.
Reactive Power	Reactive power is generally associated with the reactive nature of inductive loads like motor loads that must be fed by generation units in the system. An adequate supply of reactive power is required to maintain voltage levels in the system.
Remedial Action Scheme (RAS)	A remedial action scheme is an automatic control provision, which, for instance, would trip a selected generating unit upon a circuit overload.
SSAC	Steel Supported Aluminum Conductor.
SF6	Sulfur hexafluoride is an insulating medium.
Single Contingency	Also known as emergency or N-1 condition, occurs when one major transmission element (circuit, transformer, circuit breaker, etc.) or one generator is out of service.
Solid Dielectric Cable	Copper or aluminum conductors that are insulated by solid polyethylene type insulation and covered by a metallic shield and outer polyethylene jacket.
SVC	Static VAR Compensator: Equipment made of Capacitors and Reactors with electronic controls for producing and controlling Reactive Power in the Power System.
Switchyard	A power plant switchyard (switchyard) is an integral part of a power plant and is used as an outlet for one or more electric generators.
Thermal Rating	See ampacity.
TSE	Transmission System Engineering.
TRV	Transient Recovery Voltage

`Tap A transmission configuration creating an interconnection through a sort single circuit to a small or medium sized load or a generator. The new single circuit line is inserted into an existing circuit by utilizing breakers at existing terminals of the circuit, rather than installing breakers at the interconnection in a new switchyard.

Undercrossing A transmission configuration where a transmission line crosses below the conductors of another transmission line, generally at 90 degrees.

Underbuild A transmission or distribution configuration where a transmission or distribution circuit is attached to a transmission tower or pole below (under) the principle transmission line conductors.

VAR Voltage Ampere Reactive, a measure for Reactive power in the power system.

ALTERNATIVES

Testimony of Christopher Meyer

SUMMARY OF CONCLUSIONS

The applicant provided an analysis of two alternative sites as possible locations for the proposed project. Staff determined these alternative sites would not reduce or eliminate environmental effects of the proposed project, as the proposed site would be more advantageous over the alternative sites because of visual resource impacts related to the alternative sites. Although staff has found that the proposed 148-acre parcel is preferable over the alternative site locations, staff originally found that a change in the alignment of the detention pond within the 148-acre parcel would address concerns raised by United States Fish and Wildlife Service staff on the wildlife corridor adjacent to the San Luis Canal. The applicant has subsequently agreed to provide the 300-foot setback requested by Energy Commission, California Department of Fish and Game, and United States Fish and Wildlife Service staff, addressing the biological resource concern. The setback is important to preserve a larger area for foraging and movement for San Joaquin kit fox and other species such as the Tulare grasshopper mouse (*Onychomys torridus tularensis*) and the San Joaquin pocket mouse (*Perognathus inornatus inornatus*) (Avenal Power 2008a, CNDDB 2008). Energy Commission staff has proposed Condition of Certification **BIO-7** to address this setback.

To address public comments on the designation of the San Joaquin Valley Air Basin as an extreme nonattainment area for ozone and a serious nonattainment area for PM2.5, staff expanded the reasonable geographical area to include the South Central Coast Air Basin. Although the South Central Coast Air Basin is designated as a non-attainment area for PM10 and is unclassified for PM2.5 due to lack of data, this air basin is less impacted than either the San Joaquin Valley Air Basin or the South Coast Air Basin while still offering the possibility of transmission line connectivity to the Gates Substation. Staff analyzed two sites in the South Central Coast Air Basin as well as a smaller power plant on the proposed site.

Avenal Energy would result in the conversion of 34.8 acres of land that is designated as “Prime Farmland” by the California Department of Conservation. Since the project site, switch yard and storm water evaporative/percolation basin are currently being used for agricultural crops and have the required productive soil characteristics, staff has concluded that the proposed project would have a significant adverse impact on agricultural resources and recommends that mitigation be required. Although alternatives sites west of Interstate 5, currently used for cattle grazing, would avoid impacts to prime farmland, the development of these sites could lead to significant impacts to kit fox habitat and are outside the area zoned for industrial development. However, the applicant has agreed to preserve prime agricultural land acreage at another location at a 1:1 ratio for the long term site disturbance.

Alternative generation technologies (i.e. solar, wind, and biomass) were analyzed as possible alternatives to the project. Staff determined that none of the technologies were feasible alternatives to the proposed project. Solar and wind were eliminated from consideration, as the land needed to implement solar and wind has the potential for

significant environmental impacts. Although recent improvements in biomass technology is increasing efficiency and reducing air quality impacts, a facility capable of providing the same amount of energy as the proposed project would require several thousand acres of feedstock and several hundred acres more than the proposed project to process that feedstock, potentially resulting in the conversion of a much greater amount of prime farmland to an industrial use than the proposed project, without resulting in a reduction of air quality impacts over the proposed project.

INTRODUCTION

This section considers potential alternatives to the construction and operation of the proposed Avenal Energy project (Avenal Energy). The purpose of this alternatives analysis is to provide an analysis of a reasonable range of feasible alternative sites 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). This section identifies potentially significant impacts of the proposed project and analyzes different technologies and alternative sites that may reduce or avoid significant impacts. Staff has also analyzed the impacts that may be created by locating the project at alternative sites.

The Energy Commission does not have the authority to require Avenal Power Center, LLC (Avenal Power) to move the proposed project to another location, even if it identifies an alternative site that meets the project objectives and avoids or substantially lessens one or more of any significant effects of the project. Implementation of an alternative site would require that the applicant submit a new Application for Certification (AFC), including revised engineering and environmental analysis; this more rigorous AFC-level analysis of any of the alternative sites could reveal environmental impacts, non-conformity with laws, ordinances, regulations, and standards; or potential mitigation requirements that were not identified during the more general alternatives analysis presented herein.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Avenal Power proposes to construct a new thermal power plant greater than 50 MW in California. The proposed project falls under the jurisdiction of the California Energy Commission as specified under the Warren-Alquist Act. In addition, the Energy Commission is the Lead Agency under the California Environmental Quality Act (CEQA) and is responsible for reviewing consistency with all laws, ordinances, regulations, and standards (LORS).

CEQA

Energy Commission staff is required by agency regulations to examine 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” (Cal. Code Regs., tit. 20, §1765).

The “Guidelines for Implementation of the California Environmental Quality Act,” Title 14, California Code of Regulations Section 15126.6(a), requires an evaluation of the

comparative merits of “a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project.” In addition, the analysis must address the No Project Alternative (Cal. Code Regs., tit. 14, §15126.6[e]). The analysis should identify and compare the impacts of the various alternatives, but analysis of alternatives need not be in as much detail as the analysis of the proposed project.

The range of alternatives is governed by the “rule of reason,” which requires consideration only of those alternatives necessary to permit informed decision making and public participation. CEQA states that an environmental document does not have to consider an alternative if its effect cannot be reasonably ascertained and if its implementation is remote and speculative (Cal. Code Regs., tit. 14, §15126.6[f][3]). However, if the range of alternatives is defined too narrowly, the analysis may be inadequate (City of Santee v. County of San Diego [4th District, 1989] 214 Cal. App. 3d 1438).

PROJECT DESCRIPTION AND SETTING

Avenal Energy would be a 600 megawatt (MW) merchant power plant in the city of Avenal in Kings County, providing electrical reliability for local and Central San Joaquin Valley loads, as well as providing the ability to serve distant loads. The proposed project site is located in the agricultural region of the southwestern San Joaquin Valley. The project would be built on approximately 34.8 acres of a 148-acre site just south of the Fresno County line, and about two miles east of Interstate 5. Although the proposed project is within city of Avenal town limits in an area zoned for industrial use, it is located approximately 6 miles from the city’s residential and commercial districts. Current land use at the project site is irrigated agriculture, as is the surrounding land use.

Avenal Energy would be a combined-cycle generating plant consisting of two natural gas-fired General Electric 7FA gas turbines with heat recovery steam generators (HRSG) and one General Electric steam turbine. Natural gas would be provided via a 2.5-mile, 20-inch underground pipeline interconnection to the Pacific Gas and Electric (PG&E) natural gas pipeline transmission system at the Kettleman compressor station. The plant would use a dry cooling process to minimize water consumption. The city of Avenal would provide raw water for non-cooling industrial uses to the proposed project from the city’s turnout on the San Luis Canal. Groundwater from three local wells would provide a back-up water source to the project via two separate pipelines, totaling less than 1.4 miles. The proposed project would recycle water to the maximum extent possible through the use of a zero liquid discharge system which would eliminate waste water discharge. The proposed project would be connected to the PG&E transmission grid via a 6.4-mile single-circuit 230kV transmission line, traversing agricultural land to the PG&E Gates substation in Fresno County. Although the electrical transmission line and natural gas pipeline interconnection points are respectively only 4.5 miles and 1.3 miles from the proposed project site in a straight line, the proposed routes for these linear facilities are longer to utilize existing utility corridors and avoid and/or minimize potential environmental impacts.

If approved, Avenal Power plans to begin construction in April of 2010, with commercial operation beginning June 1, 2012. Total capital investment is estimated to be $530 million. The construction work force would average 320 people over a 27-month period. Avenal Energy would employ 25 people when complete.

DETERMINING THE SCOPE OF THE ALTERNATIVES ANALYSIS

The purpose of staff's alternatives analysis is to determine the potential significant impacts of Avenal Energy and then focus on alternatives that are capable of reducing or avoiding these impacts.

To prepare this alternatives analysis, the staff used the methodology summarized below:

- Describe the basic objectives of the project.
- Identify any potential significant environmental impacts of the project.
- Identify and evaluate alternative locations or sites to determine whether the environmental impacts of the alternatives are the same, better, or worse than the proposed project.
- Identify and evaluate technology alternatives to the project which would mitigate impacts.
- Evaluate the impacts of not constructing the project to determine whether the "no project" alternative is superior to the project as proposed.

In considering site alternatives, staff originally determined a reasonable geographical area. Since alternatives must consider the underlying objectives of the proposed project, staff originally confined the geographic area for site alternatives to the industrial zoned area in the city of Avenal near the PG&E transmission line corridor. These location alternatives are generally consistent with Avenal Energy's objectives and siting criteria: connectivity to the California transmission system backbone; location in an area appropriate for industrial development and compatible with city general plans and zoning ordinances; proximity to water service, transmission line and gas pipeline connections; and ability to have no significant impact on the environment with implementation of reasonable mitigation measures. In the Preliminary Staff Assessment, staff expanded this area to include Avenal Power's Alternative Site B in Fresno County.

To address public comments on the designation of the San Joaquin Valley Air Basin as an extreme nonattainment area for ozone and a serious nonattainment area for PM 2.5, staff expanded the reasonable geographical area to include the South Central Coast Air Basin. Although the South Central Coast Air Basin is designated as a non-attainment area for PM10 and is unclassified for PM2.5 due to lack of data, this air basin is less impacted than either the San Joaquin Valley Air Basin or the South Coast Air Basin while still offering the possibility of transmission line connectivity to California transmission system backbone.

Primarily, staff focused on alternative locations that would not involve the conversion of prime agriculture lands outside those in the area already zoned for industrial development by the city of Avenal. Given the project's conversion of prime agricultural land, staff also considered the concept of an alternative site located on grazing lands, which would not be productive for crops. Although this concept was set aside during the initial alternative site screening stage due to potentially significant biological impacts greater than that of the proposed project, staff expanded the original geographical area to examine an alternative site outside the San Joaquin Air Basin. The potentially significant impacts to biological resources and agricultural land is discussed below.

Alternative generation technologies, as discussed in this analysis, include both methods to reduce the demand for electricity and also alternative methods to generate electricity.

There may also be specific technologies that could be applied to Avenal Energy that would reduce impacts of the project. The in-depth discussion of such technology alternatives is included in the technical area chapters of this staff assessment, where appropriate.

BASIC OBJECTIVES OF THE PROJECT

After studying Avenal Power's AFC, Energy Commission staff has determined Avenal Energy's objectives to be:

- To construct and operate a cost-effective, environmentally sound, and efficient merchant generating facility to provide power generation to California's energy market;
- To minimize or eliminate the length of any project linear facilities, including gas and water supply lines, discharge lines, and transmission interconnections;
- To deliver electricity to the California transmission system backbone; and
- Develop a site consistent with community planning and existing zoning at a location that is supported by the local community.

Although the applicant did not specify a MW goal in the basic project objectives stated on page 2-1 of the Application for Certification (AFC), the introductory paragraph to the applicant's project objectives describes the project as "…construction and operation of a 600 MW combined-cycle electric power generating plant and ancillary facilities". This component of the project description was not used by staff as a project objective, but rather as a metric by which to analyze the potential impacts of alternative sites and alternatives technologies relative to the proposed project.

POTENTIAL SIGNIFICANT ENVIRONMENTAL IMPACTS OF THE PROJECT

The Energy Commission staff has identified two areas of potentially significant environmental impacts, Biological Resources and Land Use, related to the construction of the proposed Avenal Energy. Although Air Quality and Greenhouse Gas staff did not find that the proposed project would result in potentially significant impacts, these issues

were considered in the alternatives analysis due to the extreme non-attainment status of the San Joaquin Valley Air Basin and global concerns on climate change.

BIOLOGICAL RESOURCES

The United States Fish and Wildlife Service (USFWS) staff identified that the originally proposed alignment of the project's detention pond encroaches on the required buffer area for the wildlife corridor adjacent to the United States Bureau of Reclamation (USBR) San Luis Canal. The setback is important to preserve a larger area for foraging and movement for the federally listed San Joaquin kit fox, the state threatened Swainson's hawk (*Buteo swainsoni*), and other sensitive species such as the Tulare grasshopper mouse (*Onychomys torridus tularensis*) and the San Joaquin pocket mouse (*Perognathus inornatus inornatus*). The status of each of these species is listed in BIOLOGICAL RESOURCES Table 1. Although the project is approximately 300 feet from the San Luis Canal, the USBR will not allow lands under their jurisdiction to be encumbered for mitigation. Due to this USBR decision, USFWS staff determined that the 300-foot buffer zone would have to be completely on the land controlled by the applicant.

As shown in **Biological Resources Figure 1**, the original applicant-proposed location of the detention pond falls within the buffer zone as defined by the USFWS staff. The applicant designed the project based on buffer zone definitions prior to the USBR decision, and a portion of the applicant-proposed buffer zone is land under the jurisdiction of the USBR. Starting in June of 2008, Energy Commission staff worked with the applicant and the USFWS staff to address the changes in the buffer zone definition. During the Preliminary Staff Assessment workshop, the applicant agreed to redesign the detention pond system to avoid the buffer zone as defined by the USFWS staff. Energy Commission and USFWS staff agree that the redesigning the detention pond agreed to by the applicant will address the concerns over the wildlife corridor adjacent to the USBR San Luis Canal. This issue is discussed in further detail in the BIOLOGICAL RESOURCES section of this document.

AGRICULTURAL LAND

In 1992, the city of Avenal prepared an update to the Avenal General Plan authorizing the conversion of 510 acres of agricultural land, which were designated as prime farmland from agricultural land to urban (non-agricultural uses). Avenal Energy is located within the area that was converted from agricultural to non-agricultural use by the 1992 General Plan Update. Prior to adopting the General Plan Update, the city of Avenal prepared, pursuant to CEQA, a Notice of Preparation, Draft Environmental Impact Report (EIR) and an Environmental Assessment circulated for public review.

Based on staff's review of the city of Avenal's environmental documentation pertinent to the 1992 and 2005 General Plan updates, the proposed project would permanently remove 34 designated acres of prime farmland from production. The city identified in the EIR the loss of prime agricultural land as significant and unavoidable, and as a result, a Statement of Overriding Considerations was adopted by the Avenal City Council in conjunction with certification of the EIR. Avenal Energy would result in the physical conversion of 34 acres of land that is designated as "Prime Farmland" by the California Department of Conservation. The project site, switch yard and storm water

evaporative/percolation basin are currently being used for agricultural crops. These areas of land for the project site, evaporative ponds and switch yard meets the Department of Conservation's criteria for prime farmland, in that they have been farmed and irrigated within the last five years, and they have the required productive soil characteristics.

Staff also analyzed the proposed site using the Land Evaluation Site Assessment (LESA) approach, resulting in a high score, which indicates a significant impact. Staff's LESA analysis is discussed in detail in the LAND USE section.

Staff therefore concludes that the project will have a significant adverse impact on agricultural resources and recommends that mitigation be required. Specifically, staff believes that the project owner should be required to ensure that an identical amount of prime farmland is preserved in perpetuity. As noted above, a grazing land alternative site would avoid the impact of prime farmland conversion. Since the grazing land region, located primarily west of Interstate 5, is a prime habitat area for the San Joaquin kit fox, staff concluded that such an alternative site would result in a different potentially significant impact with more difficult mitigation choices, thus it would not be a viable option.

AIR QUALITY

Staff finds that with the adoption of the attached conditions of certification, the proposed Avenal Energy would likely conform with applicable federal, state and San Joaquin Valley Air Pollution Control District air quality laws, ordinances, regulations and standards, and that the proposed Avenal Energy would not result in significant air quality related impacts.

Staff finds that the project has secured emission reduction credits in sufficient quantity to meet local air district requirements and to fully offset all nonattainment pollutants and their precursors at a minimum ratio of one-to-one. Staff has assessed both the potential for localized impacts and regional impacts for the project's construction and operation, and as a product of this analysis staff has recommended mitigation and monitoring requirements that should provide adequate mitigation and monitoring sufficient to reduce the adverse construction and operating emission impacts to less than significant.

The San Joaquin Valley Air Pollution Control District developed an interpollutant trading ratio for sulfur oxides to particulate matter of one-to-one and concluded that this would be protective of managing regional particulate matter impacts and progress towards attainment. However, staff notes that there is no evidence in the record indicating whether the methods used in developing the ratio have been reviewed and/or approved by U.S. Environmental Protection Agency.

GREENHOUSE GASES

Avenal Energy is a proposed addition to the state's electricity system. It would be an efficient, new, dispatchable natural gas-fired combined cycle power plant that would produce greenhouse gas (GHG) emissions while generating electricity for California consumers. Its addition to the system would displace less efficient plants and facilitate the integration of renewable resources. Because the project's emissions per megawatt-

hour (MWh) would be lower than those of other power plants that the project would displace, the addition of Avenal Energy would contribute to a reduction of the California and overall Western Electricity Coordinating Council system greenhouse gas (GHG)[1] emissions and GHG emission rate average

Staff notes that mandatory reporting of the GHG emissions provides the necessary information for the California Air Resources Board to develop greenhouse gas regulations and/or trading markets required by the California Global Warming Solutions Act of 2006 (AB 32 Núñez, Statutes of 2006, Chapter 488, Health and Safety Code sections 38500 et seq.). The project may be subject to additional reporting requirements and GHG reductions or trading requirements as these regulations become more fully developed and implemented.

On October 8, 2008, the Energy Commission adopted an order initiating an informational (OII) proceeding to solicit comments on how to satisfy its responsibilities under the California Environmental Quality Act (CEQA) and assess the greenhouse gas impacts of proposed new power plants. This analysis provides the staff conclusions for this siting case. Future power plant siting cases will be reviewed recognizing new information as it becomes available in response to the OII. This analysis recognizes that "prudent use" of natural gas for electricity generation is necessary (for integrating intermittent renewable generation and providing reliability), but further analysis will be conducted for future cases to refine this general understanding (CEC 2009a).

The operation of Avenal Energy would have an impact upon the overall electricity system operation and GHG emissions in several ways:

- Avenal Energy would displace less efficient local generation in the dispatch order of gas-fired facilities that are required to provide electricity reliability in the local Greater Fresno Area.
- Avenal Energy would provide flexible, dispatchable power necessary to integrate the growing generation from intermittent renewable sources, such as wind and solar generation.
- Avenal Energy would facilitate to some degree the replacement out-of-state coal electricity generation that must be phased out in conformance with the State's new Emissions Performance Standard.
- Avenal Energy would facilitate to some extent the replacement of generation provided by aging power plants that use once-through cooling.

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

[1] Fuel-use closely correlates to carbon dioxide (CO_2) emissions from natural gas-fired power plants. And since CO_2 from the fuel combustion dominate greenhouse gas (GHG) emissions from power plants, CO_2 and GHG are used interchangeably in this section.

Staff concludes that the short-term emission of greenhouse gases during construction would be sufficiently reduced by “best practices” and would not be significant.

The project would comply with the limits of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard (EPS), Article 1, Section 2900 et. seq.), the Greenhouse Gas Emission Performance Standard that applies to utility purchases of base load power from power plants.

SITE ALTERNATIVES TO THE PROJECT

This section evaluates the alternative sites identified by Avenal Power and other site possibilities identified by staff or the public.

Staff considered the following criteria in identifying potential alternative sites:

1. Avoid or substantially lessen one or more of the potential significant effects of the project;

2. Satisfy the following criteria:

   A. Site suitability. Approximately 40+ acres are required for the site. This includes both the actual project sites and any temporary construction areas. The shape of the site also affects its usability;

   B. Availability of infrastructure. The site should be within a reasonable distance of the electric transmission system, natural gas supply, and water supply;

   C. Not located adjacent to moderate or high density residential areas or to sensitive receptors (such as schools and hospitals) or to recreation areas;

   D. Compliance with general plan designation and zoning district; and

   E. Availability of the site.

Staff began by identifying an initial study region. The region consisted of the geographic area near the PG&E Gates Substation. Staff chose this region to determine whether alternative sites (in addition to those identified by Avenal Power) were close enough to PG&E’s Gates Substation to provide power to that substation, similar to the proposed project. Due to concerns over zoning inconsistencies, biologically sensitive areas on the hillsides west of Interstate 5, and impacts to agricultural lands, staff originally focused on the area designated by the city of Avenal for heavy industry. The Energy Commission’s analysis of local system effects of Avenal Energy indicates that this project could serve load demands in either northern or southern California. Although a similar project outside the city of Avenal industrial park connecting to the Gates Substation would provide similar benefits to the electrical grid, it would be incompatible with land use zoning and the city of Avenal’s redevelopment goals for the area. Although staff focused its initial search for alternative sites in the area zoned for heavy industry, the applicant’s Alternative Site B is located outside this industrial zone in an area zoned by Fresno County for agricultural use.

To address public comments on the designation of the San Joaquin Valley Air Basin as an extreme nonattainment area for ozone and a serious nonattainment area for PM 2.5, staff expanded the reasonable geographical area to include the South Central Coast Air Basin. Although the South Central Coast Air Basin is designated as a non-attainment area for ozone and PM10, and is unclassified for PM2.5 due to lack of data, this air basin is less impacted than either the San Joaquin Valley Air Basin or the South Coast Air Basin while still offering the possibility of transmission line connectivity to either the Gates Substation or substations on the California transmission line backbone.

Staff found that potential sites that could meet staff's criteria are rare. Much of the land in the study area has been designated as "Prime Farmland" by the California Department of Conservation, is closer to sensitive receptors, is of significantly higher environmental value due to biological resources, or is not zoned for heavy industrial uses. Although the plans, policies, and ordinances of many local governments either prohibit heavy industry (such as a power plant), or discourage expansion of heavy industry into areas where it is not currently the predominant land use, staff does recognize the compatible zoning of the proposed project and the goal of the city of Avenal to site a power plant in the industrial park to assist in the development of the area by heavy industry.

SITES INITIALLY IDENTIFIED FOR FURTHER EVALUATION

Staff examined the two site location alternatives proposed in the Avenal Energy AFC: Avenal Power Alternative Sites 1 and 2 (Avenal Power AFC, Figure 5.3-1), as well as two Energy Commission staff-proposed sites outside the San Joaquin Valley Air Basin. The San Joaquin Valley Air Basin is designated as an extreme nonattainment area for ozone and a serious nonattainment area for PM 2.5. Staff expanded the reasonable geographical area to include the South Central Coast Air Basin – an air basin with a lower level of non-attainment ozone and PM10. The alternative sites proposed by the applicant are located in the general area of the proposed Avenal Energy site and share some common attributes. Staff examined the two additional sites in the South Central Coast Air Basin in response to public concerns over additional air quality impacts in the San Joaquin Air Basin (**Alternatives Figure 3** and **Alternatives Figure 4**).

Sites not Meeting Screening Criteria

Staff toured the project area and discovered that available properties were either outside the area designated for heavy industry by the city of Avenal, designated as "Prime Farmland" by the California Department of Conservation, or were undisturbed areas, such as grazing lands, potentially supporting listed and common wildlife. Both state and federal land use policies have identified the importance of protecting agricultural land from development, as well as the importance of protecting critical habitat for common and listed species. Staff determined that it was not appropriate to undertake a detailed evaluation of sites with obvious environmental impacts greater than the proposed project.

Morro Creek Site

In looking for alternative sites outside the San Joaquin Valley Air Basin, staff looked at previous cases before the Energy Commission. The alternatives analysis for the Morro Bay Modernization & Replacement Power Plant Project (00-AFC-12) case included an

alternative site based on comments from members of the public that stated that the applicant for that case could achieve project objectives with an electric generation facility located just east of but physically adjacent to the City of Morro Bay near existing transmission lines but further from the coast. One such potential site is located along the north side of Little Morro Creek Road approximately one mile east of the existing Morro Bay Power Plant (**Alternatives Figure 3**). This area is within unincorporated San Luis Obispo County in an area that is currently agricultural with low-density residential usage. The existing natural gas pipeline to the Morro Bay Power Plant passes immediately west of this site, and the 230 kV transmission line to the Gates Substation is within a few hundred feet to the south.

Advantages

The site can easily be connected to the PG&E 230 kV transmission system leading to the California transmission system backbone at the Gates Substation, and is adjacent to the existing natural gas pipeline. The site has an accessible road system, though access roads would need to be evaluated for their ability to support construction traffic. While visual impacts may still occur due to the site's visibility from Highway 41, views of the site from the coast and from central Morro Bay would be limited. Operational impacts of the proposed Avenal Energy project at its current site would be reduced or eliminated (air quality impacts would be shifted to an alternate air basin).

Disadvantages

Land is not zoned heavy industrial but rather agriculture and vineyard, and the land is currently used for agriculture. This site would require a rezoning decision by the County of San Luis Obispo. There is the potential for flooding and liquefiable soils due to the site's location within the floodplain of Morro Creek. The South Central Coast Air Basin is already non-attainment for several criteria air pollutants. The applicant does not have site control of this alternative site.

Due partially to zoning, and more particularly to the distance to sensitive receptors, staff determined that the Morro Bay alternative site analyzed in the Morro Bay Modernization & Replacement Power Plant Project (00-AFC-12) case is not a viable alternative to the proposed Avenal Energy.

Sites Meeting Screening Criteria

A discussion of those sites which generally meet the screening criteria is provided below. These sites are identified in **Alternatives Figure 1 and Alternatives Figure 4**. The Alternative Sites include the two sites identified in the Avenal Energy AFC and two additional alternative sites identified by Energy Commission staff.

Avenal Power Alternative Site A

Avenal Power Alternative Site A is located within the city of Avenal near the Kettleman compressor station, approximately 1 mile southwest of the Avenal Energy site. The site is between 34 1/2 Avenue and 34th Avenue, north of Plymouth Avenue. This site is also within the city of Avenal's industrial park, and zoned for heavy industry. The site is currently in agriculture and is similar in nature to the proposed project. No California Natural Diversity Data Base (CNDDB) occurrences have been identified on Site A and

the project is over 1.5 miles from the San Luis Canal. The closest residential noise receptors are located approximately 0.5 miles from the site and a school is located approximately 5.1 miles west of the site. Avenal Power was not able to obtain site control for this alternative site.

As compared to the proposed site, Avenal Power Alternative Site A would require a slightly shorter transmission line connection to PG&E's Gates Substation. Although the potable water service pipelines are close to Avenal Power Alternative Site A, a longer pipeline would be required to carry raw water from the city of Avenal turn-out at the San Luis Canal to the site. The closest noise receptors are approximately 0.8 miles closer at this site as compared to the proposed site. The distance to public schools would be almost a mile and a half closer than the proposed site, yet the overall distance of 5.1 miles, the intervening hills, and Interstate 5 eliminate impacts to schools as a significant concern. Avenal Power Alternative Site A is far more visible from Interstate 5 and the adjacent local roadways than the proposed project. Due to the elevated nature of the Interstate 5 compared to the site, visual screening of the facility is not feasible, increasing the visual sensitivity of this location. The size of the Avenal Energy facility would have a greater visual resources impact at Avenal Power Alternative Site A than the proposed site due to the proximity to Interstate 5 and to Plymouth Avenue.

Avenal Power Alternative Site B

Avenal Power Alternative Site B is located near the PG&E Gates Substation in Fresno County, approximately 3 miles north of the Avenal Energy site. The site is near the corner of Jayne Avenue and Lassen Avenue (Route 269). This site is outside the city of Avenal's industrial park, and is zoned for agriculture. The site is currently in agriculture and is similar in nature to the proposed project. No California Natural Diversity Data Base (CNDDB) occurrences have been identified on Site B and the project is approximately 2 miles from the San Luis Canal. The closest residential noise receptors are located approximately 0.5 miles from the site and the closest school is located approximately 9.0 miles west of the site. Avenal Power was not able to obtain site control for this alternative site.

As compared to the proposed site, Avenal Power Alternative Site B would require a significantly shorter transmission line connection to PG&E's Gates Substation. Although potable water service pipelines should be available close to Avenal Power Alternative Site B, a much longer pipeline would be required to carry raw water from the city of Avenal turn-out at the San Luis Canal to the site. This alternative site is 3 miles further from the Kettleman Compressor Station than the proposed project, yet similar distance to a potential tie-in with PG&E's natural gas transmission line. The closest noise receptors are approximately 0.8 miles closer at this site as compared to the proposed site. The distance to public schools would be 2.5 miles farther than the proposed site, yet the overall distance of 9.0 miles, the intervening hills, and Interstate 5 eliminate impacts to schools as a significant concern. Avenal Power Alternative Site B is no more visible from Interstate 5 than the proposed project, but very visible from the adjacent local roadways, including Route 269. Visual screening of the facility is feasible at this location, possibly mitigating the visual impacts of this location. Land use zoning inconsistencies and the loss of prime farmland make the potential impacts of Avenal Power Alternative Site B significantly higher than the proposed project.

Energy Commission Staff Alternative Site A

Staff reviewed the objectives of the proposed Avenal Energy and recognizes that a project site along a transmission line that could interconnect to the Gate Substation and be located outside of the San Joaquin Valley Air Basin would meet some of the basic objectives of the project and address public concerns. Although the proposed site is located six miles from the population centers in the city of Avenal, Kettleman City, and the city of Heron, staff received comments from the Center on Race, Poverty & the Environment expressing concerns over the proposed siting of a power plant in the already impaired San Joaquin Valley Air Basin.

Staff focused on the South Central Coast Air Basin due to the relatively low levels of ozone and PM10 compared to other local air basins. Although the South Central Coast Air Basin is designated as a non-attainment area for PM10 and is unclassified for PM2.5 due to lack of data, this air basin is less impacted that either the San Joaquin Valley Air Basin or the South Coast Air Basin while still offering the possibility of transmission line connectivity to the Gates Substation or other substations on the California transmission system backbone. Staff analyzed two sites in the South Central Coast Air Basin, one near Morro Bay Creek and one on the southern edge of the San Ardo Oil Field, and determined that a site on the southern side of the San Ardo Oil Field, the approximate location is shown in **Alternatives Figure 4**, lacked the potential land use zoning inconsistency and environmental impacts of the Morro Bay site and could be carried forward for additional analysis.

The San Ardo Oil Field is a large oil field in the upper Salinas Valley of Monterey County, about five miles south of the town of San Ardo, and about twenty miles north of Paso Robles. It is the 13th-largest oil field in California in production and of the top twenty California oil fields in size. As of the end of 2006, the principal operators of the field were Chevron Corp. and Aera Energy LLC. The San Ardo Oil Field is about five miles long by two miles wide, and encompasses over 4,390 acres.

Vegetation in the oil field area varies from riparian in the immediate vicinity of the Salinas River, to grassland, chaparral, and oak woodland in the hills and uplands, although much of the vegetation has been removed in the central area of active operations. Land immediately north of the oil field in the Salinas River Valley is agricultural, while other adjacent land, which is mostly hilly, is predominantly used for livestock grazing.

Since the oil is heavy crude, getting it to flow to production wells can result in logistical challenges. Various enhanced recovery technologies developed during the 1960s and 1970s have been utilized at the San Ardo Field to address these challenges. Steam flooding has been the overall technology of choice in the San Ardo Field; injection wells force steam into the ground to heat up the crude and decrease its viscosity, and if properly placed, can push the oil to nearby production wells. Steam flooding has been used in both the Aurignac and Lombardi sands since 1966-1967; and the peak production from the field was in 1967, the first year in which both productive units were subject to steam flooding.

A natural gas pipeline serves the existing gas pipeline serves existing 38 and 40 MW cogeneration plants on the San Ardo Field. The additional capacity of this pipeline is

unknown to staff and may need to be expanded to address the additional natural gas demands of a 600 MW power plant. In additional to providing power, the cogeneration facilities provide steam for the steam flooding process. It is staff's understanding that the oil fields need additional steam for oil extraction. The proposed 600 MW combined-cycle power plant could be designed to provide steam for both the STG and the oil fields. The Pacific Gas and Electric San Ardo Substation is located adjacent to the San Ardo Fields and would be the logical connection point for this alternative site. A new 26-mile transmission line would be required to connect to the PG&E 230 kV transmission line leading into the California transmission line backbone at the Gates Substation.

As compared to the proposed site, Energy Commission Staff Alternative Site A would require a significantly longer transmission line connection to California transmission line backbone along an undisturbed right-of-way. Although potable water service pipelines should be available close to Energy Commission Staff Alternative Site A, it is unclear as to the availability of raw water for the industrial uses of a 600 MW power plant. This alternative site is a similar distance to a potential tie-in with PG&E's natural gas transmission line as the proposed project, yet it is uncertain if the existing line has the capacity for a large gas-fired power plant. The closest noise receptors are approximately 0.8 miles closer at this site as compared to the proposed site. The distance to public schools would be only 0.3 miles closer than the proposed site, yet the overall distance of 6.2 miles, the intervening oil fields, and adjacent location of Highway 101 eliminate impacts to schools as a significant concern. Energy Commission Staff Alternative Site A is more visible from Highway 101 than the proposed project is from Interstate 5. Visual screening of the facility or minor relocation using existing screening may be feasible at this location, possibly mitigating or minimizing the visual impacts. In addition, the heavy industrial nature of the San Ardo Oil Fields and the existing smaller cogeneration facilities reduce the visual sensitivity of this alternative site. Land use zoning would be similar to the proposed project site. Overall, the biological, cultural resources, and visual resource impacts of Energy Commission Staff Alternative Site A could be greater than the proposed project, primarily due to the construction of a new transmission line on an undisturbed right-of-way. In addition, the applicant does not have site control at this proposed location and future expansion of the oil field could impact the availability of buildable acreage.

Alternatives Table 1 compares the approximate lengths of linears (transmission line, gas pipeline, water and sewer lines) required for the proposed project and the three alternative sites retained for consideration. Staff did not include the detention basin redesign or the smaller power plant alternative in this table as they would have the same linears as the proposed project.

Alternatives Table 2 shows whether impacts of the alternatives are less than, similar to, or greater than for the Avenal Energy site.

Alternatives Table 1
Comparison of Approximate Length of Linears/Distance to Receptors (miles)

	Avenal Energy Site	Avenal Power Alternative Site A	Avenal Power Alternative Site B	Staff Alternative Site A
Transmission Line Length	6.4 miles	5.4 miles	1.7 miles	26 miles
Gas Pipeline Length	2.5 miles	0.5 miles	5.5 miles	2-3 miles
Raw Water Connections	Adjacent	2.2 miles	5.8 miles	1-2 miles
Potable Water Connections	0.75 miles	Adjacent	Adjacent	2 miles
Distance to Sensitive Receptors	1.3 miles	0.5 miles	0.5 miles	0.5 miles
Distance to Schools	6.5 miles	5.1 miles	9.0 miles	6.2 miles

Alternatives Table 2
Comparison of Impacts of Alternatives to the Proposed Avenal Energy*

Issue Area	Avenal Power Alternative Site A	Avenal Power Alternative Site B	Detention Basin Redesign	Staff Alternative Site A	Staff Alternative B - 300 MW Project
Environmental Assessment					
Air Quality	Similar to proposed site	Similar to proposed site	Similar to proposed project	Similar to proposed site	Less than proposed project
Biological Resources	Less than proposed site	Less than proposed site	Less than proposed project	Greater than proposed site	Similar to proposed project
Cultural Resources	Similar to proposed site	Similar to proposed site	Similar to proposed project	Greater than proposed site	Similar to proposed project
Hazardous Materials	Similar to proposed site	Similar to proposed site	Similar to proposed project	Similar to proposed site	Similar to proposed project
Land Use	Similar to proposed site	Greater than proposed site	Similar to proposed project	Similar to proposed site	Similar to proposed project
Noise and Vibration	Greater than proposed site	Greater than proposed site	Similar to proposed project	Similar to proposed site	Similar to proposed project
Public Health	Similar to proposed site	Similar to proposed site	Similar to proposed project	Similar to proposed site	Similar to proposed project
Socio-economic Resources	Similar to proposed site	Similar to proposed site	Similar to proposed project	Similar to proposed site	Similar to proposed project
Soil and Water Resources	Similar to proposed site	Similar to proposed site	Similar to proposed project	Similar to proposed site	Similar to proposed project
Traffic and Transportation	Similar to proposed site	Similar to proposed site	Similar to proposed project	Similar to proposed site	Similar to proposed project
Visual Resources	Greater than proposed site	Greater than proposed site	Similar to proposed project	Greater than proposed site	Similar to proposed project
Waste Management	Similar to proposed site	Similar to proposed site	Similar to proposed project	Similar to proposed site	Similar to proposed project
Worker Safety	Similar to proposed site	Similar to proposed site	Similar to proposed project	Similar to proposed site	Similar to proposed project
Engineering Assessment					
Geology, Mineral Resources, and Paleontology	Similar to proposed site	Similar to proposed site	Similar to proposed project	Similar to proposed site	Similar to proposed project
Transmission System Engineering	Similar to proposed site	Similar to proposed site	Similar to proposed project	Greater than proposed site	Similar to proposed project

*Shaded cells identify impacts greater or less than the proposed project

ENERGY COMMISSION STAFF ALTERNATIVE B - SMALLER POWER PLANT PROJECT

In the review of the public comments received on the Preliminary Staff Assessment for the proposed Avenal Energy project, staff identified a concern over the size of the proposed project and the potential to reduce air quality impacts to residents in the city of Avenal, Kettleman City, and city of Huron areas.

The proposed project would consist of two natural gas-fired combustion turbines with inlet-air mechanical chillers, each generating approximately 172 MW of gross power at 101°F ambient temperature. All of the steam exiting the two heat recovery steam generators (HRSGs) would be directed to the one steam turbine generator (STG), which would generate approximately 291 MW of gross power duct burners in service. Under these conditions, the power plant would produce approximately 636 MW of gross power, however for the purposes of analyzing the smaller power plant project, staff has used the net output of 600 MW (project operating with both inlet air chillers and duct burners) as the standard.

The smaller power plant project alternative is based on the construction of just one GE 7FA 180 MW natural gas-fired combustion turbine with inlet air chilling and an appropriately sized STG with duct burners. The efficiency of operating two combustion turbines into one STG is approximately equal to operating one combustion turbine into a proportionally smaller STG. This translates into a 300 MW power plant with approximately half the air quality emissions of the proposed 600 MW project (**Alternatives Table 3**).

Alternatives Table 3
Avenal, Short-Term Emissions Rates Comparison (pounds per hour [lb/hr])

Source	NOx	VOC	PM10/ PM2.5	CO	SOx
One Combustion Turbine (maximum lb/hr with duct firing)	17.20	5.89	11.78	10.60	6.65
Two Combustion Turbines (maximum lb/hr with duct firing)	34.40	11.78	23.56	11.20	13.30

Although some air quality benefits could be derived from dividing the delivery of 600 MW into two widely separated projects, the environmental impacts in other areas would not be greatly reduced. The acreage needed to place the 300 MW project and the associated facilities would be considerably greater than half of the 34 acres of the proposed Avenal Energy. The visual resource impacts would also be very similar to the full project. As discussed in this section, the continued population growth and energy demands per household in California continue to require additional generation capacity throughout the state. Although distributive generation can minimize the costs and environmental impacts of transmission systems, the encroachment of sensitive receptors into former industrial areas and expansion of population centers has made siting power generation facilities near the load centers more challenging. Until these

issues are addressed through conservation or the development of renewable energy, it is likely that additional large-scale centralized nature gas-fired power generation facilities will be proposed in California. Although the goal of California is to increase the percentage of power generation from renewable sources, the downsizing of the proposed Avenal Energy to 300 MW or less will likely just postpone the necessary construction of additional load-following generation along the same transmission line system until the intermittent nature of renewable power generation is addressed. In addition, the cost of developing the power generation and transmission infrastructure at multiple sites could significantly increase the development cost per MW.

Finding no evidence that the reduction of the permitted capacity from 600 MW to 300 MW would alleviate an otherwise unmitigated air quality or public health impact, staff has determined that the 300 MW alternative is not environmentally superior to the proposed project.

REDESIGN OF DETENTION BASIN

In the review of the proposed Avenal Energy, staff determined that the 148-acre proposed project site was environmentally superior to the alternatives identified, yet the applicant's originally proposed layout of project facilities within that larger parcel conflicted with species protection measures required by the USFWS. To address this issue, staff determined that the environmentally superior alternative to the originally proposed project would be a minor realignment of the detention basin on the 148-acre parcel controlled by the applicant. To assist the resource agencies and the applicant in finding a solution to this issue, staff proposed Energy Commission Staff Modification (Staff Modification), shown in **Alternatives Figure 2**. The alignment of the detention basin shown in **Alternatives Figure 2**, in addition to wildlife-passable fencing, allowed wildlife passage on either side of the water treatment facility. The staff proposed location of the basin was generally located on the same topographic elevation relative to the power block as the applicant's proposed location. Staff's proposed relocation of the basin addressed both the USFWS staff requirement to maintain a 300-foot buffer zone from the applicant's property line and staff's concern over funneling wildlife into the open and unvegetated area between the water treatment plant and the canal. The applicant has subsequently agreed to provide the 300-foot setback requested by Energy Commission, California Department of Fish and Game, and United States Fish and Wildlife Service staff, addressing the biological resource concern. The setback is important to preserve a larger area for foraging and movement for San Joaquin kit fox and other species such as the Tulare grasshopper mouse (*Onychomys torridus tularensis*) and the San Joaquin pocket mouse (*Perognathus inornatus inornatus*) (Avenal Power 2008a, CNDDB 2008). Energy Commission staff has proposed Condition of Certification **BIO-7** to address this setback. Although the change in the project design eliminates the need for this alternative, the discussion has been retained for background on this issue.

CONSERVATION AND DEMAND SIDE MANAGEMENT

One alternative to meeting California's electricity demand with new generation is to reduce that demand for electricity. Such "demand side" measures include programs that increase energy efficiency, reduce electricity use, or shift electricity use away from "peak" hours of demand.

In California there is a considerable array of demand side programs. At the federal level, the Department of Energy adopts national standards for appliance efficiency and building standards to reduce the use of energy in federal buildings and at military bases.

At the state level, the Energy Commission adopts comprehensive energy efficiency standards for most buildings, appliance standards for specific items not subject to federal appliance standards, and load management standards. The Energy Commission also provides grants for energy efficiency development through the Public Interest Energy Research (PIER) program.

The California Public Utilities Commission, along with the Energy Commission, oversees investor-owned utility demand side management programs financed by the utilities and its ratepayers. At the local level, many municipal utilities administer demand side management and energy conservation programs. These include subsidies for the replacement of older appliances through rebates, building weatherization programs, and peak load management programs. In addition, several local governments have adopted building standards which exceed the state standards for building efficiency, or have by ordinance set retrofit energy efficiency requirements for older buildings. New buildings may combine the need for heat and power through a single fuel source or a common source may supply heating and/or heating and cooling to a number of adjacent buildings, increasing overall efficiency.

Even with this great variety of federal, state, and local demand side management programs, the state's electricity use is still increasing as a result of population growth and business expansion. Current demand side programs are not sufficient to satisfy future electricity needs, nor is it likely that even much more aggressive demand side programs could accomplish this at the economic and population growth rates of the last ten years.

Therefore, although it is likely that federal, state, and local demand side programs will receive even greater emphasis in the future, both new generation and new transmission facilities will be needed in the immediate future and beyond in order to maintain adequate supplies.

RENEWABLE RESOURCES

Staff compared various alternative technologies with the proposed project, scaled to meet the project's objectives. Technologies examined were those principal electricity generation technologies which do not burn fossil fuels such as natural gas: solar, wind, and biomass. There are no geothermal resources in the project vicinity, making this technology an infeasible alternative to Avenal Energy. Hydroelectric power also does not require burning fossil fuels. In addition to the lack of water sources for hydroelectric power in the project area, this power source can cause significant environmental impacts primarily due to the inundation of many acres of potentially valuable habitat and the interference with fish movements during their life cycle. It is unlikely that new hydropower facilities could be developed and permitted in California within the next several years.

Both solar and wind generation can be credited with an absence or reduction in air pollutant emissions and need for related controls, and visible plumes. In the case of

biomass, however, emissions can be substantially greater. Solar and wind resources would require large land areas in order to generate 600 MW of electricity. Specifically, central receiver solar thermal projects ideally require approximately 5 acres per MW; 600 MW would require approximately 3000 acres, or 50 to 100 times the amount of land area taken by the proposed Avenal Energy. Parabolic trough solar thermal technology ideally requires similar acreage per MW. Photovoltaic (PV) arrays mounted on buildings generally require about 4 acres per MW. To generate 600 MW using PV panels, about 2400 acres would be needed in an environmental with high solar energy value. Considerable more acreage could be required in the project area due to atmospheric cover. Wind generation "farms" generally require about 4.5 acres per MW; about 2700 acres would be needed to generate 600 MW in an ideal environment for wind power. However, the project area is not located in a prime wind power location and an alternative site on the ridgelines to the west would be more efficient in taking full advantage of wind resources per acre impacted. Although staff also considers the efficient use of land resources, the primary concern is the specific environmental and socioeconomic impacts related to the conversion of large areas of listed species habitat or prime farmland to power production. The need for extensive acreage would also add to the complexities of local discretionary actions for land use modifications. Although there is acreage in the project area, and specifically some limited acreage that offers the specific needs of these renewable resources, the land use impacts, potential for biological impacts to listed species, and loss of agricultural land could be significant impacts.

To avoid the land use zoning inconsistencies and potential impacts to listed species habitat, staff examined the potential for renewable energy development on the proposed project site. Since the actual footprint of the proposed project is only 34.8 acres and would produce only minimal amounts of renewable energy, staff considered the development of the entire 148-acre site owned by the applicant. Even assuming ideal renewable power generation conditions and not accounting for space required by the support infrastructure, the 148-acre site would only produce between 29 and 37 MW of renewable energy. A more realistic output from solar renewable projects at the proposed site would be between 20 and 25 MW. In addition, the permanent conversion of the entire 148-acre parcel to industrial use would significantly increase both the biological impacts and loss of prime farmland over the proposed project's conversion of only 34.8 acres. In essence, this translates into over four times the area impacted while only producing 1/30th the power. While there would not be visible plumes, other visual impacts of the large solar arrays and windfarm generators must be considered.

While current biomass facilities usually use wood chips or other sources from agricultural operations, several companies are developing technologies that would focus on "gasification combustion" to meet the low emission standards mandated by the state. Even if these technologies are developed in the future that address the smoke stack emissions of biomass facilities, these projects still produce a level of mobile source emissions from the delivery and processing of the fuel sources. However, traditional biomass plants are typically sized to generate less than 20 megawatts, which is far less than the capacity of the proposed 600-MW Avenal Energy. In order to generate 600 MW, thirty 20 MW biomass facilities would be required. A traditional biomass facility would require significantly more land than needed for Avenal Energy and several thousand acres could be required for the feedstock. If new biomass technology is

developed in the near future, increased energy production could come from landfills in the area, limiting the necessary power from base-load power plants.

Looking outside the Avenal area, the development uncertainties and the potential for impacts at remote resource areas are significant constraints. Furthermore, because alternative generation technologies may not be available on demand, they do not provide the capability to quickly respond to increases in regional demands. Consequently, staff does not believe that geothermal, hydroelectric, solar, wind or biomass technologies present feasible alternatives to the proposed project.

THE "NO PROJECT" ALTERNATIVE

The "no project" alternative under CEQA assumes that the project is not constructed. In the CEQA analysis, the "no project" alternative is compared to the proposed project and determined to be superior, equivalent, or inferior to it. The CEQA Guidelines state that "the purpose of describing and analyzing a No Project Alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project" (Cal. Code Regs., tit. §15126.6(i)). Toward that end, the "no project" analysis considers "existing conditions" and "what would be reasonably expected to occur in the foreseeable future if the project were not approved…" (§15126.6(e)(2)). CEQA Guidelines and Energy Commission regulations require consideration of the "no project" alternative. The no-action alternative provides a baseline against which the effects of the proposed action may be compared. In short, the site-specific and direct impacts associated with the power plant would not occur at this site if the project does not go forward.

If the "no project" alternative were selected, the construction and operational impacts to biological resources and prime farmland from the proposed Avenal Energy would not occur. Staff has proposed mitigation in the **LAND USE** and **BIOLOGICAL RESOURCES** sections of this staff analysis to reduce potential impacts to biological resources and prime farmland to a less than significant level. In the absence of Avenal Energy, however, Avenal Power or another power company would likely propose that other power plants be constructed along the PG&E transmission system to serve the demand that could be met with Avenal Energy.

If the project is not built, the state will not benefit from the relatively efficient source of 600 MW of new generation that this facility would provide. This new generation would increase the supply of energy and potentially decrease energy costs due to competition. While the State of California works to increase the energy available from renewable energy sources, the availability of newer and more efficient natural gas-fired generation could result in the displacement of older less efficient facilities with relatively higher environmental impacts. Another benefit of Avenal Energy is that it could serve load demands in northern, central and southern California. With these issues and the growing population and increased energy demands per household in California, it is difficult to conclude that "no project" would or would not have serious, long-term consequences on air quality and the cost or reliability of electricity in the region.

RESPONSE TO APPLICANT, INTERVENOR AND PUBLIC COMMENTS

On March 4, 2009, staff received a comment on the Alternatives analysis from the applicant on proposed redesign of the detention pond. Although the issue of the detention pond location has been resolved, staff has retained the basic discuss with the Generation Technology Alternatives above to provide clarification on the process and background for staff's responses to the applicant's comment on the PSA. Staff also received comments from the Center on Race, Poverty, and the Environment (CRPE) regarding alternatives to Avenal Energy. The March 11, 2009 letter from CRPE expresses concerns on the proposed project and requesting that the Energy Commission deny the license.

Comment 1: Avenal Power (03/04/09). "In various locations, the Alternatives section addresses the issue of the setback distance from the USBR ROW, and an alternative project design that would move the project's storm water evaporation/percolation basin from its planned location to allow for a 300-foot setback (p. 6-1, 6-4, 6-5, 6-8, and 6-14). As discussed during the February 18, 2009 workshop, the Applicant has agreed to the 300-foot setback measured from the USBR ROW. A revised project layout to accommodate the 300-foot setback is included with the Applicant's comments to the PSA. With the 300-foot setback resolved, it is the Applicant's opinion is that all of the references to this alternative and the setback issue are superfluous in the Alternatives section and can be deleted."

Response: As discussed above and in the Biological Resources section of this document, the issue of the setback from the San Luis Canal has been resolved with Avenal Power's agreement to redesign the detention pond system.

Comment 2: CRPE (03/11/09). "The CEC must foster meaningful public participation and informed decision making in deciding the range of feasible alternatives to be discussed in the EIR. Cal. Code Regs., tit. 14, § 15126.6(f). The CEC can only eliminate alternatives from detailed consideration in the EIR for "(i) failure to meet most of the basic project objectives, (ii) infeasibility, or (iii) inability to avoid significant environmental impacts." Cal. Code Regs., tit. 14, § 15126.6(c). Here, the CEC eliminated alternative technologies such as solar and wind from detailed consideration because these facilities would take up more acreage than a conventional gas-fired power plant. In addition, the CEC confined the geographic area for site alternatives to the industrial zoned area in the city of Avenal. Both of these actions precluded a reasonable range of alternatives from being analyzed and considered."

Response: As stated on page 6-13 of the Preliminary Staff Assessment (PSA), Staff has provided additional clarification on the inability to avoid significant environmental impacts related to large-scale renewable energy projects in the proposed project area.

In response to the concern that staff confined the geographic area to the industrial zoned area in the city of Avenal, Avenal Energy Alternative Site B is outside the city of Avenal industrial zone in Fresno County. Furthermore, the potential siting of power plants outside areas zoned for heavy industry has been a primary concern of several environmental justice organizations in the State of California (i.e.; Environmental Health Coalition comments on the Chula Vista Energy Upgrade Project). In addition, the city of Avenal was required to analyze the impacts to sensitive receptors from the creation of a heavy industrial zone as part of the 1992 Environmental Impact Report for General Plan Update.

Nonetheless, staff understands the concern raised by CRPE on confining the geographic area for site alternatives and has analyzed the potential for siting the proposed project outside the San Joaquin Air Basin as Energy Commission Staff Alternative A.

Comment 3: CRPE (03/11/09). "The CEC can eliminate infeasible alternatives from detailed consideration in the EIR. Cal. Code Regs., tit. 14, § 15126.6(c). However, "if the agency finds certain alternatives to be infeasible, its analysis must explain in meaningful detail the reasons and facts supporting that conclusion." Marin Municipal Water District v. KG Land Cal. Corp., 235 Cal. App. 3d 1652, 1664 (1991). Here, the County excluded the alternative energy projects from detailed analysis because these projects would require additional acreage than the proposed project. This is insufficient to support a finding of infeasibility. Feasible means "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors." Pub. Res. Code § 21061.1. In finding infeasibility, the CEC relied upon the mistaken assumption that an alternative project must have the same capacity or output as the proposed project. However, a 600 megawatt capacity is not included in the project objectives and, therefore, the CEC cannot eliminate alternative energy projects solely because the energy output would be reduced. The CEC should consider the feasibility of a smaller capacity solar or wind facility at the proposed location."

Response: In both the Project Description (p. 3-1) and the Alternatives section (p. 6-4) of the PSA, staff outlined the basic objectives of the project as: To construct and operate a cost-effective, environmentally sound, and efficient nominal 600 MW, natural-gas-fired merchant generating facility to serve California's energy market; to minimize or eliminate the length of any project linears, including gas and water supply lines, discharge lines, and transmission interconnections; to deliver electricity to the PG&E Gates Substation; and to develop a site consistent with community planning and existing zoning at a location that is supported by the local community.

Nonetheless, staff understands the concern raised by CRPE on the potential for siting a smaller facility and has analyzed the potential impacts of a smaller facility as Energy Commission Staff Alternative B. In addition, staff has revised the project objectives in this FSA to expand the area along the California transmission line backbone, remove the reference to nature gas as the energy source for the facility, and 600 MW as a basic power generation objective of the project.

Comment 4: CRPE (03/11/09). "The requirement to set forth project alternatives in the EIR "is crucial to CEQA's substantive mandate that avoidable significant environmental damage be substantially lessened or avoided where feasible." Michael H. Remy, et. al, Guide to the California Environmental Quality Act 431 (10th ed. 1999) (citations omitted). The County alleges that project impacts would not be reduced if the project was located in a different location within the County. However, this is just not the case. Project impacts on air quality, traffic and public health would be reduced if the project was sited in a different location.

The CEC should have considered alternative locations outside of the severely impaired San Joaquin Air Basin. Instead, the CEC limited itself to alternative locations within a mile or two of the proposed site. These alternatives will do virtually nothing to reduce impacts to the three nearby communities, which already face an inequitable distribution of polluting industries surrounding them. There is no reason why the CEC must limit itself to alternative locations within the same area, especially if the project serves a regional, rather than a local purpose. CEQA Guidelines §

15126(f)(1) (While jurisdictional boundaries are a factor which can be considered in finding infeasibility, "projects with a regionally significant impact should consider the regional context.").This is especially true given that the energy needs to be met by the plant are unlikely to originate in the region but instead will come from the urban areas in Northern and Southern California. The County does not have sufficient justification for failing to consider alternative locations outside the region. The [functionally equivalent document] should be set aside until the CEC examines other locations."

Response: As addressed in detail in the Air Quality section of this document, the proposed project would not result in significant air quality related impacts to the city of Avenal, Kettleman City, or the City of Huron.

Nonetheless, staff understands the concern raised by CRPE on confining the geographic area for site alternatives and has analyzed the potential for siting the proposed project outside the San Joaquin Air Basin as Energy Commission Staff Alternative A.

CONCLUSIONS AND RECOMMENDATION

As determined by Energy Commission staff in the **BIOLOGICAL RESOURCES** section of this staff analysis, the site provides limited habitat for protected wildlife species such as the state threatened and federal endangered San Joaquin kit fox (*Vulpes macrotis mutica*) and state threatened Swainson's hawk (*Buteo swainsoni*), other sensitive species such as the Tulare grasshopper mouse (*Onychomys torridus tularensis*) and the San Joaquin pocket mouse (*Perognathus inornatus inornatus*), and there are movement corridors and foraging opportunities immediately adjacent to the site. Avenal Energy as originally proposed was inconsistent the USFWS protection measures for the San Joaquin kit fox. The applicant has subsequently agreed to provide the 300-foot setback requested by Energy Commission, California Department of Fish and Game, and United States Fish and Wildlife Service staff, addressing the biological resource concern. Energy Commission staff has proposed Condition of Certification **BIO-7** to address this setback. Avenal Power Alternative Site A and Avenal Power Alternative Site B are 1.5 and 2.0 miles from the San Luis Canal respectively and do not have the biologically sensitivity of the proposed site. Energy Commission Staff Alternative Site A is outside the range of the San Joaquin kit fox, however an AFC-level biological survey could uncover other biological concerns due to the proximity of the Salinas River and its associated riparian area. Although the applicant's proposed alternative sites reduce the impact to biological resources over the propose project, these impacts are replaced with new impacts to visual resources and land use. Given that the applicant has 148 acres on which to site the approximately 25 acre project and the biological impacts are related primarily to a small section of the project site adjacent to the San Luis Canal, staff recognizes that the impacts can be addressed on the proposed site controlled by the applicant.

Avenal Energy would result in the physical conversion of 34 acres of land that is designated as "Prime Farmland" by the California Department of Conservation. Since the project site, switch yard and storm water evaporative/percolation basin are currently being used for agricultural crops and have the required productive soil characteristics, staff has concluded that the project will have a significant adverse impact on agricultural

resources and recommends that mitigation of these potential impacts in Condition of Certification **LAND-2**. Avenal Power Alternative A has the same impact to prime farmland as the proposed project and would not decrease the potential for significant impacts. Avenal Power Alternative B not only has the same impacts to prime farmland as the propose project, but is located outside the area zoned for industrial development. In addition to requiring the same mitigation for farmland conversion, Avenal Power Alternative B would require rezoning from agricultural to industrial. The detention basin redesign alternative and the 300 MW alternative proposed by staff do not change the project location, resulting in the same land use impacts as the proposed project. Staff believes that the farmland conversion impacts are better mitigated as proposed in Condition of Certification **LAND-2** rather than by moving the project to an alternative site, such as grazing lands which could result in a potentially significant biological resources impact.

Although Energy Commission Staff Alternative Site A is located outside the San Joaquin Valley Air Basin, which is classified as an extreme nonattainment area for ozone and a serious nonattainment area for PM2.5, it is still located in the South Central Coast Air Basin which is designated as a non-attainment area for PM10 and is unclassified for PM2.5 due to lack of data. The heavy industrial nature of the San Ardo Oil Fields and the existing smaller cogeneration facilities reduce the visual sensitivity of this alternative site. Land use zoning would be similar to the proposed project site. Overall, the biological, cultural resources, and visual resource impacts of Energy Commission Staff Alternative Site A could be greater than the proposed project, primarily due to the construction of a new transmission line on an undisturbed right-of-way. In addition, the applicant does not have site control at this proposed location and future expansion of the oil field could impact the availability of buildable acreage. Although the installation of an underground 230 kV transmission line along the disturbed Highway 101 corridor, connecting into the existing 230 kV system from Morro Bay to the Gates Substation, could reduce many of the potential environmental impacts related to the overland transmission line analyzed for this alternative, the difficulties surrounding gaining access to large areas of Caltrans right-of-way and the cost issues of underground transmission raised questions about the feasibility of this alternative transmission line. Therefore, staff believes that this alternative has the potential for overall greater environmental impacts than the proposed project while not eliminating any unmitigated impacts of the proposed project.

Staff does not believe that alternative technologies (geothermal, solar, wind, biomass, hydroelectric) present feasible alternatives to the proposed project. Based on the analysis of alternative sites, the environmental impacts associated with proposed Avenal Energy site appear less than those for the other alternatives sites, provided that the proposed detention basin is redesigned as required by Condition of Certification **BIO-7**.

REFERENCES

AP 2008a – Avenal Power Center, LLC (tn 45416). Application for Certification for the Avenal Energy project, Volumes 1 and 2, dated February 13, 2008. Submitted to the CEC/Docket Unit on February 21, 2008.

AP 2008b – Avenal Power Center, LLC (tn 45792). Supplement to the Application for Certification for the Avenal Energy Project, dated March 27, 2008. Submitted to the CEC/Docket Unit on March 28, 2008.

AP 2008e – Avenal Power Center, LLC (tn 46779). Applicant's Response to Energy Commission Data Request Set 1, 1 through 74, dated June 20, 2008. Submitted to CEC/Docket Unit on June 20, 2008.

AP 2008f – Avenal Power Center, LLC (tn 48172). Applicant's Response to Energy Commission Data Request Set 2, 75 through 94, dated September 24, 2008. Submitted to CEC/Docket Unit on September 24, 2008.

AP 2008g – Avenal Power Center, LLC(tn 48373). Applicant's Response to September 8, 2008 USFWS Letter to U.S. EPA, dated October 1, 2008. Submitted to CEC/Docket Unit on October 3, 2008.

AP 2008h – Avenal Power Center, LLC (tn 48443). Supplemental Information Regarding a Buffer Along the San Luis Canal, dated October 6, 2008. Submitted to CEC/Docket Unit on October 7, 2008.

CEC 2008a – California Energy Commission (tn 46202). Issues Identification Report, dated May 8, 2008. Submitted to CEC/Docket Unit on October 30, 2008.

CEC 2008b – California Energy Commission (tn 2206). Transcript of the Informational Hearing and Site Visit, dated May 20, 2008. Submitted to CEC/Docket Unit on June 4, 2008.

CDFG 2008a – California Dept. of Fish and Game (tn 46503). Summary of March 18, 2008 Meeting with Avenal Power, dated May 27, 2008. Submitted to CEC/Docket Unit on May 30, 2008.

CRPE 2009a - Center on Race Poverty & the Environment/I. Brostrom (tn 50479). Center on Race, Poverty & the Environment's (CRPE) Comments Regarding Air Quailty Issues, dated March 11, 2009. Submitted to CEC/Docket Unit on March 12, 2009.

TRC 2008d – TRC/J. Stenger (tn 48111). System Impact Study – Response to Data Request Set 1, dated September 19, 2008. Submitted to CEC/Docket Unit on September 22, 2008.

TRC 2008e - TRC/J. Stenger (tn 47011). Response to CEC Staff's Workshop Data Request, dated July 11, 2008. Submitted to CEC/Docket Unit on July 11, 2008.

TRC 2008h - TRC/J. Srenger (tn 49097). System Impact Study Supplement, dated November 21, 2008. Submitted to CEC/Docket Unit on November 21, 2008.

TRC 2009c - TRC/J. Stenger (tn 50397). Applicant's Final Comments to the Preliminary Staff Assessment, dated March 4, 2009. Submitted to CEC/Docket Unit on March 5, 2009.

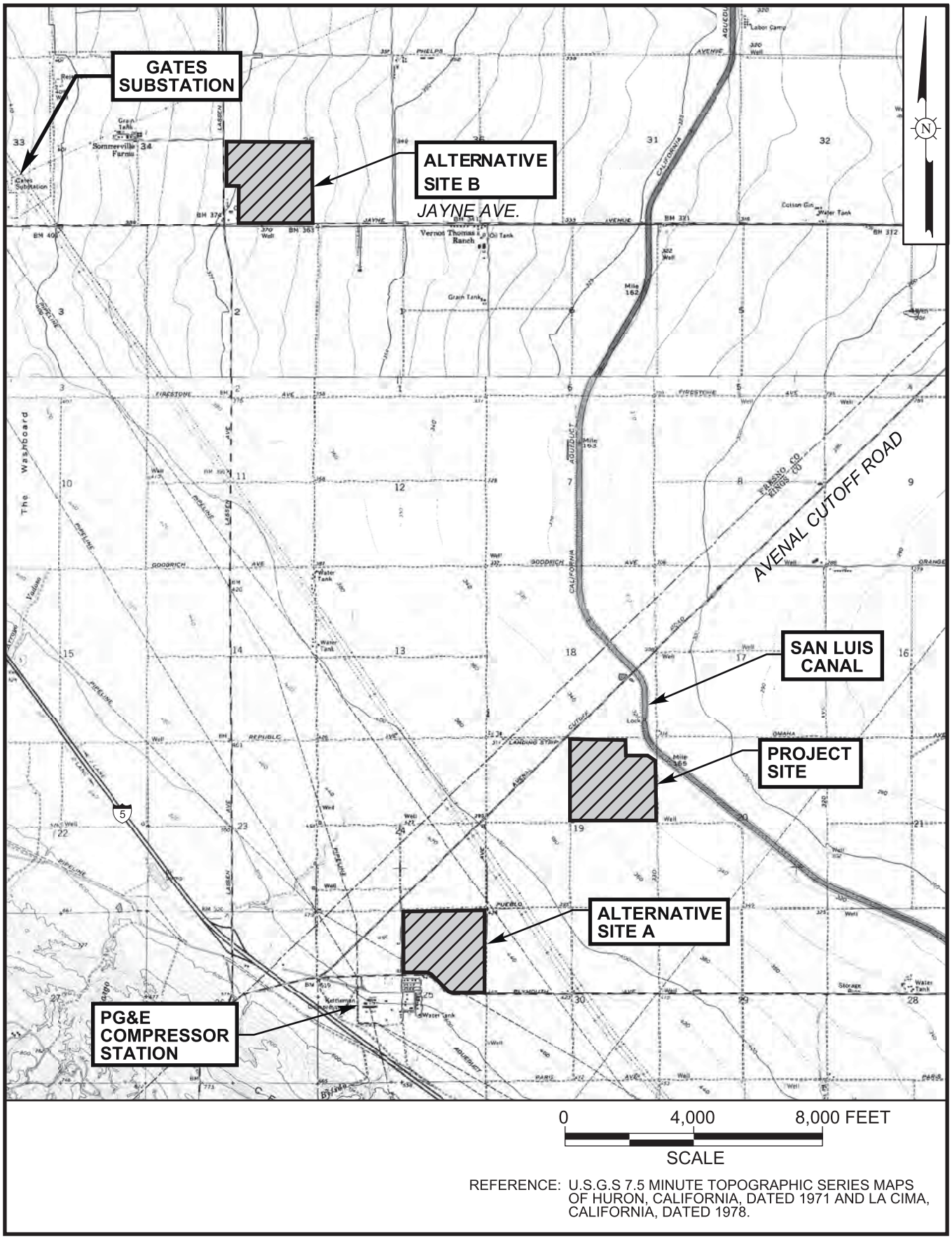
USFWS 2002a – U.S. Fish and Wildlife Service. USFWS Letter on Application for Avenal Cogeneration and Power Project, March 22, 2002.

USFWS 2008a – U.S. Fish and Wildlife Service (tn 45923). Letter Clarifying USFS's Requirements for the Avenal Power Plant, dated April 17, 2008. Submitted to CEC/Docket Unit on April 18, 2009.

USFWS 2008b – U.S. Fish and Wildlife Service. Letter to U.S. EPA on Section 7 Consultation on Avenal Energy, September 8, 2008.

ALTERNATIVES - FIGURE 1

Avenal Energy - Alternative Site Locations



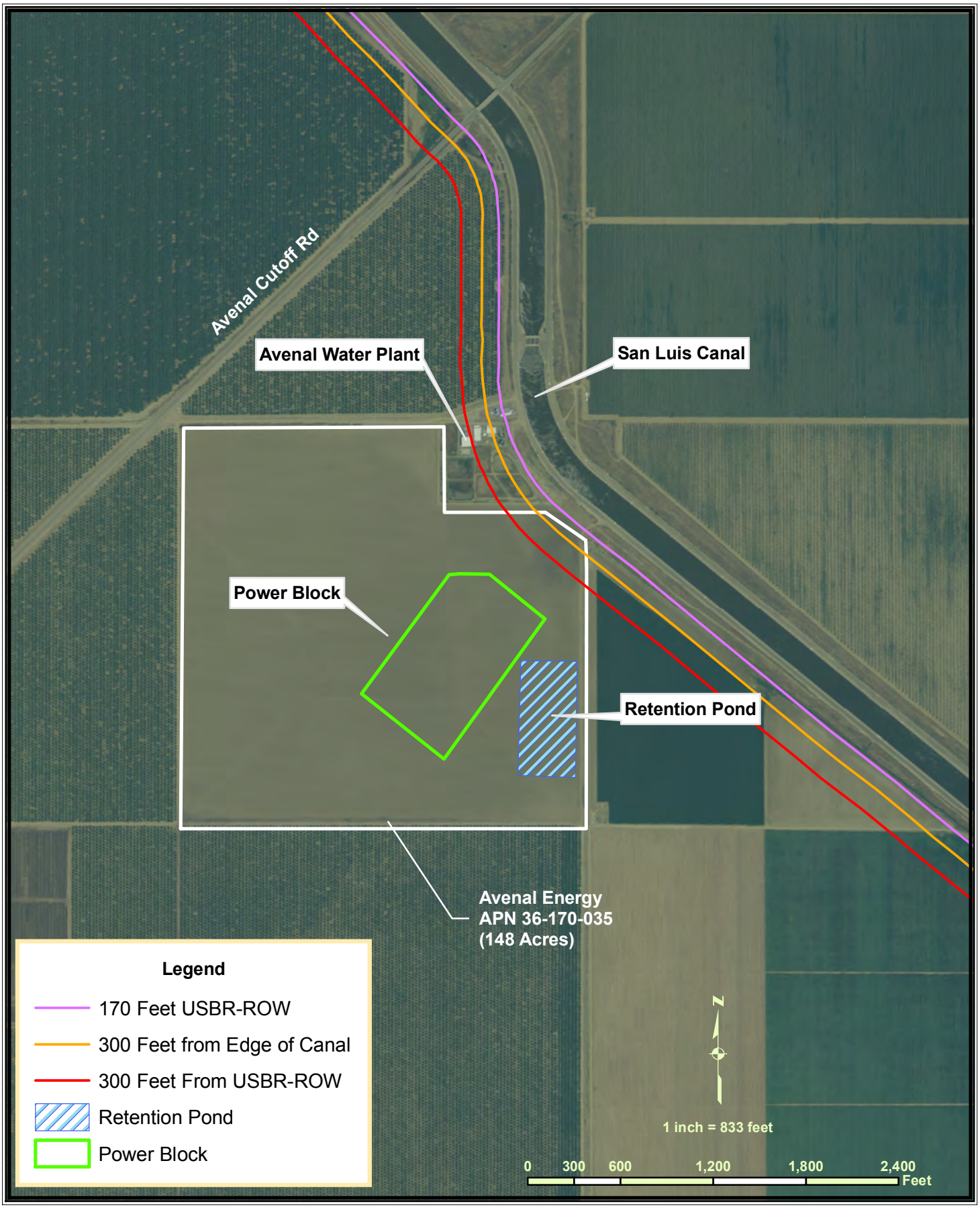
REFERENCE: U.S.G.S 7.5 MINUTE TOPOGRAPHIC SERIES MAPS OF HURON, CALIFORNIA, DATED 1971 AND LA CIMA, CALIFORNIA, DATED 1978.

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

SOURCE: AFC Figure 5.3-1

ALTERNATIVES - FIGURE 2

Avenal Energy - Staff Proposed Realignment of Retention Pond

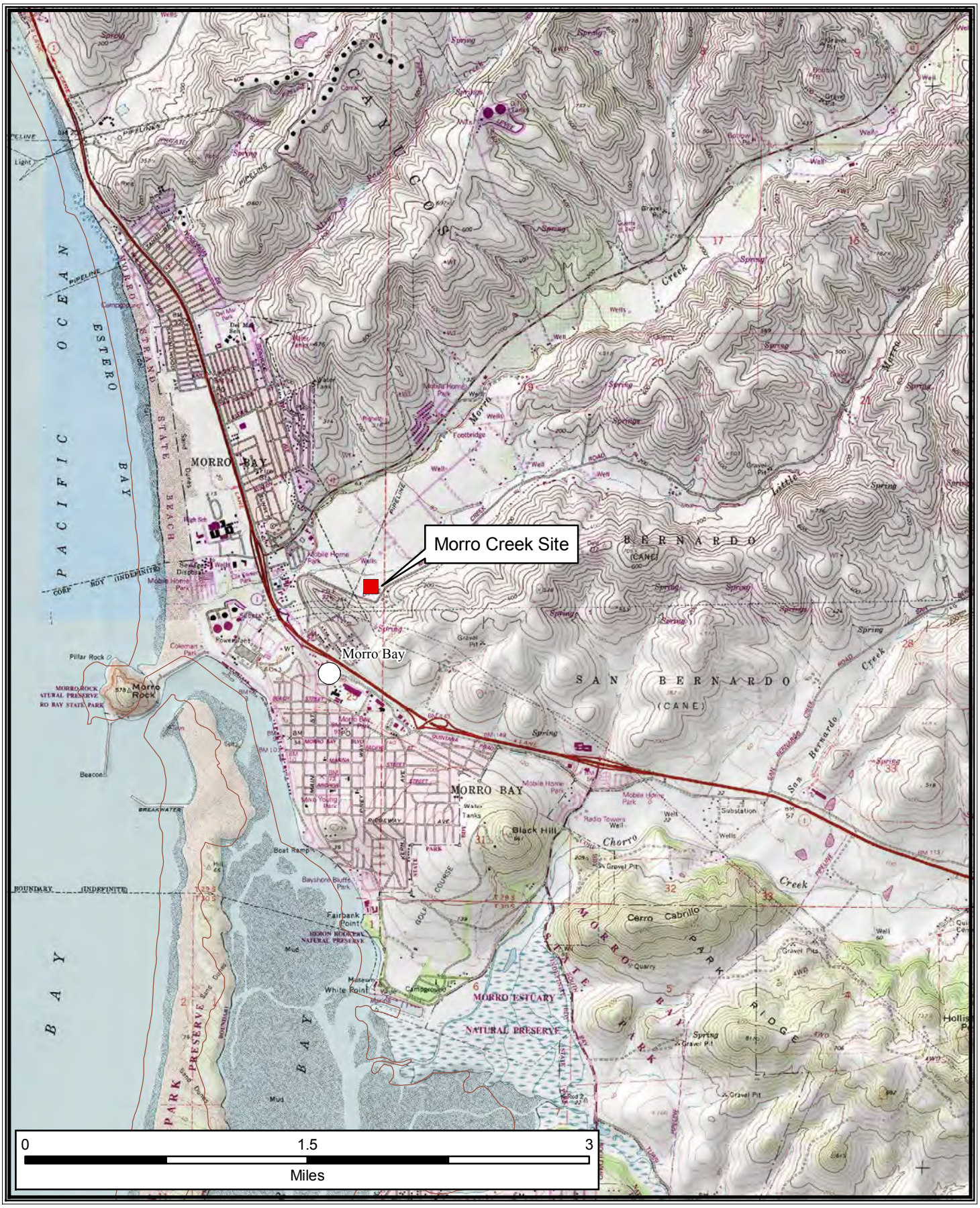


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2009

SOURCE: NAIP Background Image & Tele Atlas

ALTERNATIVES - FIGURE 3

Energy Commission Staff Morrow Creek Alternative Site

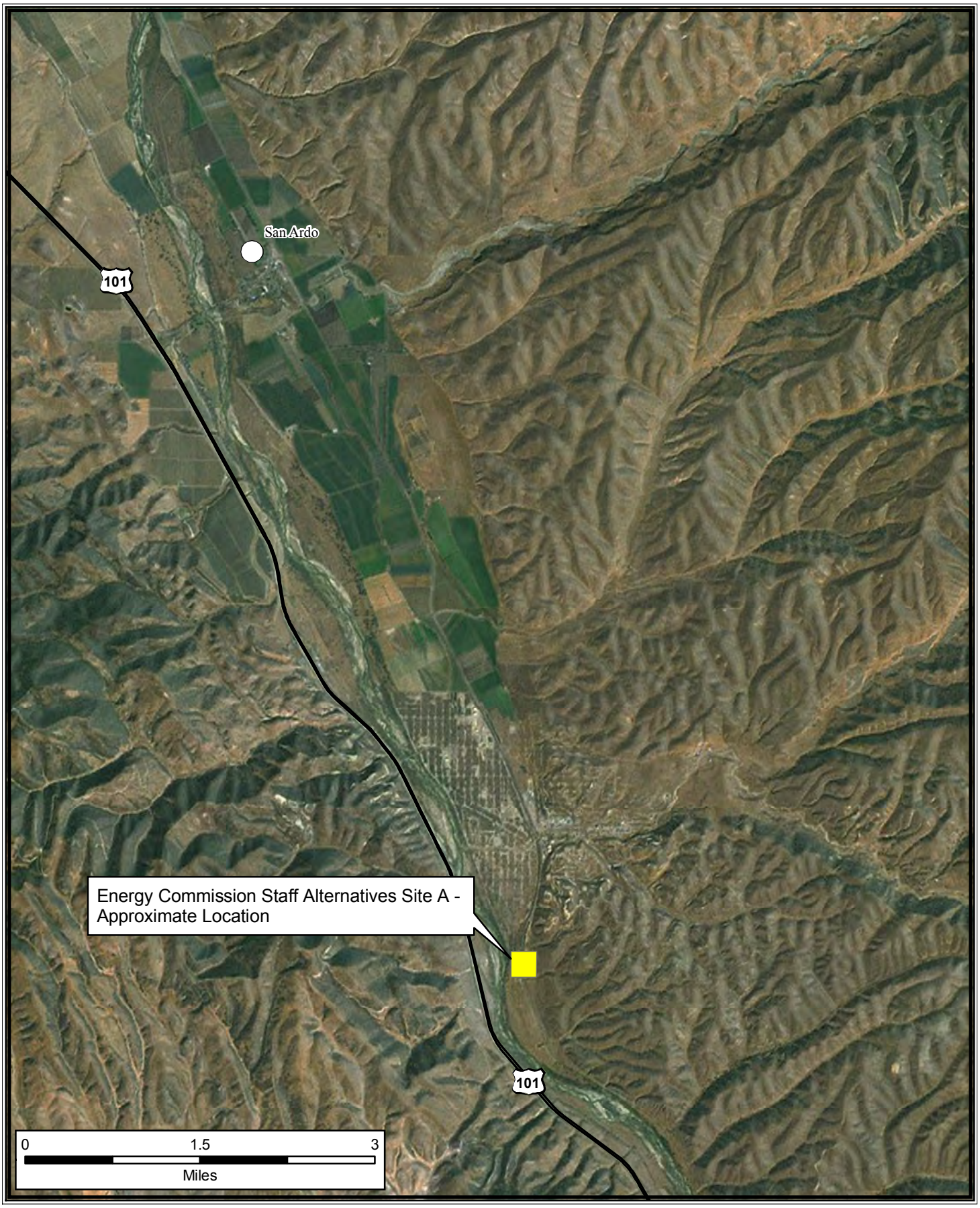


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2009

SOURCE: NAIP Background Image & Tele Atlas

ALTERNATIVES - FIGURE 4

Energy Commission Staff Alternatives Site A - Approximate Location



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

SOURCE: NAIP Background Image & Tele Atlas

GENERAL CONDITIONS
INCLUDING
COMPLIANCE MONITORING AND CLOSURE PLAN

Testimony of Steve Munro

INTRODUCTION

The project's General Compliance Conditions of Certification, including Compliance Monitoring and Closure Plan (Compliance Plan) have been established as required by Public Resources Code section 25532. The plan provides a means for assuring that the facility is constructed, operated and closed in compliance with public health and safety, environmental and other applicable regulations, guidelines, and conditions adopted or established by the California Energy Commission and specified in the written decision on the Application for Certification or otherwise required by law.

The Compliance Plan 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:

> **Compliance Project Manager**
> **(07-AFC-2C)**
> **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 (fully satisfied conditions do not need to be included in the matrix after they have been reported as completed);

4. A list of conditions that have been satisfied during the reporting period, and a description or reference to the actions that satisfied the condition;

5. A list of any submittal deadlines that were missed, accompanied by an explanation and an estimate of when the information will be provided;

6. A cumulative listing of any approved changes to conditions of certification;

7. A listing of any filings submitted to, or permits issued by, other governmental agencies during the month;

8. A projection of project compliance activities scheduled during the next two months. The project owner shall notify 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 Dockets Unit with an application for confidentiality pursuant to Title 20, California Code of Regulations, section 2505(a). Any information that is determined to be confidential shall be kept confidential as provided for in Title 20, California Code of Regulations, section 2501 et. seq.

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. The amount of the fee for FY2007-2008 was $17,676. The initial payment is due on the date the Energy Commission adopts the final decision. You will be notified of the amount due. All subsequent payments are due by July 1 of each year in which the facility retains its certification. The payment instrument shall be made payable to the

California Energy Commission and mailed to: Accounting Office MS-02, California Energy Commission, 1516 9th St., Sacramento, CA 95814.

Reporting of Complaints, Notices, and Citations (COMPLIANCE-10)

Prior to the start of construction, the project owner must send a letter to property owners living within one mile of the project notifying them of a telephone number to contact project representatives with questions, complaints or concerns. If the telephone is not staffed 24 hours per day, it shall include automatic answering with date and time stamp recording. All recorded complaints shall be responded to within 24 hours. The telephone number shall be posted at the project site and made easily visible to passersby during construction and operation. The telephone number shall be provided to 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 **insignificant project changes** 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 Modifications

Modifications that do not result in deletions or changes to conditions of certification, and that are compliant with laws, ordinances, regulations and standards may be authorized by the CPM as an insignificant project change pursuant to section 1769(a) (2). This process usually requires minimal time to complete, and it requires a 14-day public review of the Notice of Staff Approved Project Modification that includes staff's intention to approve the modification unless substantive objections are filed. These requests must also be submitted in the form of a "petition to amend" as described above.

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.

The Energy Commission has established a toll free compliance telephone number of **1-800-858-0784** for the public to contact the Energy Commission about power plant construction or operation-related questions, complaints or concerns.

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; and

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 Dockets Unit 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

AVENAL ENERGY PROJECT
PREPARATION TEAM

Executive Summary	Joseph Douglas
Introduction	Joseph Douglas
Project Description	Joseph Douglas
Air Quality	Brewster Birdsall, P.E., QEP
Biological Resources	Richard Anderson
Cultural Resources	Beverly E. Bastian
Hazardous Materials Management	Alvin J. Greenberg, Ph.D. and Rick Tyler
Land Use	David Flores
Noise and Vibration	Shahab Khoshmashrab
Public Health	Obed Odoemelam, Ph.D.
Socioeconomic Resources	Joseph Diamond, Ph.D.
Soils and Water Resources	Casey Weaver
Traffic and Transportation	James Adams
Transmission Line Safety and Nuisance	Obed Odoemelam, Ph.D.
Visual Resources	Mark R. Hamblin
Waste Management	Casey Weaver
Worker Safety and Fire Protection	Alvin J. Greenberg, Ph.D. and Rick Tyler
Facility Design	Steve Baker
Geology and Paleontology	Dal Hunter, Ph.D., C.E.G.
Power Plant Efficiency	Erin Bright
Power Plant Reliability	Erin Bright
Transmission System Engineering	Ajoy Guha, P.E. and Mark Hesters
Alternatives	Christopher Meyer
General Conditions	Steve Munro
Project Secretary	April Albright

DECLARATION OF
Joseph Douglas

I, Joseph Douglas declare as follows:

1. I am presently employed by the California Energy Commission in the Facilities Siting Office of the Energy Facilities Siting Division as Project Manager.

2. I prepared staff testimony for the Avenal Energy Project based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

3. The information in the project Description is correct, as the subject site will be owned by Avenal Power Center, LLC

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 20, 2009 Signed: Original signature in Dockets

At: Sacramento, California

Joseph Douglas

Experience

November 2008 – June 2009 *State of California, Energy Commission* *Sacramento, CA*

Siting, Transmission, and Environmental Protection Division

- Oversight of large power plant projects with state and federal involvement
- Writing and processing of environmental documents with specific time deadlines requirements
- Coordination with multiple agencies including: U.S. Fish and Wildlife Service, Army Corps of Engineers, EPA
- Partnership with local governments to inform the public
- Organized multi-functional teams to determine project impacts and transmission requirements
- Quality assurance and quality control for state and federal compliance of environmental regulations
- Participated in field studies to determine project impacts

March 2003 - October 2008 *State of California, Department of Transportation* *Oakland, CA*

Office of Environmental Analysis, Environmental Coordinator

- Oversight of large transportation projects with state and federal involvement
- Writing and processing of environmental documents with specific time deadlines requirements
- Coordination with multiple agencies including: Federal Highway Administration, U.S. Fish and Wildlife Service, Army Corps of Engineers, EPA, State Historic Officer, Homeland Security, California Highway Patrol
- Partnership with local governments to implement growth/environmental strategies
- Organized multi-functional teams to determine project cost, scope, risk, impacts, and benefits in order to meet funding and programming deadlines
- Participated in Value Analysis studies and made recommendations regarding least environmentally damaging alternative
- Establish purpose and need of project to justify benefits of future capital cost expenditures
- Quality assurance and quality control for state and federal compliance of environmental regulations
- Participated in field studies to determine project impacts

May 2000 – March 2003 *State of California, Department of Transportation* *Oakland, CA*

Right of Way Agent, Cost and Impact Estimation

- Determination of community impacts of large transportation projects
- Estimated costs, and time needed for acquisition of parcels, and relocation assistance
- Coordination with multiple disciplines within the Department including: engineering, survey, legal, and environmental to forecast cost
- Investigation of Assessors Parcel Numbers, Right of Way data maps, and property databases
- Research of city and county zoning codes, general plan, and property records
- Identified utility conflicts and estimated time and cost of relocation

Education

- University of South Florida – Tampa, Fl
- Graduated 1999
- B.S., Economics

Skills

- Map Reading:
  - Engineering Specs
  - Blue Prints
  - Assessor Parcel
- Data Processing:
  - Microsoft Word Versions 3.1 - current
- Spreadsheet::
  - Microsoft Excel

DECLARATION OF
James Brewster Birdsall

I, James Brewster Birdsall, declare as follows:

1. I am presently under contract with Aspen Environmental Group to provide environmental technical assistance to the California Energy Commission. Under Contract No. 700-05-002, I am serving as an Air Quality Specialist and Project Manager to provide Peak Workload Support for the Energy Facility Siting Program and for the Energy Planning Program.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the final staff testimony on Air Quality for the Avenal Energy Project based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 18, 2009 Signed: Original signature in Dockets
At: San Francisco, California

Aspen
Environmental Group

BREWSTER BIRDSALL, P.E., QEP
Senior Associate, Air Quality and Engineering

ACADEMIC BACKGROUND
M.S., Civil Engineering, Colorado State University, 1993
B.S., Mechanical Engineering, Lehigh University, 1991

PROFESSIONAL EXPERIENCE

Mr. Birdsall is an environmental scientist who specializes in air quality and noise analyses for land development related projects and air quality risk assessments. He has nine years of consulting experience with expertise in environmental impact assessment under the California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA), and the Clean Air Act. His focus is on air permitting, and air quality and noise-impact modeling, which includes field monitoring for traffic and other community noise sources.

Aspen Environmental Group — 2001 to present

Mr. Birdsall's project experience at Aspen includes the following:

Technical Studies for CEC Contract – Review of Power Plant AFCs. Mr. Birdsall assists the California Energy Commission (CEC) as a technical specialist by reviewing and providing testimony on Applications for Certification (AFC) for new power plants throughout California.

- **Tesla Power Plant.** Lead technical staff for air quality assessment and analyst of visible plumes for new 1,120 MW combined cycle power plant and 11-mile recycled water pipeline in rural eastern Alameda County near Tracy.
- **Inland Empire Energy Center.** Lead technical staff for air quality assessment for new 670 MW combined cycle power plant near Romoland in Riverside County.
- **Palomar Energy.** Lead technical staff for air quality assessment and supporting staff for cooling system studies for new 540 MW combined cycle power plant in northern San Diego County.
- **Kings River Conservation District Peaking Power Plant.** Lead technical staff for air quality assessment of new 97 MW simple cycle power plant in Fresno County.
- **Avenal Energy.** Lead technical staff for air quality assessment and analyst of visible plumes for large new combined cycle power plant near Avenal in Kings County.
- **Blythe Energy Project Phase II.** Lead technical staff for air quality assessment for new 520 MW combined cycle power plant and affiliated 118-mile transmission line, in the Mojave Desert and Coachella Valley of Riverside County.
- **Russell City Energy Center.** Lead technical staff for noise assessment of new 600 MW combined cycle power plant adjacent to shoreline recreational areas in Hayward.
- **Los Esteros Critical Energy Facility.** Lead technical staff for noise assessment and analyst of visible plumes for new 180 MW simple cycle power plant adjacent to recreational areas in San Jose.

- **Environmental Performance Report.** Technical review and editorial assistance for environmental portion of the first Integrated Energy Policy Report for the Governor and Legislature.
- **Air Quality Compliance.** Technical staff for analysis of modifications to permit conditions at the Moss Landing Power Plant. Prepared independent analysis of permit requirements and environmental consequences of increasing the capacity of the Midway-Sunset Cogeneration Project.
- **Alternative Cooling Technology Studies.** Supporting staff for analyses of dry cooling and hybrid cooling alternatives for the Cosumnes Power Plant and Palomar Energy Project. Coordinated and edited documentation from design engineers and other specialists.

For the **California Public Utilities Commission**:

- **San Onofre Nuclear Generating Station and Diablo Canyon Power Plant, Steam Generator Replacement Projects.** Currently serving as Deputy Project Manager for Environmental Impact Reports on the proposed improvements to these controversial nuclear power plants. Preparing certain administrative and technical portions of reports and coordinating the environmental documents with team of analysts.
- **Miguel-Mission 230 kV #2 Transmission Line.** Conducted the air quality and noise review for a system that would reduce transmission constraints between San Diego County and generators within the U.S. and Mexico. Provided oversight of the engineers studying impacts to traffic and transportation and the transmission system design.
- **Jefferson-Martin 230 kV Transmission Line.** Prepared air quality and noise studies for construction and operation of a 27-mile transmission line through urban and rural San Mateo County. The project is proposed to meet the projected electric demand in the Cities of Burlingame, Millbrae, San Bruno, South San Francisco, Brisbane, Colma, Daly City, and San Francisco.
- **Viejo System Transmission Project.** Prepared air quality, noise, and traffic analyses for construction of a controversial transmission improvement project in suburban south Orange County.
- **Looking Glass Networks Telecommunications Project.** Prepared the air quality and noise analyses for this Initial Study/Mitigated Negative Declaration (IS/MND) evaluating proposed fiber optic connections throughout the San Francisco Bay and Los Angeles areas, and developed programmatic mitigation measures for implementation of the metropolitan area network.

Presidio Trust, Presidio of San Francisco. Provided impact analysis for demolition, rehabilitation, and infill construction within the Public Health Service Hospital District, within the Golden Gate National Recreation Area and adjacent to sensitive San Francisco residences. Provided technical support and peer review of noise and vibration analyses related to the Doyle Drive Reconstruction through the Presidio of San Francisco. Involved protecting natural sounds consistent with National Park Service policy.

California State Lands Commission, Monterey Accelerated Research System Cabled Observatory. Providing technical analysis of air quality and noise effects of installing new underwater equipment in Monterey Bay. Supporting efforts of marine biologists with analysis of underwater noise.

California State Lands Commission, Concord-Sacramento Pipeline. Provided technical analysis of air quality and noise effects of constructing a new 20-inch, 70-mile petroleum products pipeline, including upgrades to storage tank facilities in Concord and distribution systems in West Sacramento.

California Department of Water Resources, Piru Creek Erosion Repairs and Bridge Seismic Retrofit Project. Provided assessment of air quality and noise impacts for construction of upgrades.

Ventura County Resource Conservation District, Casitas Springs *Arundo Donax* Removal Demonstration Project. Prepared estimates of community noise impacts and air quality assessment for cutting and removing non-native plants for improving flood control along the Ventura River.

Technical Support for U.S. Army Corps of Engineers. Analyzed construction noise and air quality effects and described applicability of general conformity rule for various flood control improvements in Arizona and Southern California.

Technical Support for Los Angeles Unified School District. Provided technical analysis of air quality and noise effects for school expansion, play area expansion, and temporary classroom projects, including reviews of cumulative, regional air quality consequences of temporary projects.

EIP Associates 1998 to 2001

As a Senior Environmental Scientist at **EIP Associates**, Mr. Birdsall performed comprehensive analyses of air quality and noise impacts for Environmental Impact Reports/Statements and independent studies. His projects at EIP included:

- **Bay Area Rapid Transit District, Oakland Airport Connector EIS/EIR.** Prepared noise impact evaluation and mitigation strategies. Conducted community noise monitoring and assessment according to Federal Transit Administration methodology.
- **Presidio Trust Implementation Plan EIS and Letterman Complex Supplemental EIS.** Prepared community noise impact assessment and traffic noise mitigation strategies. Air quality management policy consistency analysis. The plan was awarded the 2003 Outstanding Land Use Plan from the Association of Environmental Professionals.
- **San Francisco International Airport, Offshore Runway Construction Concepts, AGS Design Team.** Conducted preliminary environmental review of design and construction concepts for runway expansion. Prepared emission control strategies for general conformity rule.
- **Sacramento Metropolitan Airport Master Plan EIS/EIR, Sacramento County Department of Environmental Review and Assessment.** Baseline emission inventory and regulatory constraints.
- **Desert Resorts Regional Airport, Thermal, Riverside County.** Emission inventory and general conformity determination for runway extension and taxiway improvements.
- **San Joaquin Area Flood Control Agency, Stockton Areawide Flood Control Projects.** Reviewed emission inventories and retroactive general conformity rule applicability for construction activities.
- **Alameda County Flood Control and Water Conservation District, Zone 7, Altamont Water Treatment Plant EIR.** Analyzed air quality and community noise effects of three potential water plant sites in remote eastern Alameda County.
- **Santa Clara Valley Water District, Coyote Watershed, Lower Silver Creek Project.** Analyzed air quality and community noise effects for Initial Study/Environmental Assessment of constructing flood control improvements and habitat restoration.
- **University of California, Davis.** Prepared campuswide health risk assessment update, which included toxic air contaminant emission inventory and dispersion modeling using ISC.

- **University of California, Berkeley.** Prepared initial air quality and noise technical studies for Long Range Development Plan Update EIR and analyses for Northeast Quadrant Science and Safety Project (Stanley Hall replacement building) EIR.
- **Merced County, Draft University Community Plan.** Prepared air quality and noise background studies and policy discussion papers for the new Merced Campus of the University of California.
- **Allegro Jack London Square Project, SNK Development.** Provided expert testimony on the pile driving noise impacts to residents in a revitalized, high-density City of Oakland neighborhood. Conducted field surveys with City Staff and evaluated compliance with City noise ordinance.
- **Maranatha High School and Playing Fields Project, City of Sierra Madre.** Prepared the community noise technical study for a new private high school with outdoor amphitheater and athletic facilities. Characterized noise from events to determine impact level on sensitive residential community.
- **State Route 275 Modification Project, City of West Sacramento.** Prepared noise technical studies on the realignment of the State Route 275 Modification Project. Required assessment of new traffic noise impacts caused by rerouting traffic to grade level in close proximity of existing sensitive land uses and identification of feasible measures to insulate lodging uses.
- **City of Mountain View, Whisman Road Transit Oriented Development MND.** Deputy Project Manager for Negative Declaration related to high-density office development at the Middlefield-Ellis-Whisman Superfund Site. Prepared various technical sections, managed traffic subconsultant, and coordinated preparing the environmental documents with the city staff.

Trinity Consultants 1994 to 1998

Mr. Birdsall prepared compliance strategies, evaluated modeled impacts, and negotiated air permits while a Project Supervisor at **Trinity Consultants**, an environmental firm specializing in air quality.

- **Browning-Ferris Gas Services.** Coordinated nationwide Title V program implementation, secured numerous new source and operating permits, supported rollout of federal new source performance standards for municipal solid waste landfills and landfill gas to energy facilities.
- **Newmont Mining Joint Venture, Batu Hijau Project.** Environmental impact studies for open-pit metallic mineral mining facility and independent power production facility. Included noise assessment for "greenfield" power plant and air quality impacts evaluation in complex, coastal terrain.
- **Questar Pipeline, TransColorado Pipeline Project.** Secured new source permits for air quality effects related to construction and operation of major natural gas pipeline including compressor stations.
- **Coastal Field Services, Altamont Gas Plant.** Negotiated Title V operating permits for upstream natural gas processing plant and associated field compressor stations.
- **Solvay Soda Ash Joint Venture.** Developed particulate matter modeling protocol with State agency.
- **Potlatch Corporation.** Facilitywide emission inventory and permitting for a wood products plant. Included regionwide analyses of ambient air quality standards and resolving existing modeled violations.

NOISE IMPACT ASSESSMENT MODELS

- Federal Highway Administration Traffic Noise Model
- California Department of Transportation Traffic Noise Model (SOUND32)
- FTA Transit Noise Assessment and Mitigation Methodology

AIR QUALITY MODELING EXPERTISE

MVEI/EMFAC; URBEMIS; CALINE4; SCREEN; ISC; CTDM; TANKS; Landfill Gas Emissions Model.

ADDITIONAL TRAINING AND COURSES

- Fundamentals of Noise and Vibration for the California Energy Commission
- Expert Witness Training, California Energy Commission
- Co-Instructor, Air Permitting Issues for Municipal Solid Waste Landfills, Trinity Consultants
- Fundamentals of New Source Review Workshop, Air and Waste Management Association
- Title V and Compliance Assurance Monitoring Workshops, Air and Waste Management Association
- NATO Advanced Studies Institute, Wind Climates in Cities

PROFESSIONAL AFFILIATIONS AND AWARDS

- Professional Engineer (Mechanical, California #32565)
- Qualified Environmental Professional, Institute of Professional Environmental Practice (#03030005)
- 2001 Outstanding Performance Award presented by the California Energy Commission
- Air and Waste Management Association since 1994

PUBLICATIONS

Smith, P.J., J.B. Birdsall, and P.E. Delamater. "A Discussion of Air Permitting Issues for Landfill Gas-To-Energy Projects." 88th Annual Meeting and Exhibition of the Air and Waste Management Association, San Antonio, Texas, 1995.

Meroney, R.N., D.E. Neff, and J.B. Birdsall. "Wind-Tunnel Simulation of Infiltration Across Permeable Building Envelopes: Energy and Air Pollution Exchange Rates." 7th International Symposium on Measurement and Modeling of Environmental Flows. International Mechanical Engineering Congress and Exposition, San Francisco, California, 1995.

Birdsall, J.B. and R.N. Meroney. "Model Scale and Numerical Evaluation of Tracer Gas Distribution Due to Wind-Forced Natural Ventilation." 9th International Conference on Wind Engineering, New Delhi, India, 1995.

Birdsall, J.B. Physical and Numerical Simulation of Wind-Forced Natural Ventilation, MS Thesis, Colorado State University, Fort Collins, Colorado, 1993.

DECLARATION OF
Testimony of Richard Anderson

I, **Richard Anderson,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission, Systems Assessment and Facilities Siting Division, as a water, soils and biology expert.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Biological Resources** for the **Avenal Energy Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 6, 2009 Signed: _____

At: Davis, California

RICHARD L. ANDERSON

2850 Layton Dr.
Davis, CA 95616
530.758.4672
Danderson@cal.net

EDUCATION

1976	B.S. Biological Sciences, University of California at Davis
1977-1980	Graduate studies in the Masters of Business Administration (MBA) Program, California State University, Sacramento, California
1980-1982	Graduate studies in Biological Conservation, California State University, Sacramento, California

EXPERIENCE

March 2005 - Present	Biological Resources, water Resources and soil resources consulting related to energy production.
March 2001 – March 2005	Energy Facilities Siting Planner lll---Supervise the Biology, Water, and Soil Resources Unit of the Systems Assessment and Facilities Siting Division. Responsible for biology, water, and soil staff and related products regarding energy planning, policy, and siting.
August 1979 - March 2001	Planner l and Planner ll---Staff Biologist, California Energy Commission Develop and review planning and policy objectives for California's energy facility siting program. Work on interdisciplinary teams responsible for review and preparation of Environmental Impact Reports, environmental planning projects, and locational analyses. Provide expert testimony in the area of biological resources. Act as project manager and contract manager for field research. Organize and direct workshops. Survey existing and proposed energy facility sites. Coordinate biological resource issue evaluation and mitigation planning with Federal, State; and local agencies and other interested parties. Managed several complex multi-year research projects.
October 1977- July 1979	Environmental Specialist ll, California State Resources Control Board Responsible for environmental documents produced in the Division of Water Right's application unit. Analyzed and evaluated impacts of direct diversion and/or water storage (reservoir) on the environment. Coordinated and communicated with other State, Federal and local agencies, and the general public. Trained new employees.

PROFESSIONAL AFFILIATIONS/ CERTIFICATION	Raptor Research Foundation The Wildlife Society---Certified Wildlife Biologist, TWS American Ornithological Union Coopers Society American Field Ornithologists Swainson's Hawk Technical Advisory Committee International Erosion Control Association National Wind Coordinating Committee
PUBLICATIONS	Author of numerous staff testimonies for the California Energy Commission including marine biology and water quality issues associated with once-through cooling power plants. Author of numerous environmental assessments for water diversion and impoundment projects. Author of numerous reports and papers regarding conservation of T&E species, wind energy/bird interactions, and standard metrics and methods for monitoring bird interactions with wind turbines/utility structures.

Publications: Richard L Anderson

Anderson, D., R. Anderson, M. Bradbury, C. Chun, J. Dinsdale, J. Estep, K. Fien, and R. Schlorff. 2006. California Swainson's Hawk Inventory: 2005-2006. 2005 Progress Report. California Department of Fish and Game, Resource Assessment Program. 15pp.

Anderson, R.L. and J.A. Estep. 1988. Wind energy development in California: impacts, mitigation, monitoring, and planning. California Energy Commission, Sacramento. 12 pp.

Anderson, R.L., L.K. Spiegel, and K.M. Kakiba-Russell. 1991. Southern San Joaquin Valley ecosystems protection program: natural lands inventory and maps. California Energy Commission, Sacramento, California. 41 pp. + maps.

Anderson, R.L., J. Tom, N. Neumann, J. Noone and D. Maul. 1996a. Avian risk assessment methodology. Pp. 74-87 *in* Proceedings of the National Avian-Wind Power Planning Meeting II. National Wind Coordinating Committee/RESOLVE. Washington, D.C.

Anderson, R.L., J. Tom, N. Neumann, and J.A. Cleckler. 1996b. Avian monitoring and risk assessment at Tehachapi Pass Wind Resource Area, California. Staff Report to California Energy Commission, Sacramento, CA, November 1996. 40pp.

Anderson, R.L., H. Davis, W. Kendall, H. Drive, L.S. Mayer, M.L. Morrison, K. Sinclair, D. Strickland, and S. Ugoretz. 1997. Standard metrics and methods for conducting avian/wind energy interaction studies. Pp. 265-272 *in* Proceedings of the 1997 American Wind Energy Association Annual Meeting. American Wind Energy Association, Washington, D.C.

Anderson, R.L., J. Tom, N. Neumann, AND J. Cleckler. 1998. Avian Monitoring and Risk Assessment at Tehachapi Pass Wind Resource Area, California: Tehachapi Phase I Results. Proceedings of the American Wind Energy Association Annual Conference, Washington D.C.

Anderson, R., M. Morrison, K. Sinclair, and D. Strickland. 1999. Studying wind energy/bird interactions: A guidance document. National Wind Coordinating Committee/RESOLVE, Washington, D.C. 87pp.

Anderson, R.L., D. Strickland, J. Tom, N. Neumann, W. Erickson, J. Cleckler, G. Mayorga, G. Nuhn, A. Leuders, J. Schneider, L. Backus, P. Becker and N. Flagg. 2000. Avian monitoring and risk assessment at Tehachapi Pass and San Gorgonio Pass wind resource areas, California: Phase 1 preliminary results. Pp. 31-46 *in* Proceedings of the National Avian-Wind Power Planning Meeting III. National Wind Coordinating Committee/RESOLVE. Washington, D.C.

Anderson, R, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, K.J. Sernka, N. Neumann, and J. Tom. 2004a. Avian monitoring and risk assessment at the Tehachapi Pass wind resource area. National Renewable Energy Laboratory, Golden, Colorado. 101pp.

Anderson, R, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, K.J. Sernka, N. Neumann, and J. Tom. 2004b. Avian monitoring and risk assessment at the San Gorgonio Pass wind resource area. National Renewable Energy Laboratory, Golden, Colorado. 112pp.

California Energy Commission. 1995. Avian collision and electrocution: an annotated bibliography. California Energy Commission, Sacramento. Prepared by E. Hebert, E. Reese, and L. Mark, Project Manager and Editor R.L. Anderson.

Spiegel, L.K., M.A. Bradbury, M.M. Disney, and R.L. Anderson. 1991. California Energy Commission's San Joaquin kit fox monitoring project in Kern County. 1991 Annual report to the California Department of Fish and Game. Unpubl. Rept. Available from: The California Energy Commission, Environmental Protection Office, Sacramento, CA. 50pp + app.

Spiegel, L.K., and R.L. Anderson. 1992. Southern San Joaquin Valley ecosystem protection program: natural lands inventory. Pp 249-261, *in* Endangered and sensitive species of the San Joaquin Valley, California (D.F. Williams, S. Byrne, and T.A. Rado, eds.). California Energy Commission, Sacramento, California, 388 pp.

Strickland, D., and R.L. Anderson. 2002. Standard Metrics and Methods for Avian/Wind Energy and Utility Structures Interaction Studies. Pp 47-65 *in* Avian Interactions with Utility and Communication Structures: Proceedings of a workshop held in Charleston, South Carolina, December 2-3, 1999.

ANDERSON, R.L., J. TOM, N. NEUMANN, AND J. CLECKLER. 1996. Avian Monitoring and Risk Assessment at Tehachapi Pass Wind Resource Area, California. 1995 Progress Report. California Energy Commission, Sacramento.

ANDERSON, R.L., J. TOM, N. NEUMANN, AND J. CLECKLER. 1998. Avian Monitoring and Risk Assessment at Tehachapi Pass Wind Resource Area, California: Tehachapi Phase I Results. Proceedings of the American Wind Energy Association Annual Conference, Washington D.C.

DECLARATION OF
Beverly E. Bastian

I, **Beverly E. Bastian**, declare as follows:

1. I am presently employed by The California Energy Commission in the **Siting, Transmission, and Environmental Protection Division** as a **Planner II**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Cultural Resources,** for the Avenal Energy power plant project, based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 15, 2009 Signed: Original signature in Dockets
At: Sacramento, CA

Beverly E. Bastian
1516 Ninth Street MS 40
Sacramento, CA 95814-5504
(916) 654-4840 email: bbastian@energy.state.ca.us

Education

School	Field	Degree	Year
University of California, Davis	Anthropology	B.A	1967
University of California, Davis	Anthropology	M.A	1969
Tulane University	Anthropology	A.B.D.	1975
University of Mississippi	American History	(courses only)	1989
University of California, Santa Barbara	Public (American) History and Historic Preservation	A.B.D.	1996

Experience

State of California, California Energy Commission *2005 to present*
Planner II, Facilities Siting Division, Environmental Office, Biological and Cultural Unit,
All tasks related to the production of the cultural resources sections of CEQA-equivalent (California Environmental Quality Act) documents for the environmental review of proposed power plants in California, including: Evaluating data in applications; writing data requests to applicants and doing independent research to compile an inventory of and evaluate the historical/cultural significance of cultural resources subject to significant impacts from proposed projects; providing and receiving information in public hearings on applications; analyzing all pertinent data; writing Staff Assessments of impacts; developing mitigation measures to reduce to insignificant any impacts to significant cultural resources; providing expert testimony on my analyses and findings in public hearings; and reviewing compliance with mitigation measures during the construction, operation, and decommissioning of certified power plants. Additional tasks include: providing prefiling assistance to applicants, reviewing the CEQA documents of sister state agencies; consulting and advising cultural resources specialists in sister state agencies; coordinating and reviewing the work of Commission cultural resources consultants; and developing internal procedures and guidelines to improve cultural resources review of applications.

State of California, Department of Parks and Recreation *2001 to 2005*
Historian I1, Cultural Resources Division, Cultural Resources Support Unit
Conduct major and complex historical and historic architectural investigations and studies dealing with the significance, integrity, and management of historic buildings, structures, and landscapes in California's state parks; participate in interdisciplinary teams and project assignments; prepare technical reports and correspondence; carry out inventories and evaluations of historic properties; coordinate the statewide registration of historical properties; assess the eligibility of historic properties to the National Register of Historic Places and the California Register of Historical Resources; review environmental documents and provide technical analyses of major Departmental projects to determine impacts to cultural resources under State and federal laws; identify resource issues and constraints; establish allowable use and development guidelines; develop approaches to protect, enhance, and perpetuate cultural resources under relevant State and federal laws, regulations, and standards; propose and develop programs, policies, and budgets to meet Department's historic preservation missions.

Department of Sociology and Anthropology, University of Mississippi *1987 to 1989*
Archaeologist, Center for Archaeological Research
All tasks for the completion of the historical archaeological part of a Phase II archaeological survey and testing program final report related to a U. S. Army Corps of Engineers erosion control project in twelve north-central Mississippi counties, including: Coordinating the activities of a field crew and the research

of historians working in archives; setting up an artifact database using survey data to generate statistical summaries for discovered historical archaeological sites; gathering historical settlement and land-use data for twelve counties; conducting a special statistical analysis and synthesis of historical data only, focusing on pre-and post-Civil War land tenure and agricultural production for plantations in two counties where soil fertility contrasted; synthesizing data from all sources, collaborating on the final cultural resources management report with archaeologists specializing in prehistory and survey and sampling methodology; presenting findings at the annual meeting of the Society for Historical Archaeology in 1989.

Gilbert Commonwealth, Inc. *1984 to 1987*
Historical Archaeologist and Project Manager, Environmental Unit
All tasks as Principal Investigator for six major historical archaeological and/or historical architectural cultural resources management projects done under contract to federal, state, and local governments, including: Writing winning proposals for these projects; negotiating and managing project budgets; gathering/supervising the gathering of historical, oral historical, and archaeological data; analyzing/supervising the analysis of gathered data; and writing/supervising the writing of reports of findings, along with the creation of maps, illustrations, and data tables for these reports; serving as the historian and historical preservationist on several multidisciplinary teams tasked with siting the routes for several major power lines in east Texas.

Tennessee Valley Authority *1979 to 1981, 1983-1984*
Land & Economic Resources, Cultural Resources Program (personal services contract)
Historical Archaeologist (self-employed)
All tasks as Principal Investigator for various cultural resources management projects in areas affected by TVA construction, the most significant of which were: the complete excavation of and report on seven nineteenth-century log-cabin sites in Cedar Creek Reservoir in northwestern Alabama; and all historical research, the field work, and the report for the underwater remote-sensing reconnaissance and underwater videotaping of sunken Civil War cargo boats and gunboats at Johnsonville, Tennessee, in the western part of the Tennessee River.

Other Archaeological Projects
1981-1982 Project Director for the field excavation, historical research, data analysis, and report on Fort Independence, South Carolina (dating to the time of the Revolutionary War) for the U. S. Army Corps of Engineers.
1975-1978 Field Director for the total excavation of French-and-Indian-War-period Fort Loudoun in east Tennessee and laboratory supervisor of artifact conservation and analysis for this project at Vanderbilt University for the Tennessee Division of Archaeology.
1974 Archaeologist and Junior Investigator for intensive historical research and archaeological testing at the defunct 19th-century northeastern Alabama river town of Bellefonte, for the Department of Anthropology and Sociology, University of Alabama, Birmingham.
1973 Teaching Assistant for a summer archaeological Field School at historic Fort Southwest Point, dating to the War of 1812, Department of Anthropology, University of Tennessee.
1967 Crew Foreman for a National Park Service-sponsored salvage excavation project along the Delaware riverfront in Philadelphia, for the Department of American Civilization, University of Pennsylvania.
1966 Excavator and a laboratory technician for two California historic sites, Old Sacramento and Old Columbia, for the Department of Anthropology at the University of California, Davis.

Professional Societies

Register of Professional Archaeologists, #10683
Society for Historical Archaeology
National Council on Public History
Vernacular Architecture Forum
Society for California Archeology
California Council for the Promotion of History

DECLARATION OF
Alvin J. Greenberg, Ph.D.

I, **Alvin J. Greenberg, Ph.D.** declare as follows:

1. I am presently a consultant to the California Energy Commission, Energy Facilities Siting and Environmental Protection Division.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on the **Public Health, Hazardous Materials Management, and Worker Safety/Fire Protection** sections for the **Avenal Energy Application** based on my independent analysis of the amendment petition, supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: April 30, 2009 Signed: Alvin Greenberg

At: Sacramento, California

Risk Science Associates

121 Paul Dr., Suite A, San Rafael, Ca. 94903-2047
415-479-7560 fax 415-479-7563
e-mail agreenberg@risksci.com

Name & Title: **Alvin J. Greenberg, Ph.D., FAIC, REA, QEP**
Principal Toxicologist

Dr. Greenberg has had over two decades of complete technical and administrative responsibility as a team leader in the preparation of human and ecological risk assessments, air quality assessments, hazardous materials handling and risk management/prevention, infrastructure vulnerability assessments, occupational safety and health, hazardous waste site characterization, interaction with regulatory agencies in obtaining permits, and conducting lead surveys and studies. He has particular expertise in the assessment of dioxins, lead, diesel exhaust, petroleum hydrocarbons, mercury, the intrusion of subsurface contaminants into indoor air, and the preparation and review of public health/public safety sections of EIRs/EISs. Dr. Greenberg's expertise in risk assessment has led to his appointment as a member of several state and federal advisory committees, including the California EPA Advisory Committee on Stochastic Risk Assessment Methods, the US EPA Workgroup on Cumulative Risk Assessment, the Cal/EPA Peer Review Committee of the Health Risks of Using Ethanol in Reformulated Gasoline, the California Air Resources Board Advisory Committee on Diesel Emissions, the Cal/EPA Department of Toxic Substances Control Program Review Committee, and the DTSC Integrated Site Mitigation Committee. Dr. Greenberg is the former Chair of the Bay Area Air Quality Management District Hearing Board, a former member of the State of California Occupational Health and Safety Standards Board (appointed by the Governor), and former Assistant Deputy Chief for Health, California OSHA. And, since the events of 9/11, Dr. Greenberg has been the lead person for developing vulnerability assessments, power plant security programs, and conducting safety and security audits of power plants for the California Energy Commission and has assisted the CEC in the assessment of safety and security issues for proposed LNG terminals. In addition to providing security expertise to the State of California, Dr. Greenberg was the Team Leader and main consultant to the State of Hawaii on the updating of their Energy Emergency Preparedness Plan.

Years Experience: 26

Education:

B.S. 1969 Chemistry, University of Illinois Urbana

Ph.D. 1976 Pharmaceutical/Medicinal Chemistry, University of California, San Francisco

Postdoctoral Fellowship 1976-1979 Pharmacology/Toxicology, University of California, San Francisco

Postgraduate Training 1980 Inhalation Toxicology, Lovelace Inhalation Toxicology Research Institute, Albuquerque, NM

Professional Registrations:

Board Certified as a Qualified Environmental Professional (QEP)
California Registered Environmental Assessor - I (REA)
Fellow of the American Institute of Chemists (FAIC)

Professional Affiliations:

Society for Risk Analysis
Air and Waste Management Association
American Chemical Society
American Association for the Advancement of Science
National Fire Protection Association

Technical Boards and Committee Memberships - Present:

Squaw Valley Technical Review Committee
(appointed 1986)

Technical Boards and Committee Memberships - Past:

July 1996 – March 2002
Member, Bay Area Air Quality Management District Hearing Board
(Chairman 1999-2002)
September 2000 – February 2001
Member, State Water Resources Control Board Noncompliant Underground Tanks Advisory Group
January 1999 – June 2001
Member, California Air Resources Board Advisory Committee on Diesel Emissions
January 1994 - September 1999
Vice-Chairman, State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee
September 1998
Member, US EPA Workgroup on Cumulative Risk Assessment
April 1997 - September 1997
Member, Cal/EPA Private Site Manager Advisory Committee
January 1986 - July 1996
Member, Bay Area Air Quality Management District Advisory Council
(Chairman 1995-96)
January 1988 - June 1995
Member: California Department of Toxic Substance Control Site Mitigation Program Advisory Group
January 1989 - February 1995
Member: Department of Toxics Substances Control Review Committee, Cal-EPA

October 1991 - February 1992
Chair: Pollution Prevention and Waste Management Planning Task Force of the Department of Toxics Substances Control Review Committee, Cal-EPA

September 1990 - February 1991
Member: California Integrated Waste Management Board Sludge Advisory Committee

September 1987 - September 1988
ABAG Advisory Committee on Regional Hazardous Waste Management Plan

March 1987 - September 1987
California Department of Health Services Advisory Committee on County and Regional Hazardous Waste Management Plans

January 1984 - October 1987
Member, San Francisco Hazardous Materials Advisory Committee

March 1984 - March 1987
Member, Lawrence Hall of Science Toxic Substances and Hazardous Materials Education Project Advisory Board

Jan. 1, 1986 - June 1, 1986
Member, Solid Waste Advisory Committee, Governor's Task Force on Hazardous Waste

Jan. 1, 1983 - June 30, 1985
Member, Contra Costa County Hazardous Waste Task Force

Sept. 1, 1982 - Feb. 1, 1983
Member, Scientific Panel to Address Public Health Concerns of Delta Water Supplies, California Department of Water Resources

Present Position

January 1983- present
Owner and principal with Risk Sciences Associates, a Marin County, California, environmental consulting company specializing in multi-media human health and ecological risk assessment, air pathway analyses, hazardous materials management-infrastructure security, environmental site assessments, review and evaluation of EIRs/EISs, preparation of public health and safety sections of EIRs/EISs, and litigation support for toxic substance exposure cases.

Previous Positions

Jan. 2, 1983 - June 12, 1984
Member, State of California Occupational Safety and Health Standards Board (Cal/OSHA), appointed by the Governor

Aug. 1, 1979 - Jan. 2, 1983
Assistant Deputy Chief for Health, California Occupational Safety and Health Administration

Feb. 1, 1979 - Aug. 1, 1979

Administrative Assistant to Chairperson of Finance Committee, Board of Supervisors, San Francisco

Jan. 1, 1976 - Feb. 1, 1979
Research Pharmacologist and Postdoctoral Fellow, Department of Pharmacology and Toxicology, School of Medicine, University of California, San Francisco

Jan. 1, 1975 - Dec. 31, 1975
Acting Assistant Professor, Department of Pharmaceutical Chemistry, University of California, San Francisco

Experience

General

Dr. Greenberg has been a consultant in Hazardous Materials Management and Security, Human and Ecological Risk Assessment, Occupational Health, Toxicology, Hazardous Waste Site Characterization, and Toxic Substances Control Policy for over 26 years. He has broad experience in the identification, evaluation and control of health and environmental hazards due to exposure to toxic substances. His experience includes Community Relations Support and Risk Communication through experience at high-profile sites and presentations at professional society meetings.

He has considerable experience in the review and evaluation of exposure via the air pathway - particularly to emissions from power plants, refineries, and diesel exhaust - and a thorough knowledge of the regulatory requirements through his experience at Cal/OSHA, the BAAQMD Hearing Board, as a consultant to the California Energy Commission, and in preparing such assessments for local government and industry. He has assessed exposures to diesel exhaust during construction and operations of stationary and mobile sources and has testified at evidentiary hearings numerous times on this subject.

He is presently assisting the California Energy Commission in assessing the risks to workers and the public of proposed power plants and LNG terminals in the state. His experience in hazard identification, exposure assessment, risk assessment, occupational safety and health, emergency response, and Critical Infrastructure Protection has made him a valuable part of the CEC team addressing this issue. He has reviewed and commented on the DEIS/DEIR for the proposed SES LNG Port of Long Beach terminal, focusing on security issues for the CEC and on safety matters for the City of Long Beach. He has presented technical information and analysis to the State of California Interagency LNG Working Group on thermal radiation public exposure criteria and safety/security at an east coast urban LNG terminal. (Both presentations are confidential owing to the nature of the material.) He has conducted numerous evaluations of the safety and hazards of natural gas pipelines for the CEC and has presented his findings and recommendations at public meetings and evidentiary hearings.

He served for over five years as the Vice-chair of the California State Water Resources Control Board Advisory Committee convened to address toxic substances in sediments in bays, rivers, and estuaries. He has been a member of the Squaw Valley Technical Review Committee since 1986 establishing chemical application management plans at golf courses to protect surface and

groundwater quality. He has also conducted numerous ecological risk assessments and characterizations, including those for marine and terrestrial habitats.

Dr. Greenberg has extensive experience in data collection and preparation of human and ecological risk assessments on numerous military bases and industrial sites with Cal/EPA DTSC and RWQCB oversight. He has also been retained to provide technical services to the Cal/EPA Department of Toxic Substances Control (preparation of human health risk assessments) and the Office of Environmental Health Hazard Assessment (review and evaluation of air toxics health risk assessments and preparation of profiles describing the acute and chronic toxicity of toxic air contaminants). He has also conducted several surveys of sites containing significant lead contamination from various sources including lead-based paint, evaluated potential occupational exposure to lead dust and fumes in industrial settings, prepared numerous human health risk assessments of lead exposure, and prepared safety and health plans for remedial investigation of lead contaminated soils. Dr. Greenberg is also a recognized expert on the requirements of California's Proposition 65 and has served as an expert on Prop. 65 litigation.

Liquefied Natural Gas (LNG)

Dr. Greenberg assisted the CEC in the preparation of the "background" report on the risks and hazards of siting LNG terminals in California ("LNG in California: History, Risks, and Siting" July 2003) and consulted for the City of Vallejo on a proposed LNG terminal and storage facility at the former Mare Island Naval Shipyard. He has also conducted an evaluation and prepared comments on the risks, hazards, and safety analysis of the DEIS/DEIR for the City of Long Beach on a proposed LNG terminal at the Port of Long Beach (POLB) and conducted an analysis on vulnerability and critical infrastructure security for the CEC on this same proposed LNG terminal. He currently advises the CEC on the POLB LNG proposal on risks, hazards, human thresholds of thermal exposure, vulnerability, security, and represented the CEC at a U.S. Coast Guard briefing on the Waterway Suitability Assessment that included the sharing of SSI (Sensitive Security Information). He has presented technical information and analysis to the State of California LNG Interagency Working Group on thermal radiation public exposure criteria and safety/security at an east coast urban LNG terminal. (Both presentations are confidential owing to the nature of the material.) He has conducted numerous evaluations of the safety and hazards of natural gas pipelines for the CEC and has presented his findings and recommendations at public meetings and evidentiary hearings.

Infrastructure Security

Since 2002, Dr. Greenberg has been trained by and is working with the Israeli company SB Security, LTD, the most experienced and tested security planning and service company in the world. Since the events of 9/11, Dr. Greenberg has been the lead person for developing vulnerability assessments and power plant security programs for the California Energy Commission (CEC). In taking the lead for this state agency, Dr. Greenberg has interfaced with the California Terrorism Information Center (CATIC) and provided analysis, recommendations, and testimony at CEC evidentiary hearings regarding the security of power plants within the state. These analyses include the assessment of Critical Infrastructure Protection, threat assessments, criticality assessments, and the preparation of vulnerability assessments and off-site consequence analyses addressing the use, storage, and transportation of hazardous materials, recommendations for security to reduce the threat from foreign and domestic terrorist activities, perimeter security, site access by personnel and vendors, personnel background checks,

management responsibilities for facility security, and employee training in security methods. Dr. Greenberg is the lead person in developing a model power plant security plan, vulnerability assessment matrix, and a security training manual for the CEC. The model security plan is used by power plants in California as guidance in developing and implementing security measures to reduce the vulnerability of California's energy infrastructure to terrorist attack. He has testified at several evidentiary hearings for the CEC on power plant security issues. He also leads an audit team conducting safety and security audits at power plants throughout California that are under the jurisdiction of the CEC. In addition to providing security expertise to the State of California, in August 2004, a team of experts led by Dr. Greenberg was awarded an 18-month contract by the State of Hawaii to update and improve the state's Energy Emergency Preparedness Plan and make recommendations for increased security of critical energy infrastructure on this isolated group of islands.

Air Pathway Analysis

Dr. Greenberg has prepared numerous Air Pathway Analyses and human health risk assessments, evaluating exposure at numerous locations in California, Hawai'i, Oregon, Minnesota, Michigan, and New York. He is experienced in working with Region IX EPA, the State of California DTSC, and the Hawai'i Department of Health Clean Air Branch in the application of both site-specific and non site-specific health risk assessment criteria.

Examples

Human Health Risk Assessment for the Open Burn/Open Detonation Operation at McCormick Selph, Inc., Hollister, Ca. (June 2003)

Air Quality and Human Health Risk Assessment for the Royal Oaks Industrial Complex, Monrovia, Ca. (January 2003)

Human Health Risk Assessment and Indoor Vapor Intrusion Assessment for the former Pt. St. George Fisheries Site, Santa Rosa, Ca. (October 2002)

Human Health Risk Assessment for the former Sargent Industries Site, Huntington Park, Ca. (July 2001)

Ballard Canyon Air Pathway Analysis and Human Health Risk Assessment, Santa Barbara County, Ca. (September 2000)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Health Risk Assessment and Air Pathway Analysis for the Ballard Canyon Landfill, Santa Barbara County, Ca. (March 1999)

Human Health Risk Assessment, Teledyne Ryan Aeronautical, McCormick Selph Ordnance. Hollister, California. (December 1996)

Initial Phase Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (October 1996)

Human Health Risk Assessment for Current and Proposed Expanded Class II and Class III Operations at the Altamont Sanitary Landfill, Alameda County, Ca.
(March, 1993)

Focused Ecological Risk Characterization, Hawaiian Electric Company, Keahole Generating Station Expansion, Hawai'i (June 1993)

Human Health Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawai'i Office of Space Industry (April 1993)

Ecological Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawai'i Office of Space Industry (March 1993)

Human Health Risk Assessment Due to Emissions from a Medical Waste Incinerator, prepared for Kauai Veterans Memorial Hospital, Kauai, Hawai'i (1994)

Cancer Risk Assessment for the H-Power Generating Station, Campbell Industrial Park, Oahu, Hawai'i (1988)

Hazardous Materials Assessments, Waste Management Assessments, Worker Safety and Fire Protection Assessments, and Public Health Impacts Assessments

Dr. Greenberg also has significant experience as a consultant and expert witness for the California Energy Commission providing analysis, recommendations, and testimony in the areas of hazardous materials management, process safety management, waste management, worker safety and fire protection, and public health impacts for proposed power plant/cogeneration facilities. These analyses include the evaluation and/or preparation of the following:

- Off-site consequence analyses of the handling, use, storage, and transportation of hazardous materials,
- Risk Management Plans (required by the Cal-ARP) and Business Plans (required by H&S Code section 25503.5),
- Safety Management Plans (required by 8 CCR section 5189),
- Natural gas pipeline safety,
- Solid and hazardous waste management plans,
- Phase I and II Environmental Site Assessments,
- Construction and Operations Worker Safety and Health Programs,
- Fire Prevention Programs,
- Human health risk assessment from stack emissions and from diesel engines, and
- Mitigation measures to address PM exposure, including diesel particulates

Examples

- San Francisco Energy Reliability Project, San Francisco, Ca. 2004-present. Hazardous materials management, worker safety/fire protection, waste management, public health
- Inland Empire Energy Center, Romoland, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Malburg Generating Station Project, City of Vernon, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Blythe II, Blythe, Ca. 2002-3. hazardous materials, worker safety/fire protection,
- Palomar Energy Center, Escondido, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Cosumnes Power Project, Rancho Seco, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Tesla Power Project, Tesla, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- San Joaquin Valley Energy Center, San Joaquin, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management
- Morro Bay Power Plant, Morro Bay, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Potrero Power Plant Unit 7, San Francisco, Ca., 2001-2: hazardous materials, worker safety/fire protection
- El Segundo Power Redevelopment Project, El Segundo, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Rio Linda Power Project, Rio Linda, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Pastoria II Energy Facility Expansion, Grapevine, Ca., 2001: hazardous materials, worker safety/fire protection
- East Altamont Energy Center, Byron, Ca., 2001-2: hazardous materials, worker safety/fire protection
- Magnolia Power Project, Burbank, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Russell City Energy Center, Hayward, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Woodbridge Power Plant, Modesto, Ca., 2001: hazardous materials, worker safety/fire protection, waste management
- Colusa Power Plant Project, Colusa County, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Valero Refinery Cogeneration Project, Benicia, Ca., 2001: hazardous materials, worker safety/fire protection
- Ocotillo Energy Project, Palm Springs, Ca., 2001: hazardous materials, worker safety/fire protection
- Gilroy Energy Center Phase II Project, Gilroy, Ca., 2001-2: hazardous materials, worker safety/fire protection
- Los Esteros Critical Energy Facility, San Jose, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Roseville Energy Facility, Roseville, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health

- Spartan Power, San Jose, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Inland Empire Energy Center, Romoland, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- South Star Cogeneration Project, Taft, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Tesla Power Plant, Eastern Alameda County, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Tracy Peaker Project, Tracy, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Henrietta Peaker Project, Kings County, Ca., 2001: hazardous materials, worker safety/fire protection, waste management, public health
- Central Valley Energy Center, San Joaquin, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Cosumnes Power Plant, Rancho Seco, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Los Banos Voltage Support Facility, Western Merced County, Ca., 2001-2: waste management, public health
- Palomar Energy Project, Escondido, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Metcalf Energy Center, San Jose, Ca., 2000-1: hazardous materials
- Blythe Power Plant, Blythe, Ca., 2000-1: hazardous materials
- San Francisco Energy Co. Cogeneration Project, San Francisco, Ca., 1994-5: hazardous materials
- Campbell Soup Cogeneration Project, Sacramento, Ca., 1994: hazardous materials
- Proctor and Gamble Cogeneration Project, Sacramento, Ca., 1993-4: hazardous materials
- San Diego Gas and Electric South Bay Project, Chula Vista, Ca., 1993: hazardous materials
- SEPCO Project, Rio Linda, Ca., 1993: hazardous materials
- Shell Martinez Manufacturing Complex Cogeneration Project, Martinez, Ca., 1993: hazardous materials and review and evaluation of EIR
- SFERP Project, San Francisco, Ca. 2004 – 2006. hazardous materials, worker safety/fire protection, waste management, public health

Occupational Safety and Health/Health and Safety Plans/Indoor Air Quality

Dr. Greenberg has significant experience in occupational safety and health, having directed the development, adoption, and implementation of over 50 different Cal/OSHA regulations, including airborne contaminants (>450 substances), lead, asbestos, confined spaces, and worker-right-to-know (MSDSs). He has conducted numerous occupational health surveys and has extensive experience in the sampling and analysis of indoor air quality at residences, workplaces, and school classrooms. He is currently the team leader conducting safety and security audits at power plants throughout California for the California Energy Commission. Safety issues audited include compliance with regulations addressing several safety matters, including but not limited to, confined spaces, lockout/tagout, hazardous materials, and fire prevention/suppression equipment.

Examples

Review and Evaluation of Public and Worker Safety Issues at the proposed SES LNG Facility, Port of Long Beach. prepared for the City of Long Beach. (November 2005)

Confidential safety and security audit reports for 18 power plants in California. prepared for the California Energy Commission. (January 2005 through March 2006)

Report on the Accidental release and Worker Exposure to Anhydrous Ammonia at the BEP I Power Plant, Blythe, Ca. prepared for the California Energy Commission. (October 2004)

Investigation of a Worker Death in a Confined Space, La Paloma Power plant. prepared for the California Energy Commission. (July 2004)

Preliminary Report on Indoor Air Quality in Elementary School Portable Classrooms, Marin County, Ca. (December 1999)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

Air Pathway Analysis for the Ballard Canyon Landfill. Submitted to the County of Santa Barbara, (March 1999)

Review and Evaluation of the Health Risk Assessment for Outdoor and Indoor Exposures at the Former Golden Eagle Refinery Site, Carson, Ca. (May 1998)

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Phase 2 Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (February 1997)

Determination of Occupational Lead Exposure at a Tire Shop in Placerville, Ca. (April 1993)

Development of an Environmental Code of Regulations for Hazardous Waste Treatment Facilities on La Posta Indian Tribal lands, San Diego County, Ca. (August 1992)

Sampling and Analysis Plan, Health and Safety Plan, Site Characterization of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 2, 1988)

Sites with RWQCB and/or DTSC Oversight

Dr. Greenberg has specific experience in assessing human health and ecological risks at contaminated sites at the land/water interface, including petroleum contaminants, metals, mercury, and VOCs at several locations in California including Oxnard, Richmond, Avila Beach, Mare Island Naval Shipyard, San Diego, Hollister, San Francisco, Hayward, Richmond, the Port of San Francisco, and numerous other locations. He has used Cal/EPA methods, US EPA

methods, and ASTM Risk Based Corrective Action (RBCA) and Cal/Tox methodologies. He is extremely knowledgeable about SWRCB and SF Bay RWQCB regulations on underground storage tank sites and with ecological issues presented by contaminated sediments including sediment analysis, toxicity testing, tissue analysis, and sediment quality objectives. Dr. Greenberg served on the State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee from 1994 until the end of the program in 1999.

Dr. Greenberg experience on many of these contaminated sites has been as a consultant to local governments, state agencies, and citizen groups. He assisted the City and County of San Francisco in developing local ordinance requiring soil testing (Article 20, Maher ordinance) and hazardous materials use reporting (Article 21, Walker ordinance). He served as the City of San Rafael's consultant to provide independent review and evaluation of the site characterization and remedial action plan prepared for a former coal gasification site. He was a consultant to a citizen group in northern California regarding exposure and risks due to accidental releases from a petroleum refinery and assisted in the assessment of risks due to crude petroleum contamination of a southern California beach. He has prepared a number of risk assessments addressing crude petroleum, diesel and gasoline contamination, including coordinating site investigations, environmental monitoring, and health risk assessment for the County of San Luis Obispo regarding Avila Beach subsurface petroleum contamination. That high-profile project lasted for over one year and Dr. Greenberg managed a team of experts with a budget of $750,000. Another high-profile project included the preparation of an extensive comprehensive human and ecological risk assessment for the Hawaii Office of Space Industry on rocket launch impacts and transportation/storage of rocket fuels at the southern end of the Big Island of Hawaii. Dr. Greenberg's risk assessments were part of the EIS for the project. Dr. Greenberg also worked on another high-profile project conducting Air Pathway Analysis of off-site and on-site impacts from landfill gas constituents, including indoor and outdoor air measurements, air dispersion modeling, flux chamber investigations, and health risk assessment for the County of Santa Barbara. Dr. Greenberg has conducted RI/FS work, prepared health risk assessments, evaluated hazardous waste sites and hazardous materials use at numerous locations in California, Hawaii, Oregon, Minnesota, Michigan, and New York. He has considerable experience in the development of clean-up standards and the development of quantitative risk assessments for site RI/FS work at CERCLA sites, as well as site closures, involving toxic substances and petroleum hydrocarbon wastes. He is experienced in working with both Region IX EPA and the State of California DTSC in negotiating clean-up standards based on the application of both site-specific and non site-specific health and ecological based clean-up criteria. He has significant experience in the development of site chemicals of concern list, quantitative data quality levels, site remedial design, the site closure process, the design and execution of data quality programs and verification of data quality prior to its use in the decision making process on large NPL sites.

Examples

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)
The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Health Risk Assessment and Air Pathway Analysis for the Ballard Canyon Landfill, Santa Barbara County, Ca. (March 1999)

Screening Human Health Risk Assessment, Calculation of Soil Clean-up Levels, and Aquatic Ecological Screening Evaluation, Galilee Harbor, Sausalito, Ca. (May 1998)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

Health Risk Assessment for Residual Mercury at the Deer Creek Facility, 3475 Deer Creek Road, Palo Alto, California. (July 1997)

Phase 2 Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (February 1997)

Human Health Risk Assessment, Teledyne Ryan Aeronautical, McCormick Selph Ordnance. Hollister, California. (December 1996)

Initial Phase Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (October 1996)

Human Health Risk Assessment, Ecological Screening Evaluation, and Development of Proposed Remediation Goals for the Flair Custom Cleaners Site, Chico, California (January 1996)

Human Health Risk Assessment for the X-3 Extrudate Project at Criterion Catalyst, Pittsburg, Ca. (November 1994)

Screening Health Risk Assessment and Development of Proposed Soil Remediation Levels at Hercules Plant #3, Culver City, Ca. (July 1993)

Ecological Screening Evaluation for the Altamont Landfill, Alameda County, Ca. (June, 1993)

Focused Ecological Risk Characterization, Hawaiian Electric Company, Keahole Generating Station Expansion, Hawaii (June 1993)

Human Health Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawaii Office of Space Industry (April 1993)

Ecological Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawaii Office of Space Industry (March 1993)

Human Health Risk Assessment for Current and Proposed Expanded Class II and Class III Operations at the Altamont Sanitary Landfill, Alameda County, Ca.
(March, 1993)

Screening Health Risk Assessment for the Proposed Expansion of the West Marin Sanitary Landfill, Point Reyes Station, Ca.
(March, 1993)

Health Risk Assessment for the Proposed Expansion of the Forward, Inc. Landfill, Stockton, Ca. (September 14, 1992)

Health Risk Assessment for the Rincon Point Park Project, San Francisco, Ca. Prepared for Baseline Environmental Consulting and the San Francisco Redevelopment Agency. (August 10, 1992)

Health Risk Assessment for the South Beach Park Project, San Francisco, Ca. Prepared for Baseline Environmental Consulting and the San Francisco Redevelopment Agency. (August 10, 1992)

Screening Health Risk Assessment and Development of Proposed Soil and Groundwater Remediation Levels, Kaiser Sand and Gravel, Mountain View, Ca. Prepared for Baseline Environmental Consulting (January 30, 1992)

Development of Proposed Soil Remediation Levels for the Marine Corps Air-Ground Combat Center, 29 Palms, California (May 30, 1991)

Preliminary Health Risk Assessment for the City of Pittsburg Redevelopment Agency, Pittsburg, California (May 29, 1991)

Military Bases

Dr. Greenberg has experience in conducting assessments at DOD facilities, including RI/FS work, preparation of health risk assessments, evaluation of hazardous waste sites and hazardous materials use at the following Navy sites in California: San Diego Naval Base; Marine Corps Air-Ground Combat Center, 29 Palms; Mare Island Naval Shipyard, Vallejo; Treasure Island Naval Station, San Francisco, Hunters Point Naval Shipyard, San Francisco, and the Marine Corps Logistics Base, Barstow. He worked with the U.S. Navy and the U.S. EPA in the implementation of Data Quality Objectives (DQO's) at MCLB, Barstow.

Examples

Review and Evaluation of the Remedial Investigation Report and Human Health Risk Assessment for the U. S. Naval Station at Treasure Island, Ca. (June 1999)

Screening Health Risk Assessment for the Proposed San Francisco Police Department's Helicopter Landing Pad at Hunters Point Shipyard, San Francisco, Ca. (September 1997)

Development of Proposed Soil Remediation Levels for the Marine Corps Air-Ground Combat Center, 29 Palms, California (May 30, 1991)

Health Risk Assessment for the Chrome Plating Facility, Mare Island Naval Shipyard, Vallejo, California (October 24, 1988)

Background Levels and Health Risk Assessment of Trace Metals present at the Naval Petroleum Reserve No.1, 27R Waste Disposal Trench Area, Lost Hills, California (August 12, 1988)

RCRA Facility Investigation (RFI) Work Plan of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (August 14, 1989)

Hazardous Waste and Solid Waste Audit and Management Plan, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (July 3, 1989)

Water Quality Solid Waste Assessment Test (SWAT) Proposal RCRA Landfill, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (October 31, 1988)

Waste Disposal Facilities, Waste Haulers, Waste Recycling Facilities Report, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 22, 1988)

Sampling and Analysis Plan, Health and Safety Plan, Site Characterization of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 2, 1988)

Air Quality Solid Waste Assessment Test (SWAT) Proposal, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (August 25, 1988)

Mercury Contamination

Dr. Greenberg has prepared and/or reviewed several human health and ecological risk assessments regarding mercury contamination in soils, sediments, and indoor surfaces. Dr. Greenberg served on the State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee from 1994 until the end of the program in 1999.

Examples

Review and evaluation of a human health risk assessment of ingestion of sport fish caught from San Diego Bay and which contain tissue levels of mercury and PCBs (November 2004 – present)

Screening Human Health Risk Assessment, Calculation of Soil Clean-up Levels, and Aquatic Ecological Screening Evaluation, Galilee Harbor, Sausalito, Ca. (May 1998)

Health Risk Assessment for Residual Mercury at the Deer Creek Facility, 3475 Deer Creek Road, Palo Alto, California. (July 1997)

Human Health Risk Assessment Due to Emissions from a Medical Waste Incinerator, prepared for Kauai Veterans Memorial Hospital, Kauai, Hawai'i (1994)

DECLARATION OF
Rick Tyler

I**, Rick Tyler** declare as follows:

1. I am presently employed by the California Energy Commission in the Engineering Office of the Energy Facilities Siting and Environmental Protection Division as a Senior Mechanical Engineer

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Hazardous Material Management** and **Worker Safety and Fire Protection** sections, for the **Avenal Energy Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 6/2/09 Signed: Original signature in Dockets

At: Sacramento, California

RICK TYLER

Associate Mechanical Engineer

CALIFORNIA ENERGY COMMISSION

EDUCATION B.S., Mechanical Engineering, California State University, Sacramento. Extra course work in Statistics, Instrumentation, Technical Writing, Management; Toxicology, Risk Assessment, Environmental Chemistry, Hazardous Materials Management, Noise Measurement, and regulations regarding control of toxic substances.

Near completion of course work necessary to obtain a certificate in hazardous materials management from University of California, Davis.

EXPERIENCE

Jan. 1998-Present — California Energy Commission - Senior Mechanical Engineer
Energy Facility Siting and Environmental Protection Division

Responsible for review of Applications for Certification (applications for permitting) for large power plants including the review of handling practices associated with the use of hazardous and acutely hazardous materials, loss prevention, safety management practices, design of engineered equipment and safety systems associated with equipment involving hazardous materials use, evaluation of the potential for impacts associated with accidental releases and preparation and presentation of expert witness testimony and conditions of certification. Review of compliance submittals regarding conditions of certifications for hazardous materials handling, including Risk Management Plans Process Safety Management.

April 1985-Jan. 1998 — California Energy Commission - Health and Safety
Program Specialist; Energy Facility Siting and Environmental Protection Division.

Responsible for review of Public Health Risk Assessments, air quality, noise, industrial safety, and hazardous materials handling of Environmental Impact Reports on large power generating and waste to energy facilities, evaluation of health effects data related to toxic substances, development of recommendations regarding safe levels of exposure, effectiveness of measures to control criteria and non-criteria pollutants, emission factors, multimedia exposure models. Preparation of testimony providing Staff's position regarding public health, noise, industrial safety, hazardous materials handling, and air quality issues associated with proposed power plants. Advise Commissioners, Management, other Staff and the public regarding issues related to health risk assessment of hazardous materials handling.

Nov. 1977-
April 1985

California Air Resources Board - Engineer (last 4 years Associate level)

Responsible for testing to determine pollution emission levels at major industrial facilities; including planning, supervision of field personnel, report preparation and case development for litigation; evaluate, select and acceptance-test instruments prior to purchase; design of instrumentation systems and oversight of their repair and maintenance; conduct inspections of industrial facilities to determine compliance with applicable pollution control regulations; improved quality assurance measures; selected and programmed a computer system to automate data collection and reduction; developed regulatory procedures and the instrument system necessary to certify and audit independent testing companies; prepared regulatory proposals and other presentations to classes at professional symposia and directly to the Air Resources Board at public hearings. As state representative, coordinated efforts with federal, local, and industrial representatives.

PROFESSIONAL AFFILIATIONS/ LICENSES

Past President, Professional Engineers in California Government Fort Sutter Section;
Past Chairman, Legislative Committee for Professional Association of Air Quality Specialists. Have passed the Engineer in Training exam.

PUBLICATIONS, PROFESSIONAL PRESINTATIONS AND ACCOMPLISHMENTS

Authored staff reports published by the California Air Resources Board and presented papers regarding continuous emission monitoring at symposiums.

Authored a paper entitled "A Comprehensive Approach to Health Risk Assessment", presented at the New York Conference on Solid Waste Management and Materials Policy.

Authored a paper entitled "Risk Assessment A Tool For Decision Makers" at the Association of Environmental Professionals AEP Conference on Public Policy and Environmental Challenges.

Conducted a seminar at University of California, Los Angeles for the Doctoral programs in Environmental Science and Public Health on the subject of "Health Risk Assessment".

Authored a paper entitled "Uncertainty Analysis -An Essential Component of Health Risk Assessment and Risk Management" presented at the EPA/ORNL expert workshop on Risk Assessment for Municipal Waste Combustion: Deposition, Uncertainty, and Research Needs.

Presented a talk on off-site consequence analysis for extremely hazardous materials releases. Presented at the workshop for administering agencies conducted by the City of Los Angeles Fire Department.

Evaluated, provided analysis and testimony regarding public health and hazardous materials management issues associated with the permitting of more than 20 major power plants throughout California.

Developed Departmental policy, prepared policy documents, regulations, staff instruction, and other guidance documents and reference materials for use in evaluation of public health and hazardous materials management aspects of proposed power plants.

Project Manager on contracts totaling more than $500,000.

RES.RT

DECLARATION OF
DAVID FLORES

I, **David Flores** declare as follows:

1. I am presently employed by the California Energy Commission in the Siting, Transmission and Environmental Protection Division as a **Planner 2**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Land Use** for the Avenal Energy Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 6, 2009 Signed: Original signature in Dockets

At: Sacramento, California

DAVID FLORES

WORK EXPERIENCE

Sept. 1998 to Present — **Planner 2.** California Energy Commission, Energy Facilities Siting and Protection Division.

- Provide technical analysis of proposed energy planning, conservation, and development programs on land use, visual and traffic and transportation resources. Specific tasks include: the analysis of potential impacts; identification of suitable mitigation measures; preparation of testimony; participate in public workshops; present sworn testimony during evidentiary hearings, and project monitoring to ensure compliance with local, state and federal environmental laws and regulations.

March 29,1988 to September 12, 1998 — **Senior Planner.** County of Yolo Planning and Public Works Department

Senior Planner - Current and Advanced Planning (Resources Management and Planning)

Responsibilities included the following:

- Administered the establishment of Planning schedules and timeframe completion schedules; Administration and staff support to Planning Commission and Board of Supervisors; Staff support and liaison to citizen's committees. Preparation of Environmental documents (Negative Declarations, preparation of Environmental Impact Reports and Categorical Exemptions) in accordance with State and Federal Regulations.

June 1, 1976 to March 25, 1988 — **Manager of Resources** Citizens Utilities Company of California

Responsibilities included the following:

- Coordinated, planned and developed semi-annual and annual construction and operating and maintenance budgets for all Northern California operations.
- Assisted in the development of rate and fee schedules before the California Public Utilities Commission for all Northern California Operations.
- Direct five employees and twenty-five employees in the outlying operations.
- Extensive experience in specification writing, project planning and scheduling, construction management, and site supervision

EDUCATION

California State University @ Sacramento
University of California @Davis
Major: Environmental Studies
Minor: Business Administration

DECLARATION OF
SHAHAB KHOSHMASHRAB

I**, SHAHAB KHOSHMASHRAB**, declare as follows:

1. I am presently employed by the California Energy Commission in the **ENGINEERING OFFICE** of the Facilities Siting Division as a **MECHANICAL ENGINEER**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I participated in the preparation of the staff testimony on **NOISE AND VIBRATION**, for the **Avenal Energy** project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 6, 2009 Signed: Original signature in Dockets

At: Sacramento, California

Shahab Khoshmashrab
Mechanical Engineer

Experience Summary

Nine years experience in the Mechanical, Civil, Structural, and Manufacturing Engineering fields involving engineering and manufacturing of various mechanical components and building structures. This experience includes QA/QC, construction/licensing of electric generating power plants, analysis of noise pollution, and engineering and policy analysis of thermal power plant regulatory issues.

Education

- California State University, Sacramento-- Bachelor of Science, Mechanical Engineering
- Registered Professional Engineer (Mechanical), California

Professional Experience

2001-2004--Mechanical Engineer, Systems Assessment and Facilities Siting– California Energy Commission

Performed analysis of generating capacity, reliability, efficiency, noise and vibration, and the mechanical, civil/structural and geotechnical engineering aspects of power plant siting cases.

1998-2001--Structural Engineer – Rankin & Rankin

Engineered concrete foundations, structural steel and sheet metal of various building structures including energy related structures such as fuel islands. Performed energy analysis/calculations of such structures and produced structural engineering detail drawings.

1995-1998--Manufacturing Engineer – Carpenter Advanced Technologies

Managed manufacturing projects of various mechanical components used in high tech medical and engineering equipment. Directed fabrication and inspection of first articles. Wrote and implemented QA/QC procedures and occupational safety procedures. Conducted developmental research of the most advanced manufacturing machines and processes including writing of formal reports. Developed project cost analysis. Developed/improved manufacturing processes.

DECLARATION OF
Dr. Obed Odoemelam

I**, Obed Odoemelam** declare as follows:

1. I am presently employed by the California Energy Commission in the **Environmental Protection Office** of the Systems Assessments and Facilities Siting as a **Staff Toxicologist**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Public Health** for the **Avenal Energy Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 5/6/09 Signed: Original signature in Dockets

At: Sacramento, California

DECLARATION OF
Dr. Obed Odoemelam

I**, Obed Odoemelam** declare as follows:

1. I am presently employed by the California Energy Commission in the **Environmental Protection Office** of the Systems Assessments and Facilities Siting as a **Staff Toxicologist**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Transmission Line Safety and Nuisance for** the **Avenal Energy Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 5/6/09 Signed: Original signature in Dockets

At: Sacramento, California

RESUME

DR. OBED ODOEMELAM

EDUCATION:

1979-1981 University of California, Davis, California. Ph.D., Ecotoxicology

1976-1978 University of Wisconsin, Eau Claire, Wisconsin. M.S., Biology.

1972-1976 University of Wisconsin, Eau Claire, Wisconsin. B.S., Biology

EXPERIENCE:

1989
The Present: California Energy Commission. Staff Toxicologist.

Responsible for the technical oversight of staffs from all Divisions in the Commission as well as outside consultants or University researchers who manage or conduct multi-disciplinary research in support of Commission programs. Research is in the following program areas: Energy conservation-related indoor pollution, power plant-related outdoor pollution, power plant-related waste management, alternative fuels-related health effects, waste water treatment, and the health effects of electromagnetic fields. Serve as scientific adviser to Commissioners and Commission staff on issues related to energy conservation. Serve on statewide advisory panels on issues related to multiple chemical sensitivity, ventilation standards, electromagnetic field regulation, health risk assessment, and outdoor pollution control technology. Testify as an expert witness at Commission hearings and before the California legislature on health issues related to energy development and conservation. Review research proposals and findings for policy implications, interact with federal and state agencies and industry on the establishment of exposure limits for environmental pollutants, and prepare reports for publication.

1985-1989 California Energy Commission.

Responsible for assessing the potential impacts of criteria and noncriteria pollutants and hazardous wastes associated with the construction, operation and decommissioning of specific power plant projects. Testified before the Commission in the power plant certification process, and interacted with federal and state agencies on the establishment of environmental limits for air and water pollutants.

1983-1985 California Department of Food and Agriculture.

Environmental Health Specialist.

Evaluated pesticide registration data regarding the health and environmental effects of agricultural chemicals. Prepared reports for public information in connection with the eradication of specific agricultural pests in California.

DECLARATION OF
Joseph Diamond Ph. D.

I, Joseph Diamond, declare as follows:

1. I am presently employed by the California Energy Commission as a Planner II-Economist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on Socioeconomics for the Avenal Energy project (Avenal Energy) based on my analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 5/6/2009 Signed: Original signature in Dockets

At: Sacramento, California

Joseph Diamond Ph. D.
Work:(916)654-3877

Ph.D. with experience in economic policy.

BUSINESS AFFILIATION

California Energy Commission
1516 9th St. MS-40
Sacramento, CA 95814

EDUCATION

Michigan State University	Ph.D.	Resource Development
University of Rhode Island	M.A.	Economics
University of New Hampshire	B.A.	Economics

DECLARATION OF

I, Casey Weaver, declare as follows:

1. I am presently employed by the California Energy Commission in the Facilities Siting Office of the Systems Assessments and Facilities Siting Division as an Engineering Geologist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Soil/Water** and **Waste Management** for the Avenal Energy project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 6/01/09 Signed: Original signature in Dockets

At: Sacramento, California

CASEY W. WEAVER, RG, CEG
1621 Delta Drive
Woodland, CA 95695
(530) 662-0482

SUMMARY OF EXPERIENCE:

Certified Engineering Geologist with over 20 years of environmental and geotechnical consulting experience. Experience includes remedial investigations and feasibility studies (RI/FS), groundwater investigations, corrective action plans, landfill studies (SWATs, siting, closure), preliminary environmental site assessments (PESA, Phase I), regulatory compliance (RCRA/CERCLA), geotechnical investigation/evaluation, geologic hazard evaluations, active fault evaluations, seismic studies, landslide evaluation/repair, foundation suitability studies, personnel management and business development.

EDUCATION:

B.S. Geology, Humboldt State University, Arcata, CA, 1981
University of California, Davis Extension Courses

REGISTRATIONS/LICENCES/CERTIFICATIONS:

Certified Engineering Geologist, California
Registered Geologist, California, Oregon, Arizona
Registered Environmental Assessor
OSHA 1910.120 Hazardous Waste Operations and Emergency Response - 40hr
OSHA 1910.120 Hazardous Waste Operations and Emergency Response -Supervising Operations at Hazardous Waste Sites.

PROFESSIONAL HISTORY:

2008 to Present **Engineering Geologist**
California Energy Commission, Sacramento, CA

Duties within the Water and Soils Unit of the Environmental Office in the Facilities Siting Division include review and evaluation of applications for certification of thermal power plants within the state of California. The focus of the work is on sensitive project sites that may have issues involving groundwater and surface water resources, soil erosion, flooding potential, water quality and plant-derived waste generation and disposal. In addition, evaluate construction, operation and maintenance of the facilities and conduct investigations to determine if violations of the program's regulations, the Energy Commission's conditions of certification, or the California Environmental Quality Act (CEQA) have occurred.

2001 to 2008

Engineering Geologist
State Water Resources Control Board, Headquarters, Sacramento, CA

With the UST Enforcement Unit, under direction from the State Attorney General's Office, conducted inspections of UST systems to evaluate compliance with 1998 upgrade requirements. This work culminated in the largest settlement of its kind in the nation's history. In addition, conducted surveillance of unlawful discharges from remediation systems and conducted investigations of UST Fund fraud cases.

With the USTCF Technical Review Unit, evaluated the technical elements of USTCF claims.

With the Division of Financial Assistance, assisted with the development of program policy for the Agricultural Water Quality Grant Program ($46 million) and the Integrated Water Quality Grant Program ($380 million), participated in stakeholder workshops, contributed to multijurisdictional work groups for program development and implementation.

With the Office of Enforcement, conducted investigations of operator misconduct, wrote enforcement investigation reports and prepared disciplinary letters.

1998 to 2001

Senior Engineering Geologist
BSK & Associates, Rancho Cordova, CA

Designed and directed hydrogeologic investigations for use with environmental remediation projects. Supervised field personnel installing groundwater monitoring wells, conducting aquifer tests & SVE pilot tests, reviewed reports and workplans, and conducted business development.

Conducted review of Alquist-Priolo active fault hazard reports as county geologist for Kern County.

1993 to 1998

Senior Geologist, Geoscience Team Leader and RI/FS Task Leader
LAW Engineering and Environmental Services, Inc., Sacramento, CA

As Geoscience Team Leader, responsible for career development, training and personnel management of ten employees. This group consisted of 3 senior-level geologists, 4 project level geologists and scientists, 2 junior level geologists and 1 technician.

As RI/FS Task Leader, responsible for the development of cost estimates/budgets, preparation of Work Plans and Sampling and Analysis Plans, management of field activities, data collection and documentation associated with the investigation of 15 Installation Restoration Program

sites at Beale Air Force Base awarded under several Delivery Orders with combined project budgets of $18 million. Also responsible for aerial photographic interpretations associated with a basewide (23,000 acres), Preliminary Assessment, and preparation of a basewide Hydrogeologic Evaluation Report.

1990 to 1993

Senior Project Manger/General Manager
Earthtec, Ltd., Roseville, CA

Management of Environmental Department, business development, preparation of cost estimates and proposals, client and regulatory agency interface, supervision and training, report writing, technical review, budget management, and quality control. Initiated and supported the development of company's wetland and wildlife departments. Typical projects included preliminary sire assessments, soil vapor studies, detailed hydrogeologic evaluations, waste plume delineations, and development of remediation alternatives associated with landfills, service stations, bulk oil facilities and other potentially contaminated sites.

1981 to 1990

Project Geologist
SHN Group, Inc. Eureka, CA

Managed project work directed toward solving environmental issues at variably contaminated sites and provided geotechnical information for land development and construction. Responsibilities included development of cost estimates/budgets, planned and supervised field operations, collected and interpreted subsurface information, evaluated areas traversed by Alquist-Priolo Special Studies Zones and sites subject to slope stability hazards. Typical projects included geotechnical evaluations and geologic hazard studies for major subdivisions, hospitals, schools, lumber companies, run-of-the-river hydroelectric projects, underground storage tank sites, and solid waste landfills.

1979 to 1981

Geologist/Seismologic Technician
Woodward-Clyde Consultants, San Francisco, CA

Designed and operated a laboratory model to study surface effects of thrust faulting in connection with seismic evaluation studies for the PG&E Humboldt Bay nuclear reactor. In addition, installed and operated field seismographs in the Humboldt Bay region.

DECLARATION OF
James Adams

I, **James Adams** declare as follows:

1. I am presently employed by the California Energy Commission in the Environmental Office of the Siting, Transmission, and Environmental Protection Division as a **Planner II**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Traffic and Transportation** for the **Avenal Energy** project based on my independent analysis of the Small Power Plant Exemption and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 6, 2009 Signed: Original signature in Dockets

At: Sacramento, California

James S. Adams, M.A.
Environmental Protection Office
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5504
PH (916) 653-0702, FAX (916) 651-8868
jadams@energy.state.ca.us

5/1999
Present **Environmental Planner**
Review applications for certification to acquire permits from the California Energy Commission to build electric generating power plants. Specific technical fields include socioeconomics, traffic and transportation, land use and visual resources. Work on special projects as requested.

11/1997
Present **Energy and Resource Consultant**
Provide clients with technical expertise on various issues related to natural resource use and development. Current activities include managing an intervention by the Surfrider Foundation before the California Public Utilities Commission regarding decommissioning issues concerning Humboldt Bay, Diablo Canyon and San Onofre nuclear reactors.

9/1994--
10/1997 **Senior Analyst - Safe Energy Communication Council (SECC)**
Responsible for developing and/or implementing campaigns on various energy issues involving the promotion of energy efficiency and renewable energy and advocating less reliance on nuclear power. Managed educational outreach efforts to newspaper editorial writers throughout the U.S. to encourage coverage of energy issues. Participated in meetings and negotiations with key Clinton administration officials, members of Congress and staff, national coalitions, and grassroots organizations on important energy issues (e.g. U.S. Department of Energy Budget for Fiscal Years 1996-1998). Successfully raised $140,000 from private foundations to support SECC activities.

6/1978--
12/1992 **Principal Consultant - Redwood Alliance**
Provided consulting services to the Alliance; a renewable energy/political advocacy organization. Major responsibilities included managing and/or participating in several interventions/appearances before the California Public Utilities Commission, California Energy Commission, California Legislature, U.S. Congress and the U.S. Nuclear Regulatory Commission. Issues included electric utility planning options, greater reliance on energy efficiency and renewable energy, nuclear power economic analyses, decommissioning cost estimates, and nuclear waste management and disposal.

2/1983--
8/1986 **Natural Resource Specialist**
Assisted private consulting, firms, non-profit corporations and government agencies in various projects related to the enhancement and protection of national forests in Northern California and Southern Oregon. This included contracts with the U.S. Forest Service, Fish and Wildlife Service, National Park Service, the California Coastal Conservancy, and private landowners.

6/1978--
present Consultant/Journalist/Paralegal/Lobbyist
Throughout the period of work outlined above, I have written a considerable amount of news articles and reports connected to ongoing-projects and issues of personal interest. The leg, al/administrative interventions have required extensive paralegal work to support attorneys, and technical expertise to identify and assist consultants. In addition, many of the projects required consulting services and lobbying, at the local, state and federal level whenever necessary, as well as working with the print and television media as appropriate.

From 1978 through 1984 1 served on the Board of Directors for two locals non-profit agencies devoted to sustainable community development, Redwood Community Development Council and Redwood Community Action Agency (RCAA). I also was hired on staff at RCAA as a natural resource specialist which is explained more fully above. I am proficient with computers, printers, fax machines and related equipment.

EDUCATION

M.A. Social Science. Political science and natural resources emphasis. California State University at Humboldt. Graduated December 1988.

B.A. Political Science. Political and economic aspects of natural resource development, with a particular emphasis in forest ecology and appropriate technology. California State University at Humboldt. Graduated June 1978.

Academic
Honors. Member of PI GAMMU MU Honor Society since 1986.

MILITARY SERVICE

7/1969--
9/1975 U.S. Navy. Air Traffic Controller.
Honorable Discharge.

DECLARATION OF
Mark R. Hamblin

I, Mark R. Hamblin declare as follows:

I am presently employed by the California Energy Commission in the Environmental Protection Office of the Siting, Transmission, Environmental Protection Division as a Planner II.

My professional qualifications and experience were included in the FSA, and are incorporated by reference herein.

I prepared the additional staff testimony for the Visual Resources section for the proposed Avenal Energy Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 7, 2009 Signed: Original signature in Dockets

At: Sacramento, California

MARK R. HAMBLIN

Summary

Public administrator/land use planner with 15 years experience addressing land use development matters of concern to citizens and government leaders. Expertise in interpreting public policy pertaining to land use and environmental assessment. Demonstrated ability in working with individuals, and on teams involved in the development permitting process.

Professional Experience

California Energy Commission, Sacramento, CA.
Planner II November 2000 to present.
Prepares an independent technical analysis in the area(s) of land use, traffic & transportation, and visual resources to inform interested persons and to make recommendations to the Energy Commission regarding the consequences of a natural gas fired power generation plant proposal; reviews information provided by the applicant and other sources to assess the environmental effects of a proposal as required by the California Environmental Quality Act (CEQA), and the California Energy Commission siting regulations; evaluates project in accordance with federal, state and local laws, ordinances, regulations, standards (LORS); coordinates proposal with federal, state and local agencies; conducts field studies; oversees technical consultant(s); participates in public workshop(s) on proposal; presents sworn testimony during evidentiary hearings; implements compliance monitoring programs for projects approved by the Energy Commission to ensure that power plants are constructed and operated according to the conditions of certification of their license.

Yolo County Planning and Public Works Department, Woodland, CA.
Associate Planner June 1992 to October 2000.
Advised and assisted individuals in the processing of land use requests (general plan amendments, conditional use permits, subdivision maps, etc.); reviewed information provided by the applicant and other sources for consistency with the state zoning and planning law, the county General Plan, the county government code, and the requirements of the CEQA; collected and analyzed information pertaining to a land use request and presented it in a staff report for consideration by the county planning commission and/or county board of supervisors; board of supervisors liaison, and planning department staff person to citizen and inter-agency committees (county airport advisory committee, county habitat conservation plan steering committee, and community general plan citizen advisory committee(s); drafted zoning ordinances and regulations; prepared environmental assessment documents in accordance with CEQA and NEPA (National Environmental Protection Act); hired and supervised consultants; executed county zoning administrator duties; conducted zone code enforcement; reviewed building plans for issuance of permits; answered questions at the public counter, or on the telephone regarding land use issues and development proposals in the County.

Yolo County Community Development Agency, Woodland, CA.
Assistant Planner January 1991 to June 1992.
Advised and assisted individuals in the processing of land use requests; reviewed information provided by the applicant and other sources for consistency with the county

General Plan, the state and county government code, and the requirements of CEQA; collected and analyzed information pertaining to a land use request and presented it in a staff report for consideration by the county planning commission; drafted zoning ordinances; prepared environmental assessment documents in accordance to the CEQA; supervised consultants; conducted zone code enforcement; reviewed building plans for issuance of permits; answered questions at the public counter, or on the telephone regarding land use and development in the County.

Tulare County Planning and Development Department, Visalia, CA.
Planning Technician II March 1988 to January 1990.
Advised and assisted individuals in the processing of land use requests, specifically special-use permits, variances, parcel and subdivision maps; reviewed information provided by the applicant and other sources for consistency with the county General Plan, the state and county government code, and the requirements of CEQA; collected and evaluated information for presentation in a staff report on the proposed land use request for consideration by the county zoning administrator, site plan review committee, or planning commission; prepared environmental assessment documents in accordance with CEQA; conducted zone code enforcement; reviewed building plans for issuance of permits; answered questions at the public counter, or on the telephone regarding land use and development in the County.

Education

University of California, Davis Extension. Coursework in California Land Use Planning and the California Environmental Quality Act 1988 to 1995.
Cosumnes River College. Coursework in Television and Radio Broadcasting1990 to 1991.
California State University, Bakersfield. Master of Public Administration; August 1988. Concentration in Public Policy. Coursework in Business Administration and Political Science.
California State University, Sacramento. Bachelor of Science in Public Administration; May 1984. Concentration in Human Resources Management.
Porterville College. Associate in Arts Social Science; May 1982. Coursework in Administration of Justice.

Awards

2001 Superior Accomplishment Award - Recognition of outstanding performance and contribution as a Team Member of the “21 Day, 4, 6, and 12 Month Processes Team.” California Energy Commission.

2001 Superior Accomplishment Award - Recognition of outstanding performance and contribution as a Team Member of the “Expedited 4 Month AFC/SPPE Team,”
California Energy Commission.

DECLARATION OF
Steve Baker

I, Steve Baker, declare as follows:

1. I am presently employed by the California Energy Commission in the Engineering Office of the Siting, Transmission and Environmental Protection Division as a Senior Mechanical Engineer.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Facility Design**, and supervised preparation of the staff testimony on **Power Plant Efficiency, Power Plant Reliability, Noise and Vibration** and **Geology and Paleontology**, for the Avenal Energy Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 6, 2009 Signed: Original signature in Dockets

At: Sacramento, California

STEVE BAKER, P.E.
Senior Mechanical Engineer

Experience Summary

Thirty-four years experience in the electric power generation field, including mechanical design, QA/QC, construction/startup and business development/licensing of nuclear, coal-fired, hydroelectric, geothermal and windpower plants; and engineering and policy analysis of thermal power plant regulatory issues.

Education

- California State University, Long Beach--Master of Business Administration
- California State Polytechnic University, Pomona--Bachelor of Science, Mechanical Engineering
- Registered Professional Engineer (Mechanical), California —
  No. M27737 expires 6/30/2010

Professional Experience

1990 to Present--Senior Mechanical Engineer, Facilities Siting Division - California Energy Commission

Technical lead person for the analysis of generating capacity, reliability, efficiency, noise, geology, paleontology and the mechanical, civil/structural and geotechnical engineering aspects of power plant siting cases. Key contributor to Commission's investigation into market impediments to the deployment of advanced high-efficiency generating technologies.

1987 to 1990--Generation Systems/Facility Design Unit Supervisor, Siting & Environmental Division - California Energy Commission

Responsible for supervising the analysis of generating capacity, reliability, efficiency, safety, and mechanical, civil/structural, and geotechnical engineering aspects of power plant siting cases.

1981-1986--Operations Manager, Alternate Energy - Santa Fe Pacific Realty Corporation

Participated in and supervised identification, evaluation and feasibility analysis, licensing and permitting of hydroelectric, geothermal, windpower and biomass power projects.

1974-1981--Mechanical Engineer, Quality Engineer - Bechtel Power Corporation and Bechtel National, Inc.

Wrote equipment specifications, drew flow diagrams and P&ID's, performed system design and safety analysis for nuclear power plants and nuclear fuel processing plant. Wrote and implemented QA/QC procedures for nuclear power plant. Participated in construction/startup of large coal-fired power plant.

DECLARATION OF
Testimony of Dal Hunter, Ph.D., C.E.G.

I, **Dal Hunter, Ph.D., C.E.G.,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission, Systems Assessment and Facilities Siting Division, as an engineering geologist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **GEOLOGY AND PALEONTOLOGY** for the **Avenal Energy Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 7, 2009 Signed: _____

At: Black Eagle Consulting, Inc.
Reno, Nevada

REGISTERED GEOLOGIST
ROBERT DALTON HUNTER
No. 1411
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

exp. 3.31.11

Robert D. Hunter, Ph.D., C.E.G.
Engineering Geologist
Vice President

Education

- Ph.D. – Geology – 1989 – University of Nevada, Reno
- M.S. – Geology – 1976 – University of California - Riverside
- B.S. – Geology – 1972 – California State University, Fullerton

Registrations

- Professional Geological Engineer – Nevada
- Registered Geologist – California
- Certified Engineering Geologist – California

Experience

1997 to Present: Black Eagle Consulting, Inc.; Vice President. Dr. Hunter is in charge of all phases of geochemical, geological, and geotechnical projects and is responsible for conducting, coordinating, and supervising geotechnical investigations for public and private sector clients. He is very familiar with design specifications and state and federal requirements.

Dr. Hunter has also provided geological, geotechnical, and paleontological review and written and oral testimony for California Energy Commission (CEC) power plant projects including:

- El Segundo Power Redevelopment Project (Coastal)
- Magnolia Power Project (including compliance monitoring
- Ocotillo Energy Project (Wind Turbines)
- Vernon-Malburg Generating Station
- Inland Empire Energy Center (including testimony and compliance monitoring)
- Palomar Energy Project
- Henrietta Peaker Project
- East Altamont Energy Center
- Avenal Energy Center
- Teayawa Energy Center monitoring
- Walnut Energy Center (including compliance monitoring
- Riverside Energy Resource Center
- Salton Sea Unit 6 (Geothermal Turbines)
- National Modoc Power Plant
- Pastoria Energy Center
- Otay Mesa Generating Project (compliance monitoring)
- Montainview Power Plant Project (compliance)
- Consumes Power plant (compliance monitoring)
- Sunrise Power Project (compliance monitoring)

Attended Expert Witness Training Sponsored by CEC.

1978 to 1997: SEA, Incorporated; Geotechnical Manager, Engineering Geologist. Dr. Hunter was in charge of all phases of geotechnical projects for SEA, including project coordination and supervision, field exploration, geotechnical analysis, slope stability analysis, soil mechanics, engineering geochemistry, mineral and aggregate evaluations, and report preparation. Numerous investigations were undertaken on military, commercial, industrial, airport, residential, and roadway projects. He worked on many geothermal power plants, providing expertise in foundations design, slope stability, seismic assessment, geothermal hazard evaluation, expansive clay, and settlement problems. Project types included high-rise structures, airports, warehouses, shopping centers, apartments, subdivisions, storage tanks, roadways, mineral and aggregate evaluations, slope stability analyses, and fault studies.

1977 to 1978: Fugro (Ertec) Incorporated Consulting Engineers and Geologists; Staff Engineering Geologist; Long Beach, California.

Affiliations

- Association of Engineering Geologists

Publications

- Hunter, 1988, *Lime Induced Heave in Sulfate Bearing Clay Soils*, Journal of Geotechnical Engineering, ASCE, Vol. 14, No. 2, pp. 150-167.

- Hunter, 1989, *Applications of Stable Isotope Geochemistry in Engineering Geology*: Proceedings of the 25th Annual Symposium on Engineering Geology and Geotechnical Engineering.

- Hunter, 1993, *Evaluation of Potential Settlement Problems Related to Salt Dissolution in Foundation Soils*: Proceedings of the 29th Annual Symposium on Engineering Geology and Geotechnical Engineering.

DECLARATION OF
Erin Bright

I**, Erin Bright,** declare as follows:

1. I am presently employed by the California Energy Commission in the **Engineering Office** of the Siting Transmission and Environmental Protection Division as a **Mechanical Engineer**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Power Plant Efficiency** and **Power Plant Reliability** for the **Avenal Power Center Project** based on my independent analysis of the Application, supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 2, 2009 Signed: Original signature in Dockets

At: Sacramento, California

Erin Bright
Mechanical Engineer

Experience Summary

One year of experience in the electric power generation field, including analysis of noise pollution, construction/licensing of electric generating power plants, and engineering and policy analysis of thermal power plant regulatory issues. One year of experience in the alternative energy field, including analysis of alternative fuel production and use.

Education

- University of California, Davis--Bachelor of Science, Mechanical Engineering and Materials Science
- University of California, Davis Extension Program--Renewable Energy Systems

Professional Experience

2007 to Present-- Mechanical Engineer, Energy Facilities Siting Division - California Energy Commission

Performed analysis of generating capacity, reliability, efficiency, noise, and the mechanical, civil/structural and geotechnical engineering aspects of power plant siting cases.

2006 to 2007--Energy Analyst, Fuels & Transportation Division - California Energy Commission

Performed analysis of use potential and environmental effects of emerging non-petroleum fuels, including compressed natural gas, biomass, hydrogen and electricity, in heavy and light duty transportation vehicles. Contributor to Energy Commission's alternative fuels plan.

DECLARATION OF
Ajoy Guha

I**, Ajoy Guha** declare as follows:

1. I am presently employed by the California Energy Commission in the Engineering Office of the Energy Facilities Siting and Environmental Protection Division as a Associate Electrical Engineer

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Transmission System Engineering** section, for the **Avenal Energy Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 6/2/09 Signed: Original signature in Dockets

At: Sacramento, California

RESUME

AJOY GUHA

Associate Electrical Engineer
California Energy Commission
1516 Ninth Street, MS 46
Sacramento, CA 95814

EDUCATION:

MSEE, POWER SYSTEMS ENGINEERING, PURDUE UNIVERSITY, INDIANA
BSEE, ELECTRICAL ENGINEERING, CALCUTTA UNIVERSITY, INDIA

CERTIFICATIONS:

REGISTERED PROFESSIONAL ENGINEER, CALIFORNIA, INDIANA & ILLIINOIS
MEMBER OF IEEE; MEMBER OF THE INSTITUTION OF ENGINEERS OF INDIA

SUMMARY OF PROFESSIONAL BACKGROUND:

Ajoy Guha, P. E. has 34 years of electric utility experience with an extensive background in evaluating and determining current and potential transmission system reliability problems and their cost effective solutions. He has a good understanding of the transmission issues and concerns. He is proficient in utilizing computer models of electrical systems in performing power flow, dynamic stability and short circuit studies, and provide system evaluations and solutions, and had performed generator interconnection studies, area transfer and interconnected transmission studies, and prepared five year transmission alternate plans and annual operating plans. He is also experienced in utilizing Integrated Resource Planning computer models for generation production costing and long term resource plans, and had worked as an Executive in electric utilities and experienced in construction, operation, maintenance and standardization of transmission and distribution lines.

WORK EXPERIENCE:

CALIFORNIA ENERGY COMMISSION, ENERGY FACLITIES SITING AND ENVIRONMENTAL DIVISION, SACRAMENTO, CA, 11/2000-Present.
Working as Associate Electrical Engineer in the Transmission System Engineering unit on licensing generation projects. Work involves evaluating generation interconnection studies and their impacts on transmission system, and providing staff assessments and testimony to the commission, and coordination with utilities and other agencies.

ALLIANT ENERGY, DELIVERY SYSTEM PLANNING, MADISON, WI, 4/2000-9/2000.
Worked as Transmission Services Engineer, performed Generator Interconnection studies and system planning studies.

IMPERIAL IRRIGATION DISTRICT, POWER DEPT., Imperial, California, 1985-1998.
Worked as Senior Planning Engineer in a supervisory position and in Transmission, Distribution and Integrated Resource planning areas. Performed interconnection studies for 500 MW geothermal plants and developed plan for a collector system, developed methodologies for transmission service charges , scheduling fees and losses. Worked as the Project Leader in the 1992 Electricity Report (ER 92) process of the California Energy Commission. Worked as the Project Leader for installation of an engineering computer system and softwares. Assumed the Project Lead in the standardization of construction and materials, and published construction standards.

CITY LIGHT & POWER, Frankfort, Indiana, 1980 – 1985.
Worked as Assistant Superintendent and managed engineering, construction and operation depts.

WESTERN ILLINOIS POWER CO-OP., Jacksonville, Illinois, 1978 – 1980.
Worked as Planning Engineer and was involved in transmission system planning.

THE CALCUTTA ELECTRIC SUPPLY CORPORATION LTD. (CESC), Calcutta, India, 1964 –1978.
Worked as District Engineer and was responsible for managing customer relations, purchasing and stores, system planning, construction, operation and maintenance departments of the most industrialized Transmission and Distribution division of the Utility. Worked as PROJECT MANAGER for construction of a 30 mile Double Circuit 132 kV gas-filled Underground Cable urban project. During 1961-63, worked as Factory Engineer for design, manufacturing and testing of transformers, motor starters and worked in a coal-fired generating plant.

DECLARATION OF
Mark Hesters

I**, Mark Hesters** declare as follows:

1. I am presently employed by the California Energy Commission in the **Strategic Transmission Planning Office** of the Siting, Transmission and Environmental Protection Division as a **Senior Electrical Engineer**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Transmission System Engineering**, for the **Avenal Energy Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 1, 2009 Signed: Original signature in Dockets

At: Sacramento, California

Mark Hesters
Associate Electrical Engineer

Mark Hesters has sixteen years of experience in electric power regulation. He worked in the Engineering Office of the California Energy Commission's Energy Facilities Siting & Environmental Protection Division since 1998 providing analysis of California transmission systems and testimony on transmission systems in several Commission power plant certification processes. Prior to that Mark worked in the CEC's Electricity Analysis Office providing lead analysis on Southern California Edison resource issues and modeling support for all areas of California. He holds a B.S. degree from the University of California at Davis in Environmental Policy Analysis and Planning.

DECLARATION OF
Christopher Meyer

I**, Christopher Meyer,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission, Siting, Transmission and Environmental Protection Division, as a **Project Manager**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Alternatives Analysis** for the **Avenal Energy Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 1, 2009 Signed: Original signature in Dockets

At: Sacramento, California

CHRISTOPHER J. MEYER
Archaeologist/Lead Compliance Manager

ACADEMIC BACKGROUND
B.A., Biological Anthropology
California State University, Hayward, 1993

PROFESSIONAL EXPERIENCE

Mr. Meyer's background combines strong experience in environmental inspection and compliance management on large-scale construction projects with a solid background in archaeological field investigations. He has worked closely with construction contractors, agency representatives, and Native American tribal governments to ensure projects are built on time, within budget, and in compliance with all environmental requirements. In addition to field experience, he has produced reports, document, and permit applications, and has reviewed mitigation measures for federal, State, and local government agencies as well as corporations.

Aspen Environmental Group 1999 to present

Compliance Project Manager, Siting and Construction of Power Plants. Under contract to the California Energy Commission (CEC), Mr. Meyer serves as a Compliance Project Manager and supervises technical staff members, preparing the CEC's Conditions of Certification for construction of power plants across the State as well as managing on-going operational issues with power plants currently under license with the CEC. Responsibilities included: preparation of amendments to conditions of certification for existing power plants; review of applications for new power plants; drafting of Memoranda of Understanding with Chief Building Officials; coordinating with affected agencies to resolve concerns with potential impacts to cultural resources or threatened or endangered species; maintaining contractor construction milestones, detailed reporting; development of mitigation measures; conflict resolution; and inspection for compliance with the Conditions of Certification.

Lead Environmental Monitor, SDG&E Miguel-Mission 230 kV #2 Project Construction Monitoring and Supplemental Environmental Review Program. Under contract to the California Public Utilities Commission (CPUC), Mr. Meyer serves as Lead Environmental Monitor and supervises one environmental monitor in the field, monitoring the implementation of the CPUC environmental impact report's conditions of approval for construction of the overhead 230 kV electric transmission line and substations upgrades. The project includes installing a new 230 kV circuit on existing towers along the 35-mile right-of-way, as well as relocating 69 kV and 138 kV circuits on approximately 80 steel pole structures. In addition, the Miguel Substation and Mission Substation would be modified to accommodate the new 230 kV transmission circuit. Responsibilities include: supervision, guidance and development of environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, review of variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; and coordination with SDG&E, construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

Lead Environmental Monitor, SCE Viejo Systems Project Construction Monitoring and Supplemental Environmental Review Program. Under contract to the California Public Utilities Commission (CPUC), Mr. Meyer served as Lead Environmental Monitor and supervises one environmental monitor in

the field, monitoring the implementation of the CPUC negative declaration's conditions of approval for construction of the overhead 66 kV and 220 kV electric transmission lines and substation upgrades and construction. This Southern California Edison (SCE) project involves the installation of a 220/66/12 kV substation and 3.1-mile 66 kV transmission line in southern Orange County, California. The transmission line will traverse residential and recreational areas in the City of Mission Viejo and the substation is located in a business park adjacent to a wilderness area in the City of Lake Forest. Responsibilities include: supervision, guidance and development of environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, review of variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; and coordination with SDG&E, construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

Lead Environmental Monitor, U.S. Army Corps of Engineers Prado Dam and Reach 9 Project Construction Monitoring Program. Under contract to the U.S. Army Corps of Engineers (Corps), Mr. Meyer serves as Lead Environmental Monitor and supervises one environmental monitor in the field, monitoring the implementation of the Corps environmental regulations during expansion of the Prado Dam and associated downstream modifications. Responsibilities include: supervision, guidance and development of environmental monitoring in the field as well as the compliance review of pre-construction plans, such as the Storm Water Pollution Prevention Plan, and mitigation compliance documentation, variance requests; recommendations for Corps issuance of Notices to Proceed with construction and variance approvals; and coordination with construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

Lead Environmental Monitor, PG&E Tri-Valley 2002 Capacity Increase Project Construction Monitoring and Supplemental Environmental Review Program. Under contract to the California Public Utilities Commission (CPUC), Mr. Meyer serves as Lead Environmental Monitor and supervises two environmental monitors in the field, monitoring the implementation of the CPUC environmental impact report's conditions of approval for construction of this combination overhead and underground 230 kV electric transmission lines and substations. Construction involves underground installation of the double-circuit 230 kV transmission line conduit and construction of a substation and several transition stations as three separate phases. Responsibilities include: supervision, guidance and development of environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; and coordination with PG&E, construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

Lead Environmental Monitor, PG&E Atlantic Del Mar Project. Under Aspen's environmental services contract with CPUC, Mr. Meyer serves as Lead Environmental Monitor and supervises one environmental monitor in the field for the mitigation monitoring, compliance, and reporting program for PG&E's Atlantic Del Mar Project in the Cities of Rocklin and Roseville. This approximate four-mile transmission line involves both underground and overhead construction. The project right-of-way will traverse potential habitats for listed vernal species and areas containing historic resources. The project is currently in the construction phase which is expected to be completed by January 2006.

Project Manager, Monitoring, PG&E Jefferson-Martin 230 kV Transmission Line Project. Under contract to CPUC, Mr. Meyer serves as Lead Environmental Monitor and supervises two environmental monitors in the field, monitoring the implementation of the CPUC compliance, and reporting program for the PG&E Jefferson-Martin Project. This project involves the installation of a 27-mile 230 kV transmission line through scenic San Mateo County in the Highway 280 corridor, urban Colma and Daly City, and across San Bruno Mountain. Responsibilities include: supervision, guidance and development of

environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; and coordination with PG&E, construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

Lead Environmental Monitor, U.S. Army Corps of Engineers Murrieta Creek Flood Control, Environmental Restoration, and Recreation Project Construction Monitoring Program. Under contract to the U.S. Army Corps of Engineers (Corps), Mr. Meyer served as Lead Environmental Monitor in the field, monitoring the implementation of the Corps environmental regulations during Phase 1 of the project. Responsibilities included: pre-construction special status species surveys, protection of sensitive species habitat, guidance and development of environmental monitoring in the field as well as the compliance review of pre-construction plans, such as the Storm Water Pollution Prevention Plan, and mitigation compliance documentation, variance requests; and coordination with construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

Cultural Resources Lead, Ventura County Watershed Protection Division Los Padres National Forest Rain Gage Survey. Under contract to Ventura County, Mr. Meyer served as the Lead Archaeologist on literature search and field surveys for Ventura County's application for a renewal of their Forest Service Use Permit. Mr. Meyer conducted literature searches in both the Forest Service's archaeological records and at the California State University Fullerton Information Center. In addition, he conducted pedestrian surveys at the various rain gage locations and provided written reports on the findings.

Lead Environmental Monitor, Department of Water Resources Santa Ana Pipeline Project Construction Monitoring Program. Under contract to the Department of Water Resources (DWR), Mr. Meyer served as Lead Environmental Monitor in the field, monitoring the implementation of the DWR environmental regulations during repairs of sections of the 10-foot in diameter pipeline in San Bernardino and Riverside Counties. Responsibilities included: guidance and development of environmental monitoring in the field as well as the compliance review of pre-construction plans, such as the Storm Water Pollution Prevention Plan, and mitigation compliance documentation, and coordination with construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

Compliance Project Manager, Emergency Siting and Construction of Peaker Power Plants. Under contract to the California Energy Commission (CEC), Mr. Meyer served as a Compliance Project Manager and supervised technical staff members, preparing the CEC's Conditions of Certification for construction of emergency power plants across the State. Responsibilities included: review of applications for new emergency power plants; drafting of Memoranda of Understanding with Chief Building Officials; coordinating with affected agencies to resolve concerns with potential impacts to cultural resources or threatened or endangered species; maintaining contractor construction milestones, detailed reporting; development of mitigation measures; conflict resolution; and inspection for compliance with the Conditions of Certification.

Archaeologist, California Energy Commission Coastal Plant Study. This research study undertaken by the California Energy Commission (CEC) examined the engineering and environmental issues associated with 24 coastal power plants. The purpose of the study was to identify, describe, and analyze issues with the potential to substantially delay or complicate the certification process for future applications to the Energy Commission for expansion or modernization of existing coastal power plants. For this study, Mr. Meyer was responsible for performing site surveys and reviewing documentation for cultural resources for all 24 Coastal Power Plants.

Lead Environmental Monitor, PG&E Northeast San Jose Transmission Reinforcement Project Construction Monitoring and Supplemental Environmental Review Program. Under contract to the California Public Utilities Commission (CPUC), Mr. Meyer served as Lead Environmental Monitor and supervised two environmental monitors in the field, monitoring the implementation of the CPUC environmental impact report's conditions of approval for construction of this combination overhead and underground 230 kV electric transmission lines and substations in the Cities of San Jose, Milpitas, and Fremont. Construction of the dual 230kV circuit involved underground construction, single-pole tower installation, and construction of the Los Esteros Substation. Given the proximity of the project to the Bay, sensitive biological resources were present, including the burrowing owl and wetland mitigation sites. Responsibilities included: supervision, guidance and development of environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; and coordination with PG&E, construction managers and subcontractors, and landowners, local municipalities, affected and interested agencies and the public.

Lead Environmental Monitor, Level 3 Fiber Optics Network Construction Monitoring and Supplemental Environmental Review Program. Under contract to the California Public Utilities Commission (CPUC), Mr. Meyer served as Lead Environmental Monitor and supervised up to five environmental monitors in the field, monitoring the implementation of the CPUC's broad conditions of approval for construction of this 2,000-mile fiber optics network across the State. Responsibilities included: supervision, guidance and development of environmental monitors in field monitoring as well as the compliance review of pre-construction plans and mitigation compliance documentation, variance requests and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; preparation of weekly reports for all monitoring activity; and extensive coordination with Level 3, construction managers and subcontractors, railroad managers and other landowners, local municipalities, affected and interested agencies and the public.

Environmental Monitor, Kinder Morgan/SFPP Carson-Norwalk Pipeline MMCRP. Monitored the pipeline company's inspection team for compliance with CPUC conditions of approval during construction of 13 miles of petroleum products pipeline and four stations. Monitored for hazardous materials management, storm water pollution prevention, and biological and cultural resources. Maintained daily written documentation of compliance activities.

GPS Field Technician, Spine Flower Survey, U.S. Army Corps of Engineers. Mr. Meyer participated in a survey for the slender-horned spine flower in the Santa Ana River Wash, below the Seven Oaks Dam in San Bernardino County, to assess species impact from changes in hydrology once the Seven Oaks Dam is operational. The pedestrian survey was conducted over several months and consisted of multiple consecutive transects, covering approximately 5,300 acres. Several populations of spine flower were located and mapped. The survey and mapping required extensive use of GPS equipment for the mapping of transects surveyed and the location of spine flower populations.

Pacific Pipeline Project — 1997 to 1998

CPUC Environmental/Archaeological Monitor

Under subcontract to Aspen Environmental Group, monitored the pipeline company's inspection team for compliance with CPUC conditions of approval during construction of 132 miles of oil pipeline In southern California. Coordinated construction activities with the applicant's inspection team, archaeological specialists and Native American monitors through areas with sensitive cultural, biological, and visual resources. Monitored for hazardous materials management, storm water pollution prevention, and biological and cultural resources. Maintained daily written documentation of compliance activities.

TransCanada, Environmental Training Program 1997
Associate

Assisted in the development of an environmental training program for a major natural gas company with 8,700 miles of pipeline and associated energy facilities on three continents. Developed training exercises related to environmental compliance topics, including clearing and grading, trenching and backfilling, cultural resources, and hydrostatic testing. Interactive training strategies included small group exercises, demonstrations, quizzes, and scenarios.

Pacific Gas and Electric Company, Los Esteros Project 1997
Associate

Assisted in the research, development and production of the Proponent's Environmental Assessment (PEA) as part of a California Public Utilities Commission filing for a Permit To Construct. The Los Esteros Project includes construction of a substation and two 115/21 kilovolt power lines. Authored the project description, transportation section, utilities section, and socioeconomics section and coordinated and edited contributions prepared by PG&E and subcontractors.

Sierra Pacific Power Co., Alturas 345 kV Electric Transmission Project 1996 to 1997
Associate

Assisted in the development of the environmental management program implementation plan for a 164-mile electric transmission line. Wrote the Storm Water Pollution Protection Plan (SWPPP) for the California and Nevada segments.

El Paso Energy Corporation, Trans Colorado Phase I 1996
Environmental Inspector

Inspected for environmental compliance on a Federal Energy Regulatory Commission (FERC)-regulated 22-mile natural gas pipeline in northern New Mexico and southern Colorado. Inspected for hazardous materials management, erosion control, fire prevention, topsoil handling, stream crossings, and biological and cultural resources. Inspected site-specific installation of temporary and permanent erosion control measures. Coordinated with construction and agency personnel on a daily basis and completed daily field logs and prepared reports as requested. Assisted with the presentation of an eight-hour kickoff environmental training program for agency personnel and construction management. Conducted environmental training classes for construction personnel

Central Coast Water Authority, Mission Hills and Santa Ynez Extensions and Coastal Branch, Phase II 1995 to1996
Environmental Monitor

Monitored and inspected for environmental compliance during construction of 145 miles of water pipeline in Santa Barbara and San Luis Obispo Counties. Coordinated construction activities with the construction contractor, Native American monitors, landowners, and construction inspectors through areas with sensitive cultural, biological, and visual resources. Conducted field surveys immediately ahead of construction to identify potential problem areas and confirm proper flagging of sensitive resources. Captured and relocated wildlife from construction areas. Oversaw construction of sensitive stream crossings and conducted water quality testing in compliance with California Department of Fish and Game permit requirements. Inspected site-specific installation of temporary and permanent erosion control measures. Provided field assessment and documentation of a contractor compensation program. Designed to protect oak trees and minimize ground disturbance in sensitive habitats. Maintained daily written documentation of compliance activities. Provided on-site environmental training for construction crews.

Pacific Gas and Electric Company 1995
Regulatory Process and Environmental Review Training

Assisted as an Associate in the development of a Regulatory Process and Environmental Review training session and course handbook. Conducted research on federal, State, and local agency regulatory and permitting requirement for utility construction projects. Provided technical overview for sections on cultural resource management and historic preservation law.

Pacific Gas Transmission Company 1994 to 1995
Coyote Springs and Medford Extensions
Cultural Resources Coordinator

Coordinated development and implementation of the cultural resources management program for construction of 100 miles of natural gas pipeline in Oregon. Worked with federal, State, and local agencies to determine appropriate treatment and mitigation for affected archaeological sites. Assisted in the development of project implementation plans and environmental assessments, including the development and submittal of the project's Historic Properties Treatment Plan. Managed report preparation and field work by the archaeology subcontractor.

Pacific Gas Transmission Company, Medford Extensions 1995
Environmental Inspector

Monitored for compliance with project environmental requirements during construction of 89 miles of natural gas pipeline. Inspected for cultural and paleontological resources, erosion control, safety regulations, sensitive wildlife species, stream and wetland crossings, timber harvesting, dust control, fire protection, hazardous materials management, and post-construction restoration. Worked with local Native American tribal governments and monitors (Klamath and Siletz tribes) to ensure proper monitoring of culturally sensitive areas and treatment of unanticipated cultural discoveries. Responsible for all inspection responsibilities (craft, environmental, and cultural) during a two-month boring operation under a sensitive Native American site.

INFOTEC Research, Inc. 1989
Field Technician

Performed archaeological field work for segments of the PGT-PG&E Pipeline Expansion Project in Jefferson County, Oregon. Conducted Phase I surveys and Phase II testing of significant archaeological sites according to federal and State archaeological mitigation guidelines and evaluated eligibility for the National Register of Historic Places.

TRAINING & CERTIFICATIONS

2001 Desert Tortoise Council Surveying, Monitoring and Handling Workshop
2001 Horizontal Directional Drilling Training
1999 Railroad Right-of-Way Safety Training (UPRR, BNSFRR)
1996 International Erosion Control Association Training
1995 Cultural Resources Presenter at FERC training for Pacific Gas Transmission projects in Oregon
1995 General Services Administration course on Section 106 of Historic Preservation Law
1994 U.S. Navy Maritime Academy Course on Global Positioning System (GPS)
1989 California State University, Northridge on San Clemente Islands
Conducted field work in paleoindian archaeology (Chumash and Gabrielino Indians).
1988 California State University, Hayward
Conducted historic archaeology field work on the Ardenwood Historic Farm.

DECLARATION OF
STEVE MUNRO

I, Steve Munro, declare as follows:

1. I am presently employed by the California Energy Resources Conservation and Development Commission in the Siting Office of the Siting, Transmission and Environmental Protection Division as a Compliance Project Manager (Classification: Planner II - Energy Facility Siting).

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the and Compliance Monitoring and Closure Plan section for the Avenal Energy Power Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 6/1/09 Signed: Original signature in Dockets

At: Sacramento, California

STEVE MUNRO
Compliance Project Manager

EXPERIENCE SUMMARY

In my current position, I work as a team leader coordinating technical staff in tasks related to power plant project design, construction, operation, and associated environmental issues. These activities have included negotiating agreements between power plant operators, public agencies, and community groups and working with engineering and technical staff in identifying and resolving technical issues. Prior to working at the Energy Commission, I worked as a project manager and consultant in several other state agencies.

EXPERIENCE RECORD

July 1991 to present, California Energy Commission

Review and process compliance submittals to assure continued compliance of projects with the conditions of the Commission Decision.

Plan, organize, direct and schedule compliance-related activities of staff.

Plan, organize, direct and schedule the work of staff on petitions to amend the conditions of certification contained in Commission power plant decisions.

Prepare letters, memos and reports concerning amendments, and compliance issues and administration.

Organize and conduct workshops and meetings among the staff and between the staff, project licensees, other governmental agencies and members of the public to resolve and discuss issues, procedures, complaints and petitions for amendment involving compliance-related matters.

Assist technical staff in the drafting of compliance conditions to ensure that they are clearly written, effective, and verifiable.

Identify strategic, technical, and policy issues associated with amendments and compliance projects and make policy recommendations.

Arrange, organize, and conduct meetings, audits and on-site inspections to assure continued compliance with Commission requirements.

EDUCATION

B.A. - Degree, University of the Pacific, 1971. Academic Major: Economics. Post-graduate courses on environmental planning at UC Davis.