STAFF REPORT

Preliminary Staff Assessment

ELK HILLS POWER PROJECT

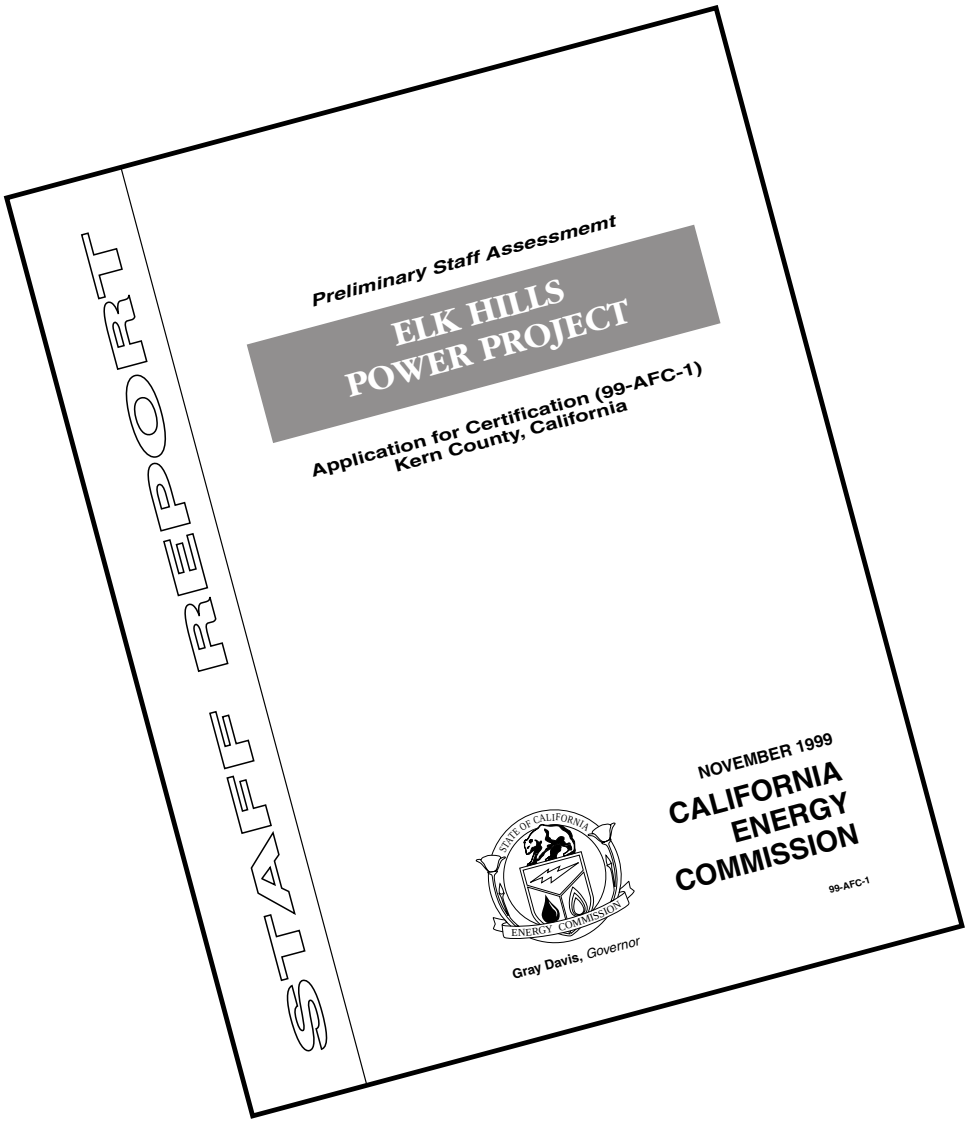
Application for Certification (99-AFC-1)
Kern County, California

NOVEMBER 1999

CALIFORNIA ENERGY COMMISSION

Gray Davis, *Governor*

99-AFC-1



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EXECUTIVE SUMMARY

Marc S. Pryor

INTRODUCTION

This Preliminary Staff Assessment (PSA) contains the California Energy Commission (Energy Commission) staff's evaluation of the Elk Hills Power, LLC's (referred to as either "Elk Hills" or "the applicant") Application for Certification (AFC) (99-AFC-1) for the Elk Hills Power Project (EHPP). The EHPP electric generating plant and related facilities, such as the electric transmission line, natural gas pipeline and water lines are under the Energy Commission's jurisdiction and cannot be constructed or operated without the Energy Commission's certification.

Staff is an independent party in the proceedings. This PSA is a staff document, presenting staff's independent analysis. It examines engineering and environmental aspects of the EHPP, based on the information available at that time of document creation. The PSA contains analyses similar to those contained in Environmental Impact Reports required by the California Environmental Quality Act (CEQA). It is not a Committee document nor is the PSA a final or proposed decision on the proposal. The PSA presents staff's conclusions and proposed conditions that staff recommends apply to the design, construction, operation, and closure of the proposed facility, if certified.

BACKGROUND

On February 16, 1999, the applicant filed an AFC with the Energy Commission to construct and operate the EHPP. On June 9, 1999, the Energy Commission deemed the AFC data adequate, at which time staff began its analysis of the proposal. The analyses contained in this PSA are based upon information from: 1) the AFC; 2) subsequent amendments; 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.

PROJECT DESCRIPTION

The proposed Elk Hills Power Project (EHPP) will be a nominal 500-megawatt (MW), natural gas-fired, combined cycle power plant located in the Elk Hills region of western Kern County. The site is about 25 miles west of Bakersfield, California, 9 miles south of the unincorporated community of Buttonwillow, California, and 9 miles north of Taft, California. The 12 acre site is a part of the 47,000 acre Elk Hills Oil and Gas Field operated by Occidental of Elk Hills Inc. (OEHI), formerly the Elk Hills Naval Petroleum Reserve Number 1. The site is currently occupied by out-of-service tanks and related equipment formerly used for the storage and loading of propane, butane, and natural gas liquid products.

Major features of the power plant are: two power trains, each comprised of one 153 to 166 MW Combustion Turbine Generator (CTG), one Heat Recovery Steam Generator (HRSG); one shared 171 MW Steam Turbine Generator (STG); and one six-cell cooling tower. Dry low NOx combustors will be used in each CTG. Each HRSG will be equipped with a Selective Catalytic Reduction (SCR) emission control system that uses anhydrous ammonia in conjunction with a fixed bed catalyst to reduce NO_x in the CTG exhaust gases. The design of the power plant provides for operational flexibility. As planned by Elk Hills, operations may be tailored to readily adapt to changing electrical energy market conditions by using multiple start ups, shut downs, turn downs and peaking.

Proposed ancillary facilities associated with the EHPP are: a 9.8 mile long cooling water supply pipeline connected to the California Aqueduct at the aqueduct's intersection with state Highway 119; a 2,500 foot natural gas supply pipeline; a 4 mile long wastewater pipeline with deep injection wells; and one of two transmission lines. Transmission line Route 1A would be 9 miles long and would terminate at a new substation located on the west side of the California Aqueduct near the community of Tupman. The substation would connect with the existing 230 kV Midway-Wheeler Ridge transmission line. Route 1B would parallel the existing 115 kV Midway-Taft transmission line and would interconnect at the Midway Substation at Buttonwillow. A variation to Route 1B would combine the EHPP transmission line with the existing Taft-Midway transmission line.

Elk Hills Power, LLC plans to complete construction and start operation of the EHPP by the summer of 2001. During construction, an average of approximately 240 to 350 workers would be employed. During operation, the EHPP would employ 20 full-time staff.

STAFF'S ASSESSMENT

Each technical area section of the PSA contains a discussion of impacts, mitigations measures and conditions of certification. The PSA includes staff's assessments of:

- the project's conformity with integrated assessment of need;
- 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; and
- proposed conditions of certification, where these can be identified at this time.

COMPLETE ANALYSES

Staff believes its analysis of the power plant is substantially complete for the following 19 technical areas:

Need Conformance	Socioeconomics
Public Health	Waste Management
Hazardous Materials Handling	Geology and Paleontology
Worker Safety & Fire Protection	Facility Design
Transmission Line Safety & Nuisance	Reliability
Land Use	Efficiency
Traffic and Transportation	Transmission System Engineering
Noise	Alternatives
Visual Resources	General Conditions/Compliance
Cultural Resources	

INCOMPLETE ANALYSES

Three technical areas, Air Quality, Biological Resources, and Soils and Water Resources are incomplete.

AIR QUALITY

The San Joaquin Valley Unified Air Pollution Control District (District) has yet to issue a Preliminary Determination of Compliance (PDOC). The applicant expects the PDOC to be issued by November 24, 1999. Staff will need the Final Determination of Compliance (FDOC) prior to completing its air quality section of the Final Staff Assessment (FSA). The FDOC is expected to be approximately 60 days after the issuance of the PDOC.

BIOLOGICAL RESOURCES

The biological resources analysis contained in this PSA is as complete as possible, pending the federal Biological Opinion. The U.S. Fish and Wildlife Service's (USFWS) Biological Opinion, initiated by the Bureau of Land Management as a Section 7 consultation, is expected to be issued after the FSA. The applicant expects the initiation to take place by November 25, 1999. A key ingredient of both the Biological Opinion will be the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP). The applicant believes its draft BRMIMP will be filed by mid-December 1999. Staff cautions that unforeseen issues may arise that could delay the Biological Opinion.

SOILS AND WATER RESOURCES

Staff expects to issue a Soils and Water Analysis on December 6, 1999.

STAFF RECOMMENDATION

Staff has identified two technical areas that are incomplete in their analyses: Air Quality and Biological Resources. In addition, the Soils and Water Resources analysis will be delayed until December 6, 1999. Although our analysis is potentially complete in 19 areas, resolution of the remaining issues in the other areas will be crucial to the Energy Commission's Decision on this project.

At this time, staff is unable to recommend that the project be certified.

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INTRODUCTION

Marc S. Pryor

PURPOSE OF THIS REPORT

The Preliminary Staff Assessment (PSA) presents the California Energy Commission (Energy Commission) staff's independent analysis of the Elk Hills Power, LLC's Application for Certification (AFC). The PSA is a staff document. It is neither a Committee document, nor a draft decision or proposed decision. The PSA describes the following:

a) the existing environment;
b) the proposed project;
c) whether the facilities can be constructed and operated safely and reliably in accordance with applicable laws, ordinances, regulations and standards (LORS);
d) the environmental consequences of the project including potential public health and safety impacts;
e) mitigation measures proposed by the applicant, staff, interested agencies and intervenors which may lessen or eliminate potential impacts;
f) the proposed conditions under which the project should be constructed and operated, if it is certified;
g) project alternatives; and
h) project closure

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

The Energy Commission staff's analyses were prepared in accordance with Public Resources Code section 25500 et seq. and Title 20, California Code of Regulation section 1701 et seq., and the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 15000 et seq.).

ORGANIZATION OF THE STAFF ASSESSMENT

This **INTRODUCTION** section of this PSA explains the purpose of the PSA and its relationship to the Energy Commission's siting process. The **PROJECT DESCRIPTION** section provides a brief overview of the project including its purpose, location and major project components.

The need conformance, environmental and engineering evaluations of the proposed project follow the **PROJECT DESCRIPTION**. In the environmental analysis, the project's environmental setting is described, environmental impacts are identified and their significance assessed, and the project's compliance with applicable laws is reviewed. The mitigation measures proposed by the applicant are reviewed for adequacy and conformance with applicable laws; if any remaining unmitigated impacts are identified, staff proposes additional mitigation measures and project alternatives. Staff's conclusions and recommendations are discussed, and proposed conditions of certification are included, if applicable. In the engineering analyses, the project is evaluated in each technical area with respect to applicable laws and performance objectives. Staff proposed modifications to the facility, if applicable, are listed. Each technical section ends with a discussion of conclusions and recommendations. Proposed conditions of certification are included, if applicable.

ENERGY COMMISSION SITING PROCESS

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

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

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

Staff conducts its environmental analysis in accordance with the requirements of the California Environmental Quality Act. No Environmental Impact Report (EIR) is required because the Energy Commission's site certification program has been certified by the Resources Agency (Pub. Resources Code, section 21080.5 and Cal. Code Regs., tit. 14, section 15251 (k)).

The staff prepares both a preliminary and final staff assessment. The Preliminary Staff Assessment (PSA) presents for the applicant, intervenors, agencies, other interested parties and members of the public, the staff's preliminary analysis, conclusions, and recommendations. Where staff believes it is appropriate, the Final Staff Assessment (FSA) incorporates comments received from agencies, the public and parties to the siting case, comments made at the workshops, and comments received on the PSA. The FSA serves as staff's testimony on a proposal.

Staff uses the PSA to resolve issues between the parties and to narrow the scope of adjudicated issues in the evidentiary hearings. During the period between publishing the PSA and FSA, staff conducts workshops to discuss their findings, proposed mitigation, and proposed compliance monitoring requirements. Based on the workshops and written comments, staff will refine their analysis, correct errors, and finalize conditions of certification to reflect areas where we have reached agreement with the parties.

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

Following the hearings, the Committee's recommendation to the full Energy Commission on whether or not to approve the proposed project will be contained in a document entitled the Presiding Members' Proposed Decision (PMPD). Following publication, the PMPD is circulated for a minimum of 30 days in order to receive written public comments. At the conclusion of the comment period, the Committee may prepare a revised PMPD. A revised PMPD is required to undergo a 15-day comment period. At the close of the comment period for the revised PMPD, the PMPD is submitted to the full Energy Commission for a decision. Within 30 days of the Energy Commission decision, any party may appeal the decision to the Energy Commission.

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. The Energy 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. The proposed **Compliance Monitoring Plan and General Conditions** are included at the end of the PSA.

PROJECT DESCRIPTION

Marc S. Pryor

NATURE AND PURPOSE OF THE PROJECT

The Elk Hills Power, Limited Liability Company (referred to as either "Elk Hills" or the "applicant") proposes to construct and operate the Elk Hills Power Project (EHPP), a 500 megawatt (MW) natural gas-fired combined cycle facility located in the Elk Hills region of western Kern County. The applicant's objective is to "utilize locally-produced natural gas from the Elk Hills Oil and Gas Field for the production of economical, reliable, and environmentally sound electrical energy, capacity, and ancillary services for California's restructured energy market."

PROJECT LOCATION

The site is about 25 miles west of Bakersfield, California, 9 miles south of the unincorporated community of Buttonwillow, California, and 9 miles north of Taft, California. The 12 acre site is a part of the 47,000 acre Elk Hills Oil and Gas Field operated by Occidental of Elk Hills Inc. (OEHI), formerly the Elk Hills Naval Petroleum Reserve Number 1. The site is currently occupied by out-of-service tanks and related equipment formerly used for the storage and loading of propane, butane, and natural gas liquid products. The oil field is bisected by the public Elk Hills Road that runs north-south between Buttonwillow, an unincorporated community about nine miles north of the plant site, and the City of Taft. However, all access to the oil field is under highly controlled conditions (guards in both guard stations and in mobile security units). Taft has approximately 6,000 people, while McKittrick, Fellows, and Derby Acres are much smaller. State Highway 33 runs northwest-southeast approximately 1.3 miles east of the site.

PROJECT DESCRIPTION

POWER PLANT

PROJECT DESCRIPTION Figure 1 shows the vicinity of the proposed power plant and the proposed linear (related) facilities routes (transmission line; natural gas, raw water supply and wastewater pipelines). The power plant would be located on a 12-acre parcel of previously disturbed land and is within an existing oil and gas production field. The vicinity is heavily developed and utilized by OEHI for natural gas and oil production. Numerous petroleum recovery and storage facilities, electric and petroleum transmission lines, and access roads characterize the area.

PROJECT DESCRIPTION Figure 2 shows a plan view of the proposed 500-megawatt power plant's site arrangement. Major features of the power plant are: two power trains, each comprised of one 153 to 166 MW Combustion Turbine Generator (CTG), one Heat Recovery Steam Generator (HRSG); one shared

PROJECT DESCRIPTION Figure 1
Location of the Proposed Site and Related Facilities

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PROJECT DESCRIPTION Figure 2
Power Plant Site Arrangement

This figure is not available in electronic format.

171 MW Steam Turbine Generator (STG); and one six-cell cooling tower. Dry low NOx combustors will be used in each CTG. Each HRSG will be equipped with a Selective Catalytic Reduction (SCR) emission control system that uses anhydrous ammonia in conjunction with a fixed bed catalyst to reduce NO_x in the CTG exhaust gases.

Natural gas will be the only fuel used at the facility and will be supplied by OEHI. The EHPP will receive its natural gas supply via a 0.5-mile long, 10-inch diameter gas pipeline from OEHI's existing main natural gas pipeline. The project includes a new 230 kV switchyard and a new 8.6- to 9.0-mile, 230 kV transmission line connecting with Pacific Gas and Electric Company's transmission system (see the transmission line description below). Water for the project will be supplied by West Kern Water District (WKWD) via a new 9.8-mile, 16-inch supply pipeline extending from an existing WKWD facility east of the power plant site. Wastewater will be disposed of in new disposal injection wells located about four miles south of the power plant site. The EHPP is not a cogeneration project because steam from the HRSGs will be used for the generation of power by the STG, not for oil field production.

TRANSMISSION LINE OPTIONS

Power will be generated by the two CTGs and the STG at 13.8 kilovolt (kV) and then is stepped-up to 230 kV for delivery to the power plant's interconnection to PG&E. Two 230 kV transmission line alternatives, Routes 1A and 1B, are being considered to interconnect the EHPP to the California electric transmission grid. In addition, the applicant has proposed a variation of Route 1B. The applicant desires certification of all three transmission line options for flexibility reasons.

ALTERNATIVE ROUTE 1A

Route 1A is a transmission line mounted on steel poles that originates at the power plant site and trends north for about two miles. For most of this distance the transmission line route would parallel the existing 115 kV Midway-Taft transmission line that runs north-south between the Midway Substation and the city of Taft, which is about ten miles south of the plant site. The Midway-Taft transmission line is mounted on steel latticework towers in the Elk Hills area and on concrete poles north of the California Aqueduct. This transmission line is associated to some degree with all three of Elk Hills Power's proposed transmission line route alternatives/variation.

At the two-mile distance, Route 1A turns east and extends about seven miles to a proposed new substation near the unincorporated community of Tupman. The substation would be located near and to the west of the California Aqueduct, and would connect with the existing Midway-Wheeler Ridge transmission line. Because the Midway-Wheeler Ridge transmission line is east of the aqueduct, the connection with the proposed substation would have the cross the aqueduct twice. These crossings would require agreement between PG&E and the California Department of Water Resources.

ALTERNATIVE ROUTE 1B

The first two miles of Route 1B are the same as 1A and is also a transmission line mounted on steel pole. From this point the route proceeds almost directly to the Midway Substation, crossing the California Aqueduct at about milepost 4.3, and following the east side of Wasco Way. Route 1B would parallel the aforementioned Midway-Taft transmission line which, along Wasco Way, is mounted on concrete poles that are located west of the roadway. Wasco Way is in a cotton-growing agricultural area. The transmission line would interconnect with PG&E's system at the Midway substation, which is about 8.6 miles north of the preferred power plant site.

ALTERNATIVE ROUTE 1B VARIATION

The Route 1B variation would combine the Midway-Taft transmission line with the proposed Route 1B, thus eliminating the existing lattice tower and concrete poles of the Midway-Taft transmission line with steel poles. The routing would follow the existing Midway-Taft transmission line's route which, along Wasco Way, is located on the west side of the roadway. This route would also interconnect at the Midway substation.

CONSTRUCTION AND OPERATION

The applicant plans to begin construction immediately after certification, which is expected to occur no earlier than June 2000, and commercial operation by the summer of 2001. There will be a peak work force of approximately 240 to 350 individuals and about 20 permanent facility operations personnel.

NEED CONFORMANCE

Kerry Willis

The Elk Hills Power Application for Certification was accepted on June 9, 1999. Currently, the Public Resources Code prohibits the Energy Commission from certifying a powerplant unless the Commission makes a finding that the facility is "needed" in accordance with the Commission's integrated assessment of the need for new resource additions. (*See,* Pub. Resources Code §§ 25523(f) and 25524(a).) The Public Resources Code directs the Commission to do an "integrated assessment of need," taking into account 5- and 12-year forecasts of electricity supply and demand, as well as various competing interests, and to adopt the assessment in a biennial electricity report.

On September 28, 1999, the Governor signed Senate Bill No. 110, which became Chapter 581, Statutes of 1999. This legislation repeals Public Resources Code sections 25523(f) and 25524(a) and amends other provisions relating to the assessment of need for new resources. It thereby removes the requirement that, to certify a proposed facility, the Commission must make a specific finding that the proposed facility is in conformance with the adopted integrated assessment of need. Regarding need-determination, Senate Bill 110 states:

> Before the California electricity industry was restructured the regulated cost recovery framework for powerplants justified requiring the commission to determine the need for new generation, and site only powerplants for which need was established. Now that powerplant owners are at risk to recover their investments, it is no longer appropriate to make this determination.

(Pub. Resources Code, § 25009, added by Stats. 1999, ch. 581, § 1.) Senate Bill 110 takes effect on January 1, 2000 (Cal. Const. Art. 4, § 8.). As of that date, the Commission will no longer be required to determine if a proposed project conforms with an integrated assessment of need. As a result, any application for certification for which the Commission adopts a final decision after January 1, 2000, is not subject to a finding of "need-conformance."

In this case, the Commission's final decision will be made after January 1, 2000. Therefore, because of SB 110, the Commission will make no finding of "need-conformance" with respect to the proposed project.

AIR QUALITY

Joseph M. Loyer

INTRODUCTION

This analysis evaluates the expected air quality impacts of the emissions of criteria air pollutants due to the construction and operation of the proposed Elk Hills Power Project (EHPP). Criteria air pollutants are defined as those for which a state or federal ambient air quality standard has been established to protect public health. They include nitrogen dioxide (NO2), sulfur dioxide (SO2), carbon monoxide (CO), ozone (O3), volatile organic compounds (VOC) and particulate matter less than 10 microns in diameter (PM10).

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

- whether the EHPP is likely to conform with applicable Federal, State and San Joaquin Valley Unified Air Pollution Control District air quality laws, ordinances, regulations and standards, as required by Title 20, California Code of Regulations, section 1742.5 (b);
- whether the EHPP is likely to cause significant air quality impacts, including new violations of ambient air quality standards or contributions to existing violations of those standards, as required by Title 20, California Code of Regulations, section 1742 (b); and
- whether the mitigation proposed for the EHPP is adequate to lessen the potential impacts to a level of insignificance, as required by Title 20, California Code of Regulations, section 1744 (b).

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

Under the Federal Clean Air Act (40 CFR 52.21), there are two major components of air pollution law, New Source Review (NSR) and Prevention of Significant Deterioration (PSD). NSR is a regulatory process for evaluation of those pollutants that violate federal ambient air quality standards. Conversely, PSD is a regulatory process for evaluation of those pollutants that do not violate federal ambient air quality standards. The NSR analysis has been delegated by the US Environmental Protection Agency (EPA) to the San Joaquin Valley Unified Air Pollution Control District (District). The EPA determines the conformance with the PSD regulations. The PSD requirements apply only to those projects (known as major sources) that exceed 100 tons per year for any pollutant.

STATE

The California State 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 cause injury, detriment, nuisance, or annoyance to any considerate 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."

LOCAL

The proposed project is subject to the following San Joaquin Valley Unified Air Pollution Control District rules and regulations:

RULE 2201 - NEW AND MODIFIED STATIONARY SOURCE REVIEW RULE

The main functions of the District's New Source Review Rule are to allow for the issuance of Authorities to Construct, Permits to Operate, the application of Best Available Control Technology (BACT) to new permit sources and to require the new permit source to secure emission offsets.

SECTION 4.1 - BEST AVAILABLE CONTROL TECHNOLOGY

Best Available Control Technology is defined as: a) has been contained in any State Implementation Plan and approved by EPA; b) the most stringent emission limitation or control technique that has been achieved in practice for a class of source, or c) any other emission limitation or control technique which the District's Air Pollution Control Officer (APCO) finds is technologically feasible and is cost effective. BACT will apply to any air pollutant that results in an emissions increase of 2 pounds per day. In the case of the EHPP, BACT will apply for NOx, SO2, PM10, VOC and CO emissions from all point sources of the project.

SECTION 4.2 - OFFSETS

Emissions offsets for new sources are required when those sources exceed the following emissions levels:

- Sulfur oxides - 150 lbs/day
- PM10 - 80 lbs/day
- Oxides of nitrogen - 10 tons/year
- Volatile organic compounds - 10 tons/year

The EHPP exceeds all of the above emission levels; therefore offsets are required for all four of these pollutants. The emission offsets provided shall be adjusted according to the distance of the offsets from the EHPP. The ratios are:

- Within 15 miles of the same source - 1.2 to 1
- 15 miles or more from the source - 1.5 to 1

Section 4.2.5.3 allows for the use of interpollutant offsets (including PM10 precursors for PM10) on a case-by-case basis, provided that the applicant demonstrates that the emissions increase will not cause a violation of any ambient air quality standard. The ratio for interpollutant trading shall be based on an air

quality analysis and shall be equal to or greater than the minimum offsetting requirements (the distance ratios) of this rule.

SECTION 4.3 - ADDITIONAL SOURCE REQUIREMENTS

Rule 4.3.2.1 requires that a new source not cause, or make worse, the violation of an ambient air quality standard as demonstrated through analysis with air dispersion models.

RULE 2520 – FEDERALLY MANDATED OPERATING PERMITS

Requires that a project owner file a Title V Operating Permit with the District within 12 months of commencing operation. A project is subject to this requirement if any of the following apply: the project is a major stationary source (under PSD definitions), it has the potential to emit greater than 100 tons per year of a criteria pollutant, that any equipment is subject to New Source Performance Standards, the project is subject to Title IV Acid Rain program, or the applicant is required to obtain a PSD permit from EPA. The Title V permit application requires that the owner submit information on the operation of the air polluting equipment, the emission controls, the quantities of emissions, the monitoring of the equipment as well as other information requirements.

RULE 2540 – ACID RAIN PROGRAM

A project greater than 25 MW and installed after November 15, 1990, must submit an acid rain program permit application to the District. The acid rain requirements will become part of the Title V Operating Program (Rule 2520). The specific requirements for the EHPP will be discussed in the “Compliance with LORS – Local” later in this analysis.

RULE 4001 - NEW SOURCE PERFORMANCE STANDARDS

Rule 4001 specifies that a project must meet the requirements of the Federal New Source Performance Standards (NSPS) specified in Title 40, Code of Federal Regulations (CFR), Part 60, Chapter 1. Subpart GG, which pertains to Stationary Gas Turbines, requires that NOx concentrations are a function of the heat rate of the combustion, which in this case would be approximately 116 ppmv at 15% O2. In addition, the SO2 concentration shall be less than 150 ppmv and the sulfur content of the fuel shall no greater than 0.8 percent by weight.

RULE 4101 - VISIBLE EMISSIONS

Rule 4101 prohibits air emissions, other than water vapor, of more than Ringelmann No. 1 (20 percent opacity) for more than 3 minutes in any one hour.

RULE 4201 - PARTICULATE MATTER CONCENTRATION

Rule 4201 limits particulate emissions from sources such as the gas turbines, cooling towers and emergency fire water pumps to less than 0.1 grain per cubic foot of exhaust gas at dry conditions.

RULE 4202 – PARTICULATE MATTER EMISSION RATE

Rule 4202 limits hourly particulate emissions based on the process rate of the process. Combustion of gaseous and liquid fuels are excluded from this rule, however, the particulate emissions associated with the cooling tower are subject to the emission limits of this rule.

RULE 4703 - STATIONARY GAS TURBINES

Rule 4703 limits NOx concentrations to 12.2 ppm for the SCR controlled turbines and 21 ppm for the SCONOx controlled turbine. In addition there is a limit in CO concentrations of less than 200 ppm.

RULE 4801 - SO2 CONCENTRATION

Rule 4801 limits the SO2 concentration emitted into the atmosphere to no greater than 0.2 percent by volume.

RULE 8010 - FUGITIVE DUST ADMINISTRATIVE REQUIREMENTS FOR CONTROL OF FINE PARTICULATE MATTER (PM-10)

Rule 8010 specifies the types of chemical stabilizing agents and dust suppressant materials that can (and cannot) be used to minimize fugitive dust.

RULE 8020 - FUGITIVE DUST REQUIREMENTS FOR CONTROL OF FINE PARTICULATE MATTER (PM-10) FROM CONSTRUCTION, DEMOLITION, EXCAVATION, AND EXTRACTION ACTIVITIES

Rule 8020 requires that fugitive dust emissions during construction activities be limited to no greater than 40 percent opacity by means of water application or chemical dust suppressants. The rule also encourages the use of paved access aprons, gravel strips, wheel washers or other measures to limit mud or dirt carry-out onto paved public roads.

RULE 8030 - CONTROL OF PM10 FROM HANDLING AND STORAGE OF BULK MATERIALS

Rule 8030 limits the fugitive dust emissions from the handling and storage of materials. It specifies that bulk materials be transported using wetting agents, allow appropriate freeboard space in the vehicles, or be covered. It also requires that stored materials be covered or stabilized.

RULE 8060 - CONTROL OF PM10 FROM PAVED AND UNPAVED ROADS

Rule 8060 specifies the width of paved shoulders on paved roads or the use of chemical dust suppressants on unpaved roadways, shoulders and medians.

RULE 8070 - CONTROL OF PM10 FROM VEHICLE/EQUIPMENT PARKING, SHIPPING, RECEIVING, TRANSFER, FUELING AND SERVICE AREAS

This rule is intended to limit fugitive dust from unpaved parking areas by means of using water or chemical dust suppressants or the use of gravel. It also requires that the affected owners/operators shall remove tracked out mud and dirt onto public roadways once a day.

ENVIRONMENTAL SETTING

METEOROLOGICAL CONDITIONS

The climate of the southern San Joaquin Valley is typically dominated by hot dry summers and mild winters with relatively small amounts of precipitation. The semi-permanent Pacific High over the eastern Pacific Ocean dominates the weather during the summer months, blocking low pressure systems from passing through the area. The Pacific High, along with the Temblor Range to the west that blocks the marine air influence from the Pacific Ocean, results in summers that are usually quite warm, with average daily maximum temperatures during July of over 98°F.

During the winter months, the Pacific High weakens and migrates to the south allowing Pacific storms into California. The annual rainfall in the Bakersfield area is only 5.7 inches. In between storms, high pressure from the Great Basin High can block storms and result in persistent tulle fog caused by temperature inversions. Daily maximums during the December-January months are a relatively mild 57°F, with lows averaging 38°F. At the Maricopa weather station, a record high of 115°F and record low of 15°F was measured. These temperatures are used in determining the maximum possible emissions from the EHPP and the maximum emission impacts in the air dispersion modeling analysis.

Winds in the area are strongly influenced by the Temblor Range to the west and the marine air that enters the Central Valley through the Carquinez Strait and Altamont Pass in the Bay Area to the north. During the summer, marine air entering the Central Valley results in northeasterly winds in the daytime hours. In the nighttime hours downslope drainage of air from the hills and mountains to the south and west results in winds from the southwest. This windflow pattern is fairly consistent throughout the year, although there is more variability to wind directions during the winter with the passage of storms through the area. Winds are usually of higher speeds during the summer because during the winter, calm and stagnant atmospheric conditions can occur between storms and the influence of the marine air from the coast is significantly diminished.

Along with the winds, another climatic factor is atmospheric stability and mixing height. 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 fewer air quality impacts from a single air pollution source like the EHPP. During the winter months between storms, very stable atmospheric conditions occur, resulting in very little mixing. Under these conditions, little air pollutant dispersion occurs, and consequently higher air quality impacts result from stationary source emissions. Mixing heights are generally lower during the winter, along with lower mean wind speeds and less vertical mixing.

EXISTING AIR QUALITY

The Federal Clean Air Act and the California Air Resources Board (CARB) both required the establishment of allowable maximum ambient concentrations of air pollutants, called ambient air quality standards (AAQS). The state AAQS, established by CARB, are typically lower (more protective) than the federal AAQS, which are established by the EPA. The state and federal air quality standards are listed in **AIR QUALITY Table 1**. As indicated in **AIR QUALITY Table 1**, the averaging times for the various air quality standards (the duration over which they are measured) range from one-hour to an annual average. The standards are read as a concentration, in parts per million (ppm), or as a weighted mass of material per a volume of air, in milligrams or micrograms of pollutant in a cubic meter of air (mg/m^3 and $\mu g/m^3$).

In July 1997, the EPA promulgated new ozone and PM2.5 (particulate matter less than 2.5 microns in diameter) ambient air quality standards, which are shown in **AIR QUALITY Table 1**. The new 8-hour ozone standard will replace the existing 1-hour standard. The PM2.5 standards will be in addition to the existing PM10 standards. Although the standards may be set, the EPA will first have to designate areas which violate these new standards, and then air districts that violate these standards will have to prepare implementation plans to reach attainment of those standards.

In general, an area is designated as attainment for a specific pollutant if the concentrations of that air contaminant do not exceed the standard. Likewise, an area is designated as non-attainment for an air contaminant if that standard is violated. Where not enough ambient data are available to support designation as either attainment or non-attainment, the area can be designated as unclassified.

Unclassified areas are normally treated the same as attainment areas for regulatory purposes. An area can be attainment for one air contaminant while non-attainment for another, or attainment for the federal standard and non-attainment for the state standard for the same contaminant. The entire area within the boundaries of a district is usually evaluated to determine the district's attainment status.

AIR QUALITY Table 1
Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Standard	California Standard
Ozone (O3)	1 Hour	0.12 ppm (235 $\mu g/m^3$)	0.09 ppm (180 $\mu g/m^3$)
	8 Hour	0.08 ppm (157 $\mu g/m^3$)	---
Carbon Monoxide (CO)	8 Hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)
	1 Hour	35 ppm (40 mg/m^3)	20 ppm (23 mg/m^3)
Nitrogen Dioxide (NO2)	Annual Average	0.053 ppm (100 $\mu g/m^3$)	---
	1 Hour	---	0.25 ppm (470 $\mu g/m^3$)
Sulfur Dioxide (SO2)	Annual Average	80 $\mu g/m^3$ (0.03 ppm)	---
	24 Hour	365 $\mu g/m^3$ (0.14 ppm)	0.04 ppm (105 $\mu g/m^3$)
	3 Hour	1300 $\mu g/m^3$ (0.5 ppm)	---
	1 Hour	---	0.25 ppm (655 $\mu g/m^3$)
Respirable Particulate Matter (PM10)	Annual Geometric Mean	---	30 $\mu g/m^3$
	24 Hour	150 $\mu g/m^3$	50 $\mu g/m^3$
	Annual Arithmetic Mean	50 $\mu g/m^3$	---
Fine Particulate Matter (PM2.5)	24 Hour	65 $\mu g/m^3$	---
	Annual Arithmetic Mean	15 $\mu g/m^3$	---
Sulfates (SO_4)	24 Hour	---	25 $\mu g/m^3$
Lead	30 Day Average	---	1.5 $\mu g/m^3$
	Calendar Quarter	1.5 $\mu g/m^3$	---
Hydrogen Sulfide (H_2S)	1 Hour	---	0.03 ppm (42$\mu g/m^3$)
Vinyl Chloride (chloroethene)	24 Hour	---	0.010 ppm (26 $\mu g/m^3$)
Visibility Reducing Particulates	1 Observation	---	In sufficient amount to produce an extinction co-efficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.

The EHPP is located in the Kern County portion of the San Joaquin Valley Air Basin and, as stated above, is under the jurisdiction of the San Joaquin Valley Unified Air

Pollution Control District (District). This area is designated as non-attainment for both the state and the federal ozone and PM10 standards, attainment for the state's CO, NO2, SO2, SO4 and Lead standards, attainment for the federal SO2 standard, and unclassified/attainment for the federal CO and NO2 standards (CARB 1998).

Ambient air quality data has been collected by the oil companies, known as the Westside Operators, in western Kern County for a number of years. Ambient air quality data was collected between 1993 and 1995 at three Westside Operators sites: Fellows, located approximately 8 miles south-southwest of the project site; Maricopa, located approximately 16 south of the project site; and McKittrick, which is located approximately 6 miles west-northwest of the project site, is presented in **AIR QUALITY Table 2**. That data shows there have been no violations during that period of the NO2, SO2 or CO ambient air quality standards.

Additional ambient air quality data from the Air Resources Board's ozone monitor in Maricopa and Taft College PM10 monitor (9 miles to the south of the project site) are shown in **AIR QUALITY Table 3**. This data shows that frequent violations of the state 1-hour ozone and 24-hour PM10 standard have occurred between 1993 and 1997. There appears to be no clear trend of significant improvement in the ambient concentrations of these two pollutants.

Ozone is not directly emitted from stationary or mobile sources, but is formed as the result of chemical reactions in the atmosphere between directly emitted air pollutants. Nitrogen oxides (NOx) and hydrocarbons (Volatile Organic Compounds [VOCs]) interact in the presence of sunlight to form ozone. The collected air quality data indicate that the ozone violations occurred primarily during the period of May through October.

In the most recent CARB report on the contribution of various districts to ozone violations in other districts (CARB 1996), the San Joaquin Valley Air Basin contributes measurably to ambient ozone levels in other districts, as well as other districts contributing measurably to the San Joaquin Valley's ozone problems. The report concludes that sources within the San Joaquin Valley Air Basin contribute to ozone levels in Mountain County districts to the northeast, the South Central Air Basin to the south, to the Mojave Desert to the east, the Sacramento area to the north, the Great Basin Valleys to the east, and to the North Central Coast Air Basin to the west. Conversely, emissions from districts such as the San Francisco Bay Area and the Sacramento area contribute to San Joaquin Valley's ozone problems. This widespread contribution from one geographic area to another demonstrates the regional nature of the ozone problem and ozone formation.

AIR QUALITY Table 2

Maximum PM10, NO2, CO and SO2 Readings

Collected at Fellows and Maricopa

Pollutant	Averaging Time	1995	1994	1993	Most Restrictive Ambient Air Quality Standard	Air Monitoring Station
PM10	24 hours	80	85	109	50	Fellows
	Annual	24.6	25.9	31.0	30	Fellows
NO2	1 hour	97	81	81	470	Maricopa
	Annual	13.6	16.3	15.6	100	Maricopa
CO	1 hour	2440	2303	2941	23,000	Fellows
	8 hour	1869	1985	2222	10,000	Fellows
SO2	1 hour	65	94	36	655	Fellows
	3 hours	36	57	27	1300	Fellows
	24 hours	13	20	14	130	Fellows
	Annual	1.5	1.8	1.8	80	Fellows

AIR QUALITY Table 3

Ozone and PM10 Ambient Air Quality Data

Pollutant & Location		1997	1996	1995	1994	1993
Ozone Maricopa	Maximum concentration (ppm)	.12	.12	.13	.13	.13
	# days exceed standard	24	63	85	78	85
PM10 Taft College	Maximum concentration (ppm)	78	94	93	64	118
	# days exceed standard	6	12	15	6	13
	% of samples above 24-hour standard	10%	20%	25%	11%	23%
California Ozone Ambient Air Quality Standard: 0.09 ppm (1-hour average) National Ozone Ambient Air Quality Standard: 0.12 ppm (1-hour average) California PM10 Ambient Air Quality Standard: 50 $\mu g/m^3$ (24-hour average)						

AMBIENT PM10

As **AIR QUALITY Table 3** indicates, the project area also annually experiences a number of violations of the state 24-hour PM10 standard, although violations of the federal 24-hour standard are not occurring. The violations of the state 24-hour standard occur predominately between the months of August and February, with the highest number of violations occurring from September through November.

PM10 can be emitted directly or it can be formed many miles downwind from emission sources when various precursor pollutants interact in the atmosphere. Gaseous emissions of pollutants like NOx, SOx and VOC from turbines, and ammonia from NOx control equipment can, given the right meteorological conditions, form particulate matter known as nitrates (NO3), sulfates (SO4), and organics. These pollutants are known as secondary particulates, because they are not directly emitted but are formed through complex chemical reactions in the atmosphere.

A number of studies have been undertaken to understand the particulate phenomenon, both PM10 and the smaller PM2.5, in the San Joaquin Valley. The EHPP has undertaken an extensive review of the literature to specifically address the role of nitrogen oxides emissions in the formation of particulate matter (Sylte 1999). Major sources of information on the subject are available from the District and CARB. The District, CARB, EPA and the Energy Commission Staff agree on the following conclusions about the NOx/PM10 relationship:

- NOx emissions contribute significantly to the formation of particulate nitrate in the region where the EHPP is located; and
- ammonium nitrate is the largest contributor to PM10 levels during the winter when ambient PM10 levels are at their highest.

Staff's assessment of the NOx contribution to particulate nitrate formation (CARB 1993-1997) (Chow et al. 1993) corroborates the conclusion that emissions of gaseous NOx emissions can contribute a substantial portion of the ambient particulate nitrate in the southern San Joaquin Valley, especially during the winter season when the PM10 levels are the highest.

PROJECT DESCRIPTION AND EMISSIONS

CONSTRUCTION

The EHPP will include not only the power plant, but the following ancillary facilities as well:

- a water pumping station located near Western Kern Water District (WKWD) facilities;
- an 9.8 mile long, 16-inch diameter water supply line from the pumping station to the project site;

- a 1,000,000 gallon water storage tank along the water supply line at the project site;
- a 4.4 mile long, 6-inch pipeline to existing waste water injection well field located in the Occidental Elk Hills Inc. (OEHI), oil and gas field;
- a 2,500 foot long, 10-inch diameter natural gas supply line from the existing 20-inch supply line from the nearby gas processing facilities operated by OEHI; and
- a double circuit 230 kV transmission line approximately 9.0 miles long from the project site to either a new substation at the Midway-Wheeler Ridge transmission corridor near Tupman or to the Midway substation, both to the north.

The construction of facilities will generate air emissions, primarily fugitive dust from earth moving activities and combustion emissions generated from the construction equipment and vehicles. The projected highest daily emissions, based on the highest monthly emissions over the 15-month construction activity are shown in **AIR QUALITY Table 4**. The emissions for the linear facilities are aggregated in **AIR QUALITY Table 4**, and may not represent all the linear facilities previously identified. Staff is currently pursuing clarification on this matter. These peak emissions will not occur over the entire construction period of the project, however it is likely that the peak emissions for the project site will coincide with the peak emissions of the linear facilities.

AIR QUALITY Table 4
Maximum Daily Construction Emissions (lbs/day)

	NOx	VOC	CO	SOx	PM10	Fugitive PM10
Project Site [a]	609.5	532.5	387.6	56.6	66.1	144.1[c]
All Linear Facilities [b]	103.3	151.3	47.6	9.7	11.4	408.2[d]
Total	712.8	683.8	435.2	66.3	77.5	552.3

Notes: All activities based on an 8 hour workday, 20 days per month.
[a] Includes the combustion turbines, cooling towers, 230kV Substation, water storage tank , associated buildings and services, and employee vehicle emissions.
[b] Includes the water supply pipeline & pumping station, waste water pipeline, natural gas pipeline and 230 kV transmission line.
[c] Assumes the disturbed earth is 12 acres and 1.2 ton PM/month/acre, 60% of which is PM10, 50% of which will be controlled by watering, averaged over a 3 month peak period.
[d] Assumes the total disturbed earth is 113.4 acres for all linear facilities and 1.2 ton PM/month/acre, 60% of which is PM10, 50% of which will be controlled by watering, averaged over a 10 month period.

(EHPP 1999a), (EHPP 1999b)

PROJECT SITE

This construction will include the combustion turbines, the cooling towers, the water storage tank, the 230kV substation and all other associated services (such as

pumps, valves, pressure vessels and buildings). The emissions in **AIR QUALITY Table 4** for the project site also include the vehicle emissions of the construction employees.

The power plant itself will take approximately 15 months to construct. The power plant project construction consists of three major areas of activity: 1) the civil/structural construction 2) the mechanical construction, and 3) the electrical construction. The largest emissions are generated during the civil/structural activity, where work such as grading, site preparation, foundations, underground utility installation and building erection occur. These types of activities require the use of large earth moving equipment, which generate considerable combustion emissions themselves, along with creating fugitive dust emissions. The mechanical construction includes the installation of the heavy equipment, such as the combustion and steam turbines, the heat recovery steam generators, condenser, pumps, piping and valves. Although not a large fugitive dust generation activity, the use of large cranes to install such equipment generates significantly more emissions than other construction equipment onsite. Finally, the electrical equipment installation occurs involving such items as transformers, switching gear, instrumentation and wiring. This is a relatively small emissions generating activity in comparison to the early construction activities.

Not surprisingly, the largest level of construction emissions for the project will occur from the project site activity, most of it due to earth moving and grading activities and large crane operations. The maximum fugitive dust emissions are expected to occur during the first three months of construction. During this time Elk Hills estimates that they will be disturbing approximately 12 acres of earth (an average of 4 acres per month). Elk Hills assumed that 1.2 tons of fugitive dust is generated for each acre of earth disturbed per month (EPA 1995a, Section 13.2.3.3), that 60% of that dust is PM10, and that 50% of that PM10 is controlled through watering the construction site. From these assumptions, the estimated maximum expected PM10 emissions from fugitive dust at the project site would be 144 lbs/day over a 3-month period. For a more detailed review of the construction emission estimated see Appendix B.

LINEAR FACILITIES

In a supplemental filing (EHPP 1999b), Elk Hills clarified their estimate of emissions associated with the construction of the linear facilities. These facilities include the two alternative transmission lines, the natural gas pipeline, the wastewater pipeline, the water pipeline and the associated pumping stations. However, the supplemental filing aggregated the construction emissions associated with the linear facilities into one set of emission values. Therefore staff is unable to determine if these emission estimates are complete. It is staff's opinion that these emission estimates are close to complete (if not complete) and that only minor clarification needs to be provided.

Elk Hills estimated the construction time for the linear facilities to be approximately 10 months, beginning in the fourth month of construction of the facility site and ending in the thirteenth month. During that time the construction activity stays fairly

constant, peaking around months 7 and 8. Using the emissions for months 7 and 8, staff made a conservative estimate of the daily emissions of the construction of the linear facilities. Staff took the emission values for months 7 and 8 (they are identical for both months) and averaged them over a 20 workday month (which is consistent with the assumptions of Elk Hills). It is staff's position that these daily emissions can be conservatively assumed for the entire construction time (10 months).

The supplemental filing by Elk Hills did not include an estimate of fugitive PM10 emissions from construction activities associated with the linear facilities. To estimate these emissions, staff used the estimated land disturbance Elk Hills provided in Table 3.8-2 (EHPP 1999a, Page 3-69). The estimated land disturbance for all the linear facilities together is 113.4 acres. Individually they are as follows: the transmission line (route 1A) is 41 acres, the water pipeline is 48 acres, the water pumping station is 1 acre, the wastewater pipeline is 21 acres and the natural gas pipeline is 2.4 acres. Staff made the previously stated assumptions for estimating fugitive PM10 emissions: the EPA emission rate of 1.2 lbs PM/acre/month, that 60% of this PM is PM10, and that 50% of the PM10 will be controlled through watering down the construction sites. Staff estimated the fugitive PM10 emissions from construction of the linear facilities to be 408.2 pounds per day over the entire 10-month construction period. For a more detailed review of the construction emission estimated see Appendix B.

OPERATIONAL PHASE

EQUIPMENT DESCRIPTION

The major components of the EHPP consist of the following: two combustion turbine generators (CTG), using the General Electric Power Systems PG7241FA, nominally rated at 171 MW. Each of the CTGs would be equipped with evaporative inlet air coolers;

- two natural gas fired heat recovery steam generators (HRSG) and ancillary equipment;
- one steam turbine, rated at 171 MW;
- one six-cell cooling tower;
- one redundant diesel fuel fired water pump.

EQUIPMENT OPERATION

The CTGs will burn only natural gas, and there are no provisions for an alternative back-up fuel.

Elk Hills is requesting that the project be analyzed with the assumption of 200 start-ups per turbine each year. However, there are three different start-up scenarios for the CTGs, depending on length of time that the turbine has been shutdown and the temperatures and pressures on the steam turbine side of the power generation block. The usual practice is to define start-ups as either a hot start, a warm start or a cold start, with the start-up period being defined as the length of time until the gas turbine is fully loaded, that is, producing base load electrical power. A hot start

would occur after an overnight turbine shutdown. The duration of a hot start is relatively short, approximately half an hour. A warm start-up is approximately 30 to 120 minutes in duration to allow for the steam turbine to be ramped up. A warm start-up duration would occur after a typical weekend shutdown (approximately 60 to 72 hours). A cold start takes considerably longer, on the order of four hours. However, this type of start-up would be very rare, occurring only after the turbines have been under extended shutdown, such as the annual maintenance inspection that the manufacturer may require. Because of the thermal efficiency of the project, it is highly likely that the EHPP will operate extensively, therefore extended shutdowns are likely to be rare.

Elk Hills has requested the project be analyzed assuming that of the 200 start-ups per turbine, 12 start-ups are defined as cold start (4-hours) and 188 are defined as warm or hot start-ups (2-hours). Staff believes that the more likely scenario is that, barring major mechanical malfunction of the equipment itself, cold start-ups may occur once or twice a year, most likely during the annual maintenance and inspection. Staff would expect that the vast majority of start-ups would be hot or warm starts, thus minimizing start-up periods of time.

The EHPP will have several different operating modes to respond to the changing power market; start-up, shutdown, base load, turndown (or part load) and peaking (or power augmented). Peak load operation is the use of water or steam injection into the compressor ahead of the turbine intake. This has the effect of increasing the power output of the turbine (up to 106% of rated capacity). It will also cause an increase in the NOx and CO emissions from the combustion turbines. However, these pollutants will be controlled by post combustion equipment (SCR and catalyst). Elk Hills has determined that they will be operating at peak load 976 hours and at base load 7360 hours per year per turbine (the balance of time being start-up). Elk Hills further assumes that EHPP can meet the air emission limits for base load while operating at part load, even for CO and VOC emissions. Therefore, emission limits for part load are not necessary and will not be analyzed. The HRSGs have natural gas fired duct burners that will also be controlled through the post combustion equipment. Elk Hills identified the operational scenario in which the highest emissions occur as being at peak load, duct fire on, and 63.9^{o}F ambient temperature.

The redundant diesel-fired emergency fire water pump will only operate if the two electric motor pumps fail to start or the pressure in the fire water distribution header drops below a certain set point. Elk Hills will only test the diesel pump once a year.

EMISSION CONTROLS

The exclusive use of an inherently clean fuel, natural gas, will limit the formation of SO2 and PM10 emissions. Natural gas contains very small amounts of a sulfur compound known as mercaptan, which when combusted, results in sulfur dioxide emissions in the flue gas. However, in comparison to other fuels used in power plants, such as fuel oil or coal, the sulfur dioxide emissions from the combustion of natural gas are very low.

Like SO2, the emissions of PM10 from natural gas combustion are very low compared to the combustion of fuel oil or coal. Natural gas contains very little noncombustible gas or solid residue; therefore, it is a relatively clean-burning fuel.

A sulfur content of 0.75 grains of sulfur per 100 standard cubic feet of natural gas was assumed for the SO2 emission calculations.

To minimize NOx, CO and VOC emissions during the combustion process, the CTG is equipped with the latest dry low-NOx combustor design developed by GE. A more detailed discussion of this combustion technology is presented in the Mitigation section of this analysis.

After combustion, the flue gases pass through the natural gas fired heat recovery steam generator (HRSG), where catalyst systems are placed to further reduce NOx, CO and VOC emissions. Elk Hills is proposing to use a Selective Catalytic Reduction (SCR) system to reduce NOx emissions. Another catalyst, an oxidizing catalyst, will also be installed in the HRSG to reduce CO and VOC emissions. A more complete discussion of these catalyst technologies is included in the Mitigation section.

PROJECT OPERATING EMISSIONS

The proposed project's criteria air pollutant emissions during short periods of time, one hour or less are shown in **AIR QUALITY Table 5**. As this table shows, the highest emissions are from the combustion turbine, with the emissions during startup being significantly higher than during steady state, full load operation. Most notably, emissions of NOx, VOC and CO are significantly higher during startup and shutdown. These higher emissions occur because the turbine combustor technology is designed for maximum efficiency during full load steady state operation.

AIR QUALITY Table 5
Project (Per CTG) Hourly Emissions

Operational Profile	**NOx**	**SO2**	**PM10**	**VOC**	**CO**
CTG Cold Start-up (4 hours) (lbs/event)	101.8	9.0	72.0	10.3	76.0
CTG Warm Start-up (2 hours) (lbs/event)	50.9	4.5	36.0	5.2	38.0
CTG Steady State at peak load + duct firing at 63.9^{o}F (lbs/hr)	15.8	3.6	18.0	4.0	12.5
Verification: Cooling Tower (lbs/hr)	--	--	0.65	--	--
Emergency Fire-water Pump (lbs/hr)	5.4	0.4	0.1	0.2	1.0
2 CTGs at peak load + duct firing at 63.9^{o}F & Cooling Tower (lbs/hr)	31.7	7.2	36.6	8.0	25.1

During startup, combustion temperatures and pressures are rapidly changing, which results in less efficient combustion and higher emissions. Also, the flue gas controls, the catalysts discussed above, operate most efficiently when the turbine operates near or at full load. Those flue gas controls are not as effective during the transitory temperature changes that occur during startup. The start-up emissions

data reflect information provided by Elk Hills (EHPP 1999d). See Appendix B for more information about how the hourly emission rates were calculated.

The daily emissions from the project are shown in **AIR QUALITY Table 6**. The table shows different operating scenarios, and the resultant emissions, including CTG start-up, steady state operation and the operation of the cooling tower. The typical daily emissions level scenario (2 turbines operating at full load with no start-ups) is presented in the last row of the table. See Appendix B for more information about how the hourly emission rates were calculated.

AIR QUALITY Table 6
Project Daily Emissions
(pounds per day [lbs/day])

Operational Profile	NOx	SO2	PM10	VOC	CO
1 turbine cold-start (4-hours) and steady state operation (20-hours)	418.4	81.2	432.0	90.3	326.6
1 turbine warm start (2-hours) and steady state operation (22-hours)	399.2	83.9	432.0	93.2	313.7
Cooling towers operating 24-hr	--	--	15.6	--	--
Total daily emissions of two 4-hour starts and operating at full load with cooling tower	836.8	162.4	879.6	180.6	653.2
Total daily emissions of one 4-hour start, one 2-hour start and full load operation with cooling towers	817.6	165.1	879.6	183.4	640.3
Typical daily operation – 2 turbines operate full load with cooling tower	758.4	173.3	879.6	192.0	601.4

Annual emissions are summarized in the **AIR QUALITY Table 7**. Elk Hills has requested that the project be analyzed assuming 12 cold start-ups per turbine per year, 188 warm or hot start-ups per turbine per year, and 976 hours of operation peak load per turbine per year. The balance of the year's operation (7,360 hours) assumes full load operation of the CTGs. This type of operational scenario is actually not possible, since by definition, the start-ups must be preceded with no turbine operation and thus no emissions. In this case the turbines would have to be down for many days before a cold start would be initiated. Therefore, the assumption of 7,360 hours of steady state operation could not happen however, Elk Hills presented this assumption as a conservative estimate for annual emissions.

For comparison, staff has presented the scenario of both turbines operating non-stop throughout the year. The highest annual emissions of SO2 would occur with this scenario, since these emissions are a function of the quantity of fuel burned. The annual emissions of NOx and CO would be higher with the inclusion of the start-up emissions. The PM10 emissions are identical in both cases because of Elk Hills' choice to make the conservative assumption that PM10 emissions during

start-up are the same as those during normal operation. In fact, PM10 is dependent of the amount of fuel burned, as is SO2. Since VOC is being controlled through a post-combustion catalyst, the emissions are fairly similar in both operating scenarios. See Appendix B for more information about how the hourly emission rates were calculated.

AIR QUALITY Table 7
Project Annual Emissions
(tons per year [ton/yr])

Operational Profile	**NOx**	**SO2**	**PM10**	**VOC**	**CO**
Start-ups, peak load and base load [a]	142.8	31.0	163.4	57.8	112.5
Peak and base load only (no start-ups) [b]	138.7	31.6	163.4	58.4	109.7

Notes:
[a] Assume 48 hr cold start, 376 hr warm start, 976 hr peak load, 7360 hr steady state, and 8760 hours cooling towers operation.

[b] Assume 976 hr peak load, 7784 hr steady state, and 8760 hours cooling towers operation.

AMMONIA EMISSIONS

Due to the large combustion turbines used in this project, and the need to control NOx emissions, significant amounts of ammonia will be injected into the flue gas stream as part of the SCR system. Not all of this ammonia mixes in the flue gases to reduce NOx; a portion of the ammonia passes through the SCR and is emitted unaltered, out the stacks. These ammonia emissions are known as ammonia slip. Elk Hills has committed to an ammonia slip no greater than 10 ppm, which is the current lowest ammonia slip level being achieved and permitted throughout California. On a daily basis, an ammonia slip of 10 ppm is equivalent to approximately 583 lbs per day of ammonia emitted into the atmosphere per turbine.

It should be noted that an ammonia slip of 10 ppm is usually associated with the degradation of the SCR catalyst, usually in a time frame of five years or more after initial operation. At that point, the SCR catalysts are removed and replaced with new catalysts. Through most of the operation of the SCR system, ammonia slip emissions are usually in the range of 1 to 2 ppm, corresponding to a mass emissions in the EHPP case to approximately 50 to 125 pounds per day per turbine. The implications of these ammonia emissions are discussed later in this analysis.

FACILITY CLOSURE

Eventually the EHPP will close, either as a result of the end of its useful life, or through some unexpected situation such as a natural disaster or catastrophic facility breakdown. When the facility closes, then all sources of air emissions would cease and thus all impacts associated with those emissions would no longer occur.

The Permit to Operate, issued by the District under Rule 2010, is required for the operation of the facility and is usually renewed on a five year schedule. However, during those five years, the applicant must still pay permit fees annually. If the applicant chooses to close the facility and not pay the permit fees, then the Permit to Operate would be cancelled. In that event, the project could not restart and operate unless the applicant pays the fees to renew the Permit to Operate.

If Elk Hills were to decide to dismantle the project, there would likely be fugitive dust emissions associated with this dismantling effort. District Rule 8020 requires that during demolition fugitive dust emissions be limited to no greater than 40% opacity by means of water application or chemical suppressants. The Facility Closure Plan to be submitted to the Energy Commission Compliance Project Manager (CPM) should include the specific details regarding how Elk Hills plans to demonstrate compliance with the District Rule 8020.

PROJECT INCREMENTAL IMPACTS

MODELING APPROACH

Staff performed an air dispersion modeling analysis (see Appendix B) to evaluate the project's potential impacts on the existing ambient air pollutant levels, both during construction and operation. An air dispersion modeling analysis usually starts with a conservative screening level analysis. Screening models use very conservative assumptions, such as the meteorological conditions, which may or may not actually occur in the area. The impacts calculated by screening models, therefore, can be double or more than the actual or expected impacts. If the screening level impacts are significant, refined modeling analysis is performed. A major difference in the refined modeling is that hour-by-hour meteorological data collected in the vicinity of the project site is used. The Industrial Source Complex Short-Term model, Version 3, known as the ISCST3 model, was used for the refined modeling.

CONSTRUCTION IMPACTS

Elk Hills performed air dispersion modeling analyses of the potential construction impacts at the project site. The analyses included fugitive dust generated from the construction activity (modeled as an area source) and combustion emissions from the equipment (modeled as a volume source). The emissions used in the analysis were the highest emissions of a particular pollutant during a one month period, converted to a gram per second emission rate for the model. Most of the highest emissions occurred during the 11th month of the 15-month construction period.

The results of this modeling effort are shown in **AIR QUALITY Table 8**. They show that the construction activities would cause a violation of the state 1-hour average NO2 standard and further exacerbate existing violations of the state 24-hour average PM10 standard. In reviewing the modeling output files, the project's construction impacts are not occasional or isolated events, but are over an area within a few hundred meters of the project site.

AIR QUALITY Table 8
Maximum Construction Impacts

Pollutant	Averaging Time	Impact ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Limiting Standard ($\mu g/m^3$)	Percent of Standard
NO2	1-hour	593.4	97	690.4	470	147
CO	1-hour	1552.2	2941	4493.0	23,000	20
	8-hour	528.9	2222	2750.9	10,000	28
SO2	1-hour	235.4	104	339.4	655	52
	3-hour	162.0	53	215.0	1,300	17
	24-hour	26.7	17	43.7	130	34
PM10	24-hour	206.3	109	315.3	50	631

Although construction of the EHPP will result in unavoidable short-term impacts, it is doubtful that the general public would be exposed to the construction impacts associated with the project. This is because of the project's rather isolated location away from any population centers in a heavily industrial area (the surrounding oilfields), where the impacts would actually occur. Nevertheless, staff believes that the impact from the construction of the project could have a significant and unavoidable impact on the NO2 and PM10 ambient air quality standards, and should be mitigated, to the extent feasible.

PROJECT OPERATION IMPACTS

The air quality impacts of project operation are shown in the following sections for fumigation meteorological conditions, and during combustion turbine start-up and steady-state operations.

FUMIGATION IMPACTS

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

The applicant used the SCREEN3 model, which is an EPA approved model, for the calculation of fumigation impacts. **AIR QUALITY Table 9** shows the modeled fumigation results and impacts on the 1-hour NO2, CO and SO2 standards. Since fumigation impacts will not typically occur much beyond a 1-hour period, only impacts on these 1-hour standards were addressed. The results of the modeling analysis show that fumigation impacts at full load will not violate the NO2, CO or SO2 1-hour standards.

AIR QUALITY Table 9
CTG Fumigation Modeling Maximum 1-Hour Impacts

Pollutant	Impact ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Limiting Standard ($\mu g/m^3$)	Percent of Standard
NO2	28.3	97	125.3	470	27
CO	21.0	2941	2962	23,000	13
SO2	2.5	104	107	655	16
Notes: Impacts reflect the highest results, turbine at 50% load, 63.9^{o}F, no duct burners, no steam injection winds at 1 m/s.					

(EHPP 1999a)

OPERATIONAL MODELING ANALYSIS

Staff provided a modeling analysis, using the ISCST3 model to quantify the potential impacts of the project both during normal steady state operation and during start-up conditions. The results of this modeling analysis are shown in **AIR QUALITY Table 10**. This table shows that during normal operation of the combustion turbines, the air pollution impacts would not cause a violation of any NO2, CO or SO2 ambient air quality standards.

The project's PM10 impacts could contribute to existing violations of the state 24-hour and annual average PM10 standards. However, it should be noted that the modeling outputs show that the vast majority of 24-hour impacts are on the level of 2 $\mu g/m^3$ or less. Because of the conservatism of the air dispersion model itself, staff believes that the actual impacts from the project would be significantly less than the projected modeled impacts shown in **AIR QUALITY Table 10**.

The start-up circumstances of the project are such that the combustion turbines will be started sequentially; that is, there will be no simultaneous start-up of both turbines. A start-up sequence of one turbine will only occur when the other turbine is operating at steady state or is not operating at all. However, Elk Hills has chosen to conservatively characterize their modeling of start-up emissions as though the turbines were started at the same time.

AIR QUALITY Table 10
Combustion Turbine Modeling Maximum Impacts

Pollutant	Operation	Averaging Time	Impact ($\mu g/m^3$)	Back-Ground ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Limiting Standard ($\mu g/m^3$)	Percent of Standard
NO2	1	1-hour	54.8	97	151.8	470	32
	5	Annual	0.4	16.6	17.0	100	17
CO	1	1-hour	58.9	2941	3000	23,000	13
	3	8-hour	26.9	2222	2249	10,000	22
SO2	1	1-hour	7.1	104	111.1	655	17
	2	3-hour	5.5	53	58.5	1300	4
	4	24-hour	1.5	17	18.5	130	14
	5	Annual	0.049	1.8	1.8	80	2
PM10	4	24-hour	7.6	118	125.6	50	251
	5	Annual	1.02	39.8	40.8	30	136

1 Both turbines start-ups NOx emission controls at 33% average efficiency, CO emission controls at 0%, employs ozone limiting method.
2 Since start-up requires 4-hours for a cold start, maximum emission are identical to operation scenario 1.
3 Both turbines start-up (4-hours) and operate at 100% load (4-hours).
4 Both turbines start-up (4-hours) and operate at 100% load (20-hours).
5 Both turbines 12 cold starts, 188 warm starts, 976 hours peak load and 7,384 hours base load.

Start-up circumstances can be troublesome for significant air quality impacts for the following reasons. First, emissions (particularly of NOx and CO) can be high and often uncontrolled, because emission control equipment is not operating at optimum temperature ranges. Second, low volumetric flow rates and exhaust gas temperatures can result in low exhaust plume rise and consequently higher ground level impacts.

For determining the maximum 1-hour impacts, Elk Hills assumed that there would be two cold start-ups, each of 4 hours, and to be conservative, they assumed they were simultaneous, not sequential. NOx controls were assumed to be at 33% efficiency and CO controls were assumed to be inactive.

The modeling results show that the highest short-term impacts on ambient NO2 and CO levels do, indeed, occur during start-up circumstances. The highest SO2 and PM10 impacts, both short-term and long term, occur during full load steady state operation. Start-up impacts on these pollutants are usually less because emissions of SO2 and PM10 are primarily a function of volume of fuel burned, and thus during start-up, much less fuel is burned than at full load, hence lower impacts.
The modeling analysis above indicates that during a project start-up scenario, the impacts from that start-up, plus background NO2 ambient levels would result in the highest impact of the project on the 1-hour state NO2 standard. This modeling analysis reflected the use of the Ozone Limiting Method (OLM) to provide a more refined estimate of NO2 impacts.

VISIBILITY IMPACTS

A visibility analysis of the project's gaseous emissions is required under the Federal Prevention of Significant Deterioration (PSD) permitting program. The analysis addresses the contributions of gaseous emissions (primarily NOx) and particulate (PM10) emissions to visibility impairment on the nearest Class 1 PSD areas, which are national parks and national wildlife refuges. The nearest Class 1 areas to the Elk Hills Project are the Domeland Wilderness Area, 90 miles to the northeast, and the San Rafael Wilderness Area 35 miles to the south. Elk Hills used the EPA approved model VISCREEN to assess the project's visibility impacts. The results from the VISCREEN modeling analysis indicated that the project's visibility impacts would be below the significance criteria for contrast and perception. Therefore, the project's visibility impacts on these Class 1 areas are considered insignificant.

CUMULATIVE IMPACTS

KERN COUNTY POWER PLANT PROJECTS

To evaluate reasonably foreseeable future projects as part of a cumulative impacts analysis, staff needs specific information. The time in which a probable future project is well enough defined to have the information necessary to perform a modeling analysis is usually when the project applicant has submitted an application to the District for a permit. Air dispersion modeling required by the District would necessitate that the applicant develop the necessary modeling input parameters to perform a modeling analysis. Therefore, we evaluate those probable future projects in our cumulative impacts analysis that are currently under construction, or are currently under District review. Projects located up to six miles from the proposed facility site usually need to be included in the analysis.

At the time of the filing of the AFC (February 1999), Elk Hills stated that there were two other projects that required a District permit within a six mile radius of the project site that were either under construction or undergoing permit review. They are the Sunrise Cogeneration and Power Project that filed an AFC with the Energy Commission in December 1998 and the La Paloma Generation Project that was certified on October 6, 1999. Staff has performed a cumulative modeling assessment of the three projects, Elk Hills, Sunrise Cogeneration and the La Paloma Generation Project, with each project located approximately six miles from each other.

Staff used the ISCST3 air dispersion model along with the 1993 meteorological file provided by Elk Hills. The results of this modeling analysis are shown in **AIR QUALITY Table 11**.

AIR QUALITY Table 11
Maximum Cumulative Impacts

Pollutant	Averaging Time	Impact ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Limiting Standard ($\mu g/m^3$)	Percent of Standard
NO2	1-hour	25.31	94	119.3	470	25
	Annual	0.34	16.6	16.9	100	17
CO	1-hour	30.46	2941	2971.5	23,000	13
	8-hour	7.72	2222	2229.7	10,000	22
SO2	24-hour	0.12	20	20.1	130	15
	Annual	0.02	1.8	1.8	80	2
PM10	24-hour	1.12	118	119.1	50	238
	Annual	0.17	31.7	31.9	30	106

As AIR QUAITY Table 11 shows, the cumulative air quality effects of the three projects do not cause a new violation of any NO2, CO or SO2 ambient air quality standards. The three projects would contribute to already existing violations of the state PM10 ambient air quality standards. However, all three of these projects will be required to provide PM10 emission offsets to mitigate their PM10 impacts.

Staff also performed an assessment of the possible secondary PM10 formation of nitrates and sulfates from the three projects' NOx and SO2 emissions. For NOx to nitrate formation, a conversion of 33% over a time span of 18 to 24 hours was used. For oxides of sulfur to sulfate formation, the conversion of 50% over 8 hours was used. These conversion rates can be input into the ISCST3 model to predict possible nitrate and sulfate PM10 impacts. The combined three-project nitrate impact was predicted to be approximately 1$\mu g/m^3$, located about 50 miles to the northeast of the projects' sites. The combined sulfate impacts would be approximately 0.1$\mu g/m^3$, located about 30 miles to the northeast. As with PM10, the emissions of NOx and SO2 will be fully offset. Because these secondary PM10 pollutants are mitigated and the magnitude of their impacts are very small, staff concludes that these secondary PM10 impacts are insignificant. For a more complete discussion of the cumulative modeling analysis, please refer to Appendix A.

SECONDARY POLLUTANT IMPACTS

OZONE

The project's emissions of gaseous emissions, primarily NOx, SO2 and VOC, can contribute to the formation of secondary pollutants, namely ozone and PM10, particularly ammonium nitrate PM10 and sulfate. There are air dispersion models that can be used to quantify ozone impacts, but they are used for regional planning efforts where hundreds or even thousands of sources are input into the modeling to determine ozone impacts. There are no regulatory agency models approved for assessing single source ozone impacts. However, because of the known relationship of NOx and VOC emissions to ozone formation, it can be said that the emissions of NOx and VOC from the EHPP do have the potential (if left

unmitigated) to contribute to higher ozone levels in the region which are cumulatively considerable.

SECONDARY PM10

Concerning secondary PM10 (primarily ammonium nitrate) formation, the applicant for the La Paloma Generation Plant (LPGP 1999a) submitted a conclusion from a study by Sonoma Technology, Inc. which states that the San Joaquin Valley is generally ammonia rich during the winter season when ambient PM10 levels are highest. This means that under such conditions, adding more ammonia to the ambient air will not automatically result in more ammonium nitrate formation. In the case of EHPP, Elk Hills quantified the highest ammonia emissions at approximately 583 pounds per day per turbine based on a permitted 10 ppm ammonia slip. However, staff believes that these mass emissions will be more on the order of 50 to 125 pounds per day per turbine based on a normal 1 to 2 ppm ammonia slip. Nevertheless, the NOx emissions from the EHPP could add to ammonium nitrate (PM10) formation, since there is more than sufficient ambient ammonia available for the NOx to react with to form ammonium nitrate.

The process of gas-to-particulate conversion is complex and depends on many factors, including local humidity and the presence of other compounds. Currently, there are no agency (EPA or CARB) recommended models or procedures for estimating nitrate or sulfate formation. Nevertheless, studies during the past two decades have provided data on the oxidation rates of SO2 and NOx. The data from these studies can be used to approximate the conversion of SO2 and NOx to particulate. This can be done by using an aggregate conversion factor (typically about 0.01 to 1 percent per hour) with Gaussian dispersion models such as ISCST3. The model is run with and without chemical conversion (decay factor) and the difference corresponds to the amount of SO2 and NO2 that is converted to particulate. This approach is an over simplification of a complex process; nevertheless, given the stringency of the PM10 and the new PM2.5 standards, and the need to address interpollutant conversion rates in setting offset ratios, for interpollutant trading, staff believes this issue needs to be addressed.

Staff, as part of their cumulative modeling analysis quantified, through air dispersion modeling and assumed NOx and SO2 conversion rates to PM10, the potential secondary PM10 impacts from the two power projects in the area currently before the Commission for licensing: Elk Hills and Sunrise Cogeneration and the recently licensed La Paloma. Staff believes that the emissions of NOx from EHPP do have the potential (if left unmitigated) to contribute, to higher secondary PM10 (particularly of ammonium nitrate) levels in the region.

MITIGATION

APPLICANT'S PROPOSED MITIGATION

CONSTRUCTION MITIGATION

As discussed earlier in the applicable LORS section, there are a series of District rules under Regulation 8 that limit fugitive dust during the construction phase of a project. Those rules require the use of chemical stabilizing agents and dust suppressants or gravel areas on site, and the wetting or covering of stored earth materials on site. They also encourage, although do not require, the use of paved access aprons, gravel strips, wheel washing or other means to limit mud or dirt carry-out onto paved public roads. Because they are required by District rules, Elk Hills will employ appropriate fugitive dust mitigation measures to limit their construction related PM10 emissions. At this time Elk Hills is proposing to use watering techniques approved by the District. These techniques are assumed to reduce the fugitive PM10 emissions by 50%.

OPERATIONS MITIGATION

The EHPP's air pollutant emissions impacts will be reduced by using emission control equipment on the project and by providing emission offsets. To reduce NOx emissions, Elk Hills proposes to use dry-low NOx combustors in the CTGs. In addition, an ammonia injection grid will be used in conjunction with a Selective Catalytic Reduction system.

To reduce CO and VOC emissions, Elk Hills proposes to use a combination of good combustion and maintenance practices, along with an oxidizing catalyst located in the HRSG. PM10 emissions will be limited by the use of a clean burning fuel (natural gas) and the efficient combustion process of the CTGs. The use of natural gas as the only fuel will limit SO2 emissions.

COMBUSTION TURBINE

Dry Low-NOx Combustors

Over the last 20 years, combustion turbine manufacturers have focused their attention on limiting the NOx formed during combustion. Because of the expense and efficiency losses due to steam or water injection in the combustor cans to reduce combustion temperatures and the formation of NOx, CTG manufacturers are presently choosing to limit NOx formation through the use of dry low-NOx technologies. The GE version of the dry low-NOx combustor is a four-stage ignition system. Initially the fuel/air mixture is ignited in two independent combustors (0% to 35% load). Then the startup sequence moves to a lean-lean operation (35% to 70% load) where the center burner is engaged as well. Then second stage burning is begun and all the fuel is directed to the center burner. The second stage burning is a transient event while proceeding to the premixed phase. Premixed operation (70% and 100% load) has fuel being pumped to all burners, but ignition only in the center burner.

In this process, firing temperatures remain somewhat low, thus minimizing NOx formation, while thermal efficiencies remain high. At steady state CTG loads greater than 40 percent load, NOx concentrations entering the HRSG are 25 ppm corrected to 15 percent O2. CO concentrations are more variable, with concentrations greater than 100 ppm at 50 percent load, dropping to 5 ppm at 100 percent load.

Flue Gas Controls

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 HRSGs. Elk Hills is proposing two catalyst systems, a selective catalytic reduction system to reduce NOx, and an oxidizing system to reduce CO.

Selective Catalytic Reduction (SCR)

Selective catalytic reduction refers to a process that chemically reduces NOx by injecting ammonia into the flue gas stream over a catalyst in the presence of oxygen. The process is termed selective because the ammonia reducing agent preferentially reacts with NOx rather than oxygen, producing inert nitrogen and water vapor. The performance and effectiveness of SCR systems are related to operating temperatures, which may vary with catalyst designs. Flue gas temperatures from a combustion turbine typically range from 950 to 1100°F.

Catalysts generally operate between 600 to 750°F (CARB 1992), and are normally placed inside the HRSG where the flue gas temperature has cooled. At temperatures lower than 600°F, the ammonia reaction rate may start to decline, resulting in increasing ammonia emissions, called ammonia slip. At temperatures above about 800°F, depending on the type of material used in the catalyst, damage to some catalysts can occur. The catalyst material most commonly used is titanium dioxide, but materials such as vanadium pentoxide, zeolite, or a noble metal are also used. These newer catalysts (versus the older alumina-based catalysts) are resistant to fuel sulfur fouling at temperatures below 770°F (EPRI 1990).

Regardless of the type of catalyst used, efficient conversion of NOx to nitrogen and water vapor requires uniform mixing of ammonia into the exhaust gas stream. Also, the catalyst surface has to be large enough to ensure sufficient time for the reaction to take place.

Elk Hills proposes to use a combination of the dry low-NOx combustors and SCR system to produce a NOx concentration exiting the HRSG stack of 2.5 ppm, corrected to 15 percent excess oxygen averaged over a 3-hour period.

Oxidizing Catalyst

To reduce the turbine carbon monoxide (CO) emissions, Elk Hills proposes to install an oxidizing catalyst, which is similar in concept to catalytic converters used in automobiles. The catalyst is usually coated with a noble metal, such as platinum, which will oxidize unburned hydrocarbons and CO to water vapor and carbon dioxide (CO2). The CO catalyst is proposed to limit the CO concentrations exiting

the HRSG stack to 4 ppm, corrected to 15 percent excess oxygen and averaged over 24 hours.

COOLING TOWER

Cooling tower drift consists of small water droplets, which contain particulate matter that originate from the total dissolved solids in the circulating water. To limit these particulate emissions, drift eliminators are installed in the cooling tower to capture these water droplets. Elk Hills intends to use drift eliminators on the cooling tower, with a design efficiency of 0.001 percent. This is a very high level of efficiency for cooling tower drift eliminators. Similar cooling tower designs have been used successfully by a number of other projects licensed by the Energy Commission in recent years.

EMISSION OFFSETS

District Rule 2102, Section 4.2, requires that Elk Hills provide emission offsets, in the form of banked Emission Reduction Credits (ERC), for the project's emissions increases of NOx, SO2, VOC and PM10. Elk Hills has secured a number of offsets through option agreements. Offsets for the project's CO emissions are not required since the project will not cause any violations of any CO standard and the area currently does not experience any violations of any CO standard. A summary of the offset liability is shown in **AIR QUALITY Table 12**. The District has not yet released the preliminary Determination of Compliance for the EHPP. Therefore, staff can not reveal the details about the proposed emission reduction credit mitigation package.

One possibility is that Elk Hills will propose interpollutant trading for their PM10 liability (i.e., trading of NOx for PM10). The ratio of 2.22 pounds of NOx for every one pound of PM10 was determined by the District as the appropriate interpollutant trading ratio. The District rules allow for such inter-pollutant trading (Rule 4.2.5.3). Staff agrees that based on the relationship of NOx contributing to secondary PM10 formation of ammonium nitrate, especially during the high ambient PM10 winter season, that NOx reductions for PM10 increases is an appropriate mitigation measure.

AIR QUALITY Table 12
Emissions Offsets Balance

	Offsets Required	Offsets provided (adjusted for distance)	Balance	Additional needed for NOx:PM trade	NOx offsets provided for PM10	Final Balance	Average daily emission Offsets provided	Average daily project emissions
	Tons/year						Lbs/day	
PM10	163.4	ND	--	--	--	--	--	879.6
NOx	142.8	ND	--	--	--	--	--	836.8
SO2	31.6	ND	--	--	--	--	--	172.3
VOC	58.4	ND	--	--	--	--	--	192.0
ND – Not disclosed								

ADEQUACY OF PROPOSED MITIGATION

CONSTRUCTION MITIGATION

Elk Hills is required to comply with the District Regulation 8 for limiting fugitive dust emissions during construction. Staff believes that additional measures are necessary to mitigate potential construction impacts (refer to staff proposed mitigation below).

OPERATIONS MITIGATION

EMISSION CONTROLS

Elk Hills has proposed, in their opinion, all practical and technically feasible mitigation measures to limit NOx emissions from the combustion turbines to 2.5 ppm over a 3-hour average. In addition, they propose to use an oxidizing catalyst to limit CO emissions to 4 ppm over a 24-hour period, which will also limit VOC emissions to 5 ppm over a 24-hour period.

Elk Hill's use of drift eliminators with an efficiency of 0.001 percent represent the state-of-the-art of drift eliminator design. To our knowledge, commercially available drift eliminators with even higher efficiency, which could further reduce the cooling tower's PM10 emissions, are not available.

OFFSETS

Staff will reserve judgement of the completeness of the offset package until the District has released the preliminary Determination of Compliance.

STAFF PROPOSED MITIGATION

CONSTRUCTION MITIGATION

As stated above, there are a number of rules in the District's Regulation 8 that will minimize fugitive dust emissions. Those rules allow for some latitude and flexibility as to how they will demonstrate compliance. Elk Hills stated in their AFC that they intend to use watering as their main control mechanism for fugitive PM10.

The modeling assessment discussed earlier shows that the combustion sources used for heavy construction have the potential for causing significant air quality impacts. Elk Hills is not proposing to minimize combustion emissions such as NOx, SO2, CO, VOC and PM10. Control of combustion emissions associated with constriction is not required by District rules. However, staff has become aware of two new techniques for controlling emissions from construction equipment that are available and cost effective, a fuel blend and an exhaust catalyst. The fuel is an emulsified blend of diesel and water which has been shown to reduce NOx emissions in diesel engines by approximately 50%. The fuel is generally mixed on-site and requires no changes to engines or equipment. This fuel is available from PuriNOx under the product name of Lubrizol at a similar cost to standard Diesel fuel. The catalyst is a post combustion soot filter and oxidation device that replaces

the muffler of the construction equipment. It reduces CO and hydrocarbon (VOC) emissions by approximately 80-90% and PM10 emissions by approximately 90-99%. This technology has been in the market for approximately 10 years and is available from several companies. The Cinco Group offers the DPX Catalyst installed at approximately $8,000 each. That translates into approximately $200,000 under Elk Hill's current construction plan (approximately 25 installations).

If these mitigation techniques were employed, the NOx emission impacts from construction activities would be reduced from a significant impact to a level of insignificance. Given the relative cost of the emulsified diesel fuel, staff concludes that this technology is cost effective. By using the fuel blend and the exhaust catalyst, the PM10 impacts would be reduced from being over twice the current background to being 2% of the current background. On an annual basis, staff calculated that a reduction of approximately 207 tons per year could occur. That reduction would cost approximately $965 per ton, so staff concludes that this technology is therefore cost effective. Staff encourages Elk Hills to make their own inquires and analysis, and intends to include Conditions of Certification requiring the use of Lubrizol and soot filters in its Final Staff Assessment.

OPERATIONS MITIGATION

Staff will reserve judgement of the completeness of the proposed mitigation until the District has released the preliminary Determination of Compliance.

COMPLIANCE WITH LORS

FEDERAL

The US EPA has not yet issued a preliminary Prevention of Significant Deterioration (PSD) permit for the EHPP.

STATE

Staff can not make a determination of compliance with Section 41700 of the California State Health and Safety Code until the District has issued a Determination of Compliance.

LOCAL

Staff will relate the compliance status of the EHPP with District rules after the preliminary Determination of Compliance has been issued.

CONCLUSIONS AND RECOMMENDATIONS

Staff can make no conclusions until after the District has released the preliminary Determination of Compliance.

CONDITIONS OF CERTIFICATION

To be developed

REFERENCES

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APPENDIX A

CUMULATIVE AIR QUALITY IMPACT ANALYSIS

Air Permitting Specialists

Technical Note
Cumulative Air Quality Impact Analysis
La Paloma Generating Station
Kern County, California

May 12, 1999

Prepared for:
Siting and Environment Division
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

1. INTRODUCTION

The objective of this modeling analysis is to quantify cumulative air quality impacts associated with the operation of La Paloma generating station with two other planned generating stations: Sunrise and Elk Hills. All three generating stations are to be located in Western Kern County, California.

In the present analysis, “cumulative” air quality impact means the sum total of air quality impacts from the three generating stations (GS) plus background concentration. The focus of this study is on the following pollutants:

- Carbon Monoxide (CO)
- Oxides of Nitrogen (NOx)
- Sulfur Dioxide (SO_2)
- Fine Particulate (PM-10)
- Sulfate (SO_4)

2. CRITERIA FOR SIGNIFICANT IMPACT

In order for the cumulative impacts to be considered significant, two criteria would have to be met:

The maximum ground level concentration of any air pollutant emitted by the La Paloma GS would increase as a result of contribution from other existing or proposed sources. For the purposes of this analysis, there are no existing sources near the La Paloma GS and the only proposed emission sources are the Elk Hills and Sunrise generating stations.

Cumulative maximum ground level concentration would exceed California or Federal ambient air quality standards.

Cumulative air quality impact is considered insignificant unless both criteria are satisfied.

3. MODELING METHODOLOGY

The basic modeling methodology consisted of the following steps:

Run ISCST3 with emissions from La Paloma alone.
Re-run ISCST3 with emissions from all three plants. (La Paloma, Sunrise and Elk Hills).
If there is an increase in the ground level concentration (GLC) at the point of max as determined in Step 1, assess if the increased concentration is likely to violate applicable ambient air quality standard.

If there is no increase in max GLC at the point of max concentration, conclude that emissions from Sunrise and Elk Hills would not contribute to the max GLC associated with operation of La Paloma

3.1 SELECTION OF EMISSIONS/OPERATIONAL SCENARIO

Emissions from the three generating stations vary depending on ambient temperature and whether the plants are operating in 'normal' or 'start-up' modes. For the purposes of this analysis it was assumed that La Paloma and Sunrise were operating normally at an ambient temperature of 65 F; it was assumed that Elk Hills was in a start-up mode. These emissions scenarios were selected in consultation with CEC staff. A summary of emissions and other input data used in the modeling analysis are summarized below. The data were obtained from data files provided by the applicants.

Parameter	**Units**	**La Paloma**	**Elk Hills**	**Sunrise**
CO	Lbs/hr	18.8	37.0	26.8
NOx	Lbs/hr	15.7	46.6	15.4
SO2	Lbs/hr	0.87	2.1	3.3
PM-10	Lbs/hr	7.86	18.	18.
No. of Stacks		4	2	2
Stack Height	Meters	30	36.6	30.5
Stack Diameter	Meters	5.3	5.49	5.79
Exhaust Temp.	K	362	345.	368.
Exit Velocity	meters/sec	18.5	12.5	13.0
Note: Emissions (lbs/hr) are per stack.				

3.2 MODELING OF SOX AND NOX CONVERSION TO PARTICULATE MATTER

For NOx emissions, the results of a recent modeling study by Desert Research Institute (DRI 1999) were used. This study concluded that approximately 33% of the NOx, emissions were converted to particulate matter. The time scale involved in this conversion is between 18 to 24 hours. Using these results, the maximum predicted ground level concentration was adjusted to allow for conversion form oxides of nitrogen (NO and NO_2) to nitrate. An estimate of particulate concentration due to secondary formation of nitrate would equal:

Max. Particulate concentration = Max. NO_2 Conc. x (100-66)/100

This approach yields only an order of magnitude estimate of nitrate concentration. A more refined approach that takes into account detailed atmospheric chemistry and the time variation of various chemical species affecting nitrate formation is beyond the scope of this evaluation.

For oxides of sulfur conversion to sulfate, it was assumed that emissions consisted entirely of SO_2 and that the conversion could be modeled as a first order chemical

reaction. Under this assumption, one can model the SO_2 to sulfate conversion using a simple decay coefficient or a half-life for SO_2. The half-life of SO_2 varies between 1 to 4 days (Stern, et al, 1984). For the present analysis, a half-life of 8 hours was assumed. That is, 50% of the SO_2 is converted to sulfate in 8 hours. This half-life can be used in ISCST3 to account for the SO_2 to sulfate conversion.

3.3 CHOICE OF AIR DISPERSION MODEL

EPA's ISCST3 air dispersion model was employed for this analysis. This model is recommended by the EPA's Guidelines of Air Quality Models for use in simple and complex terrain. Version 98356 was used to perform the model runs.

3.4 CHOICE OF METEOROLOGICAL DATA

One year (1993) of hourly meteorological data were used to conduct the analysis. The surface data from McKittrick (Station 99991) were supplemented by upper air data from Bakersfield (99992). These data were taken from the input files provided by the applicant for the La Paloma project.

Since the focus of this study was on the cumulative air quality impacts associated with emissions from all three GS, the use of additional years of meteorological data would not change the results or conclusions reached in this study. In other words, the *relative contributions* of the Elk Hills and Sunrise GS emissions to the maximum GLC associated with the operation of La Paloma would remain the same.

3.5 SELECTION OF MODELING GRID

A 2 kilometer grid (100 meter x 100 meter) was used to determine the location of GLC for each source. A second larger grid was used to enclose all three sources. This grid extended 20 km x 20km and was centered at the La Paloma GS. A rectangular coordinate system was used employing the UTM coordinate system.

RESULTS

The results of the analysis show that there would be minimal cumulative impact associated with operation of all three generating stations. For example, the maximum 1-hour NO_2 concentration due solely to emissions from La Paloma would not increase as a result of all three generating stations operating concurrently. For annual NO_2 concentration, there would be a minor increase. Specifically, the results were as follows:

Pollutant	Averaging Time	La Paloma GS	All 3 Stations
NO_2	1-hour	25.31	25.31
	Annual	0.300	0.343
PM-10	24-hour	1.10	1.12
	Annual	0.150	0.172
SO_2	24-hour	0.123	0.124
	Annual	0.0167	0.0202
CO	1-hour	30.45	30.46
	8-hour	7.72	7.72

Overall, the analysis showed that inclusion of emissions from the proposed Sunrise and Elk Hills generating stations leads to a new point of maximum ground level concentration. This shown in the attached contour plots of concentration for emissions from (a) La Paloma; (2) La Paloma, Elk Hills and Sunrise, and (3) Elk Hills and Sunrise. A comparison of Figures 1 and 2 (1-hour NO2, La Paloma and All 3 Stations), shows negligible contribution in the vicinity of La Paloma from the other two plants.

Figure 2 shows that a new point of maximum concentration near Elk Hills and Sunrise generating stations. This is due entirely from emissions from these two plants as can be confirmed in Figure 3 (Sunrise and Elk Hills). The same pattern was identified for annual NO_2 concentrations as shown in Figures 4-6.

Particulate impacts associated with the conversion of NO_2/NO to nitrate are estimated to be 1 ug/cubic meter. This is based on 33% conversion of the maximum 24-hour averaged NO_2 concentration associated with operation of La Paloma GS. The latter range between 0 to 0.3 ug/cu/meter on a 24 hour basis. The impact of secondary nitrate formation on the PM-10 concentration is not considered significant.

It was noted in Section 3.2 that the time scale for the conversion of NO_2/NO to nitrate is between 18 to 24 hours. This means that areas that are located 175 to 200 miles to the southeast would be impacted with higher nitrate particulate. This would transport the plume out of Kern County to adjacent counties located to the East or Southeast. This estimate is based on the fact that on an annual basis, the predominant winds in Kern County are from the NE with an average annual speed of 8.9 mph (Ref: California Surface Wind Climatology, CARB, June 1984).

Use of the ISCST3 model with a half-life of 8 hours indicates that the maximum 24-hour ground level concentration of SO_2 would decrease from 2.5 ug/cu meter to 2.4 ug/cu meter. This means that about 4% of the SO_2 (0.1 ug/cu meter) would be converted to sulfate. Since the state standard for sulfate is 25 ug/cu meter, the secondary formation of sulfate is not considered significant.

As with NO_2/NO conversion to nitrate, the SO_2 to sulfate conversion takes place over a period of 1-4 days. On this time-scale the emissions would be transported several hundred miles to the East or Southeast. Therefore the highest concentration of sulfate would not occur near the power plants but several hundred miles to the East or Southeast. For example, in 2 days the plume would travel approximately 400 miles from the source. This would transport the sulfate (and nitrate particulates) out of Kern County and possibly, out of state.

APPENDIX B

EXCEL SPREADSHEETS FOR THE CONSTRUCTION AND OPERATION EMISSION ESTIMATES AND IMPACTS

This Appendix contains spreadsheets used to estimate the Elk Hills Power Project emissions for construction and operations. The construction emissions include fugitive dust and all other emissions. This analysis separates the emissions from the project site and linear facilities, but does not separate out the individual linear facilities. Construction emission impacts are based on a modeling analysis provided by the applicant, Elk Hills. Since the modeling analysis was completed and submitted, the emission rates have been refined. However, because the model that was used (ICST3) it is still possible to use the modeling results. The resulting impacts of an ISC modeling run are directly proportional to the emission rate at the source. Therefore, if only the emission rate changes then the impact results can be factored (up or down) by the new emission rates. This is the technique employed by staff to determine a new construction emission impact. The operational emissions and impacts were also refined after the modeling was submitted to the Energy Commission. Therefore, they also have been modified in a similar manner.

PUBLIC HEALTH

Obed Odoemelam

INTRODUCTION

Operating the proposed Elk Hills Power Project (EHPP) would create combustion products and possibly expose workers and the general public to these pollutants as well as the toxic chemicals associated with other aspects of facility operations. The issue of possible worker exposure is addressed in the **Worker Safety and Fire Protection** section of this Preliminary Staff Assessment (PSA). Exposure to electric and magnetic fields (EMF) is addressed in the **Transmission Line Safety and Nuisance** section. The purpose of this public health analysis is to determine whether a significant health risk would result from public exposure to these chemicals and combustion by-products routinely emitted during project operations.

The exposure of primary concern in this section is to pollutants for which no air quality standards have been established. These are known as the noncriteria pollutants, or toxic air pollutants. Those for which ambient air quality standards have been established are known as criteria pollutants. These criteria pollutants are identified in this section (along with regulations for their control) because of their usually significant contribution to the total pollutant exposure in any given area. Furthermore, the same control technologies may be effective for controlling both types of pollutants when emitted from the same source. Compliance with the required control technologies will be discussed in the **Air Quality** section.

LAWS ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

The Clean Air Act of 1970 (42 U.S.C., section 7401 et seq.) required establishment of ambient air quality standards to protect the public from the effects of air pollutants. These standards have been established by the United States Environmental Protection Agency (EPA) for the major air pollutants: nitrogen dioxide, ozone, sulfur dioxide, carbon monoxide, sulfates, particulate matter with a diameter of 10 micron or less (PM10) and lead. The Act required states to adopt plans to ensure compliance by 1982. These plans are known as the State Implementation Plans (SIPs). The EPA considers it appropriate to differentiate between PM10 and particulate matter with a diameter of 2.5 micron or less (PM2.5). Such particulate matter may serve as a source of exposure to both criteria and noncriteria pollutants.

STATE

California Health and Safety Code section 39606 requires the California Air Resources Board (CARB) to establish California's ambient air quality standards to reflect the California-specific conditions that influence its air quality. Such standards have been established by the CARB for ozone, carbon monoxide, sulfur dioxide, PM10, lead, hydrogen sulfide, vinyl chloride and nitrogen dioxide. The same

biological mechanisms underlie some of the health effects of most of these criteria pollutants as well as the noncriteria pollutants. The California standards are listed together with the corresponding federal standards in the **Air Quality** section.

California Health and Safety Code section 41700 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 business or property."

The California Health and Safety Code section 39650 et seq. mandates that the California Environmental Protection Agency (Cal-EPA) establish safe exposure limits for toxic, noncriteria air pollutants and identify the best available methods for their control. These laws also require that the new source review rules for each air district include regulations establishing procedures to control the emission of these pollutants. The toxic emissions from natural gas combustion are listed in CARB's April 11, 1996 California Toxic Emissions Factors (CATEF) database for natural gas-fired combustion turbines. Cal-EPA has developed specific cancer potency estimates for assessing their related cancer risks at specific exposure levels. For noncancer-causing toxic air pollutants, Cal-EPA established specific no-effects levels (known as reference exposure levels) for assessing the likelihood of producing health effects at specific exposure levels. Such health effects would be considered likely only when exposure exceeds these reference levels. Staff uses these Cal-EPA potency estimates and reference exposure values in its health risk assessments.

California Health and Safety Code section 44300 et seq. requires facilities, which emit large quantities of criteria pollutants and any amount of noncriteria pollutants to provide the local air district an inventory of toxic emissions. Such facilities may also be required to prepare a quantitative health risk assessment to address the potential health risks involved. The CARB and the San Joaquin Valley Air Quality Management District will ensure implementation of these requirements for the proposed project.

LOCAL

The San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) has no specific rules implementing Health and Safety Code section 44300. It does, however, require the results of a health risk assessment as part of the application for the Authority to Construct (ATC). EHPP has complied with this requirement.

SETTING

According to information from Elk Hills (EHPP 1999 pages 5.15-1 through 5.15-5), the toxic air contaminants from the project will be emitted into a sparsely populated, mostly agricultural area with oil and gas production fields. The area population density is 19 persons per square mile according to the 1990 U.S census figures, with the nearest residence to the 12-acre project site located approximately 5.1

miles to the east. There are no sensitive receptors within the normal 6-mile radius of concern. Sensitive receptors, such as children and the elderly, are usually more susceptible than the general population to the effects of environmental pollutants. Extra consideration is given to possible effects in such individuals in establishing exposure limits for environmental pollutants. The project area is largely inaccessible to the public.

METHOD OF ANALYSIS

Any impacts from this type of project would be mainly associated with the toxic pollutants originating from the combustion turbines, ammonia from the selective catalytic reduction (SCR) system, and toxic chemicals from the cooling towers. Potential public exposure to the surrounding population is estimated through air dispersion modeling. After estimating the exposure levels, staff assesses whether these exposure estimates are below the applicable reference exposure levels in the case of noncancer effects, or below levels at which any possible cancer risks are considered significant by regulatory agencies in the case of cancer-causing (or carcinogenic) pollutants. The procedure for evaluating the potential for these cancer and noncancer health effects is known as a health risk assessment process and consists of the following steps:

- A hazard identification step in which each pollutant of concern is identified along health effects it can cause;
- A dose-response assessment step in which the relation between the magnitude of exposure and the probability of effects is established;
- An exposure assessment step in which the possible extent of pollutant exposures from a project is established for all possible pathways by dispersion modeling; and
- A risk characterization step in which the nature and often the magnitude of the possible human health risk is assessed and presented.

HEALTH EFFECTS ASSESSED

Health risks associated with a project can result from high-level exposure, which creates immediate-onset (acute) effects, or from prolonged low-level exposure, which creates chronic effects. Since noncancer effects are assumed to result after exposure above specific thresholds, an analysis of the potential for these effects will include, where possible and mechanistically appropriate, consideration of background or ambient levels of the toxic pollutants being assessed. Unfortunately, such background measurements are not usually available for the noncriteria pollutants associated with natural gas combustion unless there are major sources in the area. Such pollutants are generally emitted at relatively low levels as compared to the criteria pollutants. Staff will not necessarily add the background levels of every noncriteria pollutants in the area to the incremental, project-related levels being considered unless it determines that the effects of the pollutants are produced through the same biological mechanism at the target organ involved.

For facilities such as the proposed EHPP, which burn natural gas and emit the pollutants identified by the ARB for the combustion process involved, high-level exposure to toxic pollutants (which could cause acute effects), could occur only during major accidents and are not expected from routine operations when emissions are much lower. Long-term, chronic exposures are, therefore, of greater concern than such potential short-term effects in assessing possible public health impacts. Chronic effects from exposure to toxic emissions from natural gas combustion may be related to cancer or health effects other than cancer. Since the proposed project site is located within oil production fields (away from areas of human habitation), any background exposure to oil field-related pollutants in the project area is best assessed in terms of occupational exposure.

The method used by regulatory agencies to assess the significance of noncancer health effects is known as the hazard index method and is used to assess both acute and chronic effects. In this method, a hazard index is calculated for the individual pollutants by dividing projected exposure by the reference level for that pollutant. A hazard index of less than 1.0 suggests that acute or chronic effects would be unlikely. A value of more than 1.0 would suggest a likelihood of effects. The indices for all pollutants are then added together to obtain an aggregate hazard index value for the project in question. A total index of less than 1.0 would suggest a lack of potential effects from all pollutant exposures considered together. A value of more than 1.0 would suggest a potential for significant effects but does not guarantee that such effects will occur. In such a case, recommended regulatory actions would be based on further more refined analysis of the environmental circumstances.

POTENTIAL CANCER RISK

Cancer from carcinogenic exposure usually results from biological effects at the molecular level. Since such effects are currently assumed possible from every exposure to a carcinogen, the risk of cancer is generally considered by staff and other regulatory agencies as more sensitive than the risk of noncancer health effects, for assessing the environmental acceptability of a source of both carcinogens and noncarcinogens. This accounts for the prominence of theoretical cancer risk estimates in the environmental risk assessment process. For any source of concern, the potential risk of cancer is obtained by multiplying the exposure estimate by the potency values for the individual carcinogens involved. The total project-related cancer risk is then obtained by adding together the risk values obtained for each of the individual carcinogens. This assessment process allows for calculation of only the upper bounds on the cancer risk. The actual risk will likely be lower and could indeed be zero.

STAFF'S SIGNIFICANCE CRITERIA

Energy Commission staff considers a potential cancer risk of one in a million as the threshold of significance for sources of environmental carcinogens. Above this threshold, further mitigation could be recommended after proper consideration of issues related to the limitations of the assessment process. For noncarcinogenic pollutants, staff will consider significant health impacts unlikely (as do other regulatory agencies) when the hazard index estimate is less than 1.0. If more than

1.0, staff would regard the related emissions as potentially significant from an environmental health perspective.

IMPACTS

PROJECT SPECIFIC IMPACTS

CONSTRUCTION PHASE IMPACTS

Potential risks to public health during construction may be associated with toxic substances disturbed during site preparation, and emissions from heavy equipment as identified for the project (EHPP 1999 page 5.15-3). Potential impacts from emission of criteria pollutants from heavy equipment operation and particulates from site preparation are assessed in staff's **Air Quality** section in connection with the applicable air quality standards. That section also addresses compliance with applicable emission-limiting SJVUAPCD rules together with the requisite conditions of certification. Since no hazardous substances were identified from the Environmental Site Assessment for the project, no significant pollutant-related public health impacts are anticipated from the relatively short-term construction-related earth moving activities involved. Effects from chronic exposures are usually not expected from these short-term activities.

DIRECT OPERATIONAL IMPACTS

Elk Hills conducted the health risk assessment for the project-related emissions of potential significance according to procedures specified in the 1993 California Air Pollution Control Officer's Association (CAPCOA) guidelines for sources of this type. Results of this assessment have been provided to staff, along with documentation of the assumptions used (EHPP 1999 pages 5.15-3 through 5.15-10). Such documentation was provided with regard to the following:

- 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.

Energy Commission staff has found these assumptions to be generally accurate and concurs with Elk Hill's findings with regard to the numerical public health risk estimates expressed either in terms of the hazard index for each noncarcinogenic pollutant, or a cancer risk for estimated levels of the carcinogenic pollutants. To assess the potential for incremental public health effects, only the project-related emissions were considered in calculating the hazard index values involved. These

analyses were conducted, as mechanistically appropriate, to determine the 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.

The following pollutants were considered for potential to produce noncancer effects with due regard for the underlying biological mechanisms: ammonia, acetaldehyde, acrolein, benzene, 1,3 butadiene; formaldehyde, naphthalene, toluene, xylenes, propylene oxide and polycyclic aromatic hydrocarbons (PAHs). The following were considered with regard to a possible cancer risk: acetaldehyde, benzene, 1,3 butadiene, formaldehyde, PAHs and propylene oxide.

A hazard index value of 0.014 was calculated for combined chronic health effects for the individual at a location approximately 1.1 kilometers (km) northeast of the project site. A value of 0.043 was calculated for combined acute health effects for an individual at a location approximately 0.25 km west of the site. These values are significantly below the 1.0 significance level suggesting that significant noncancer health effects would be unlikely during operations.

The highest combined cancer risk was estimated to be 0.12 in a million for an individual at the same location identified for the total hazard index for chronic effects. This risk was calculated using existing procedures, which assume that the individual will be exposed at the highest possible levels to all the carcinogenic pollutants from the project for 70 years. This risk value is much below the one in a million level considered significant by staff regarding public exposure to environmental carcinogens.

CUMULATIVE IMPACTS

In addition to the EHPP, the Commission is reviewing the Sunrise Cogeneration and Power Project and the La Paloma Generating project, which are proposed for the same western Kern County area. The three projects, all of which will burn natural gas, intend to use the same state-of-the art pollution controls as currently available. They are to be located between 6.7 and 8 miles from one another. Staff has reviewed the potential public health impacts from each of these projects to determine the potential cumulative impacts that could result from their combined operation.

When toxic pollutants are emitted from multiple sources within a given area, the cumulative, or additive, impacts of such emissions could, in concept, lead to significant health impacts within the population, even when such pollutants are emitted at insignificant levels from the individual sources involved. Analyses of such emissions have shown, however, that the peak impacts of such toxic pollutants are normally localized within relatively short distances from the source. Toxic pollutant emission levels beyond the point of maximum impact normally fall within existing ambient background levels. Potentially significant cumulative impacts are only expected in situations where new sources are located adjacent to

one other. The highest impact levels, from each of the three projects being evaluated, are approximately one mile or less from the emissions source. Therefore, given the between 6.7 and 8-mile distance between each of the projects, their combined operation will not contribute significantly to any public health impacts from toxic pollutant emissions.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Staff has determined that the construction and operation of the proposed natural gas-burning project will not pose a significant public health risk to the surrounding population with regard to the pollutants considered.

RECOMMENDATIONS

Since no significant public health impacts are considered likely by staff, no Public Health Conditions of Certification are proposed.

REFERENCES

California Air Resources Board (CARB) 1996. California Toxic Emissions Factors (CATEF) Database for Natural Gas-Fired Combustion Turbine Cogeneration.

California Air Pollution Control Officers Association (CAPCOA) 1993. Air Toxics “Hot Spots” Program, Revised 1992 Risk Assessment Guidelines. Prepared by the Toxics Committee, October 1993.

Elk Hills Power Project 1999. Application for Certification (99-AFC-1). Submitted to the California Energy Commission, February 16, 1999

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WORKER SAFETY AND FIRE PROTECTION

Chris Tooker

INTRODUCTION

Industrial workers use process equipment and hazardous materials on a daily basis. Accidents involving relatively small amounts of material can result in serious injuries to workers. Worker protection measures can include special training, protective equipment and procedural controls. The employer must also comply with applicable laws, ordinances, regulations and standards (LORS) to protect workers. This Worker Safety and Fire Protection analysis assesses the completeness and adequacy of the measures proposed for the Elk Hills Power Project (EHPP) by the applicant, Elk Hills, to comply with applicable health and safety standards and other reasonable requirements (Title 20, California Code Regulations, section 1743); and draws conclusions about the compliance of the proposed project with applicable LORS (Title 20, California Code Regulations, section 1744). These standards are designed to protect the health and safety of workers during construction and operation of the facility, and to establish adequate fire protection and emergency response procedures.

Staff has reviewed the EHPP Application for Certification (AFC) to determine whether Elk Hills has proposed adequate measures to:

- comply with all applicable (LORS);
- protect the workers during construction and operation of the facility;
- protect against fire; and
- provide adequate emergency response procedures.

Unless features of the project present unusual industrial safety or fire protection problems, staff believes that compliance with applicable LORS will be sufficient to ensure worker safety and fire protection, and provide adequate emergency response procedures.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

Occupational Safety and Health Act of 1970 (29 United States Code sections 651 et seq.).

Occupational Safety and Health Administration Safety and Health regulations (29 Code of Federal Regulations §§ 1910.1 - 1910.1500)

Occupational Safety and Health Act of 1970 (29 United States Code section (USC) (§) 651 et seq.).

29 C.F.R. §1910.120 (HAZWOPER Standard) Defines the regulations for Hazardous Waste Operations and Emergency Response. This section covers the clean-up operations, hazardous materials removal work, corrective actions, voluntary clean-up operations, monitoring, and emergency response required by federal, state, and local agencies of hazardous substances that are present at controlled and uncontrolled hazardous waste sites.

29 C.F.R. §§1910.1 - 1910.1500 (Occupational Safety and Health Administration Safety and Health regulations)

29 C.F.R. §§1952.170 - 1952.175 (Approval of California's plan for enforcement of its own Safety and Health requirements, in lieu of most of the federal requirements found in §§ 1910.1 - 1910.1500)

STATE

California's plan for enforcement of its own Safety and Health requirements is in lieu of most of the federal requirements found in 29 CFR §§ 1952.170 - 1952.175.

- Title 8, California Code of Regulations (CCR), section 450 et seq. (Applicable requirements of the Division of Industrial Safety, including Unfired Pressure Vessel Safety Orders, Construction Safety Orders, Electrical Safety Orders, and General Industry Safety Orders).
- California Building Code, Title 24, CCR, § 501 et seq. The California Building Code is designed to provide minimum standards to safeguard human life, health, property and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, etc. of buildings and structures.
- Title 8, CCR, § 5192 (HAZWOPER Standard). Defines the regulations for Hazardous Waste Operations and Emergency Response. This section covers the clean-up operations, hazardous removal work, corrective actions, voluntary clean-up operations, monitoring, and emergency response required by federal, state, local agencies of hazardous substances that are present at controlled and uncontrolled hazardous waste sites.

LOCAL

1998 Edition of California Fire Code (CFC) and all applicable National Fire Protection Association (NFPA) standards. The fire code contains provisions necessary for fire prevention and information about fire safety, special occupancy uses, special processes, and explosive, flammable, combustible and hazardous materials.

Uniform Fire Code Standards. This is a companion publication to the CFC and contains standards of the American Society for Testing and Materials and of the National Fire Protection Association.

California Building Code. (Cal. Code Regs., Tit. 24, § 501 et seq.) The California Building Code is designed to provide minimum standards to safeguard human life, health, property and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, etc. of buildings and structures.

SETTING

The EHPP is located about 25 miles west of Bakersfield, California, in western Kern County. The site is approximately 12 acres and is in the center of the 74 square mile Elk Hills Oil and Gas Field. Off-site fire protection is provided by the Kern County Fire Department (KCFD). **WORKER SAFETY AND FIRE PROTECTION Table 1** lists the fire stations located closest to the EHPP site and their response time capabilities, equipment and staffing levels (Dickson 1999).

WORKER SAFETY AND FIRE PROTECTION Table 1
Fire Station/Fire Protection Capabilities

Station	Response Time	Equipment	No. of Firefighters
Station 23 100 Broadway Fellows, CA	10 minutes	1997 Pierce Saber Engine	2
Station 24 2nd Street McKittrick, CA	12 minutes	1997 Pierce Saber Engine	2
Station 21 303 10th Street Taft, CA	25 minutes	1990 Beck Engine	3
Station 22 801 Stanislaus Mariposa, CA (HAZMAT TEAM)	23 minutes	1997 Pierce Saber Engine	2
Landco Station 3000 Landco Drive Bakersfield, CA (HAZMAT TEAM)	45-50 minutes	Engine Hazmat response Vehicle Technical rescue Vehicle	3

IMPACTS

DIRECT IMPACTS

FIRE PROTECTION

To determine the project's impacts on fire protection, staff reviewed the information provided in the AFC regarding available fire protection services and equipment, which are intended to limit personnel injury and property loss (EHPP 1999a, Section 3.4.10). The project will include the following fire protection equipment: fire hydrants and sprinkler systems, a carbon dioxide fire protection system, deluge spray system for the anhydrous ammonia storage tank, fire detection sensors, and

portable fire extinguishers. Three hundred and seventy thousand gallons of water from the on-site 1,000,000 gallon raw water storage tank is dedicated to the fire protection system. Elk Hills will be required to provide final diagrams and plans to staff and the KCFD, prior to construction and operation of the project, to confirm the adequacy of these fire protection measures. The EHPP will also be supported by local fire protection services, as described in **WORKER SAFETY AND FIRE PROTECTION Table 1**. The KCFD has evaluated the potential impacts of the proposed project on their service capabilities, as described below under **CULMULATIVE IMPACTS**.

WORKER SAFETY

Industrial environments are dangerous. Workers may be exposed to chemical spills, hazardous wastes, fires, moving equipment, and confined space and entry/egress problems. It is important for Elk Hills to have well-defined policies, procedures, training, hazard recognition and control at their facility to minimize such hazards and to protect workers. Elk Hills has provided adequate outlines of their proposed worker safety plans that will be expanded prior to construction and operation of the project, as required by conditions of certification **SAFETY-1** and **SAFETY-2**.

CUMULATIVE IMPACTS

There could potentially be five power plants built in western Kern County in the near future, including the La Paloma, Sunrise, Elk Hills, Midway-Sunset, and Pastoria projects. Staff has completed a visual inspection of the proposed project sites and the KCFD responding fire stations. Staff has confirmed that some of the structures proposed to be located on the proposed project sites can average more than 50 feet taller than the largest buildings in the communities of Buttonwillow, Elk Hills, and Taft. The KCFD has adequate resources to respond to emergencies that consist of structures that are approximately one story high only. Because of the height of some of the power plant equipment and structures, the KCFD has identified a need for additional resources, such as a ladder truck for elevated hose streams, and high-angle and confined space rescue capabilities, to adequately serve the proposed projects.

Staff held a meeting with the KCFD on March 3, 1999 to discuss potential impacts of the proposed projects on the KCFD's service capabilities. Staff subsequently received a letter from the KCFD, dated March 18, 1999, which identifies the potential service impacts of the proposed projects. The letter also identifies additional equipment and staffing required for the KCFD to provide fire protection and emergency response services to the power plant projects.

The letter states:

> "Both of the County's two ladder trucks are located in the metropolitan Bakersfield area; the ladder truck closest to the power plants is located about 40 miles away. The operations and structures associated with the thermal electric power plants result in increased incident complexity and access problems which our typical fire engine is not equipped to handle

(both in terms of number of personnel and specialized equipment) without the back up of a ladder truck. The distance between the power plant locations and the metropolitan Bakersfield area is such that it is not acceptable to dispatch an existing ladder truck for emergency response to Western Kern County because of excessive time delay. The potential needs for elevated hose streams, and high-angle and confined space rescue capability can only be addressed through the addition of a ladder truck; it will provide the appropriate fire apparatus to get the specialized personnel and equipment to the scene of incidents in a timely manner and provide the elevated platform for hose streams and rescue access as needed." (Dickson 1999)

MITIGATION

As mitigation for the impacts to fire protection services, the KCFD is proposing that the applicant or applicants purchase a ladder truck that will be located at Station 21 in Taft. One ladder truck will be required as mitigation for all of the proposed projects. High Angle and Confined Space Specialist Technicians would be trained to operate the ladder truck, and staffing for three work shifts would need to be provided, including a captain, an engineer and a firefighter. Refer to the **Socioeconomics** section of this Preliminary Staff Assessment (PSA) for a discussion of funding requirements recommended by staff to address the proposed project's direct and cumulative impacts on the KCFD's fire protection service capabilities.

CONSTRUCTION SAFETY AND HEALTH PROGRAM

The Construction Safety Orders found in Title 8, California Code of Regulations contain health and safety requirements promulgated by California Occupational Safety and Health Administration (Cal/OSHA) that are applicable to the construction phase of the project (CCR, tit. 8, § 1500 et seq.). The various plans required by the regulations are incorporated in the project Construction Safety and Health Program, the major elements of which include:

- Construction Injury and Illness Prevention Program (IIPP) (CCR, tit. 8, § 1509);
- Construction Fire Protection and Prevention Plan (CCR, tit. 8, § 1920);
- Personal Protective Equipment Program (CCR, tit. 8, §§ 1514 - 1522; and §§ 3401 - 3411).

In addition, the requirements of the Electrical Safety Orders (CCR, tit. 8, and §§-2299 - 2974) and Unfired Pressure Vessel Safety Orders (CCR, tit. 8, §§ 450 - 544) may be applicable to the project.

Elk Hills provided adequate outlines in the AFC for each of the above programs and plans (EHPP 1999a, Section 5.14) and prior to construction of the facility will provide detailed programs and plans in accordance with condition of certification **SAFETY-1**.

OPERATION SAFETY AND HEALTH PROGRAM

During the operation phase of the project, many Electrical Safety Orders (CCR, tit. 8, and §§-2299 - 2974) and Unfired Pressure Vessel Safety Orders (CCR, tit. 8, §§ 450 - 544) will be applicable. In addition, the Division of Industrial Safety has promulgated regulations applicable solely to operations. These are contained in the General Industry Safety Orders (CCR, tit. 8, § 3200 et seq.). Elk Hills will incorporate these requirements into its Operation Safety and Health Program, the major elements of which include:

- Injury and Illness Prevention Program (CCR, tit. 8, § 3203)
- Emergency Action Plan (CCR, tit. 8, § 3220)
- Fire Prevention Plan (CCR, tit. 8, § 3221)
- Personal Protective Equipment Program (CCR, tit. 8, §§ 3401 - 3411)

Elk Hills provided adequate outlines for each of the programs and plans in the AFC and will provide detailed programs and plans in accordance with condition of certification **SAFETY-2**.

SAFETY AND HEALTH PROGRAM ELEMENTS

Elk Hills has provided proposed outlines for both a Construction Safety and Health Program and an Operation Safety and Health Program (EHPP 1999a, Section 5.14.1.2). Both programs will cover the EHPP, including any aspect of the transmission lines and pipelines under the applicant's control. 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

Elk Hills has provided an adequate draft outline for an Injury and Illness Prevention Program (IIPP). Elk Hills will need to submit an expanded Injury and Illness Prevention Program to Cal/OSHA for review and comment 30 days prior to both construction and operation of the project.

Cal/OSHA will review and provide comments on the IIPP as the result of an on-site consultation at the request of Elk Hills, during which a Cal/OSHA representative will complete a physical survey of the site, analyze the work practices, and point out those practices that are likely to result in illness or injury. The on-site consultation will give Cal/OSHA an opportunity to evaluate Elk Hills' IIPP and apply it directly to activities taking place on-site.

EMERGENCY ACTION PLAN

Title 8, California Code of Regulations, section 3220 requires an Emergency Action Plan. The AFC contains a satisfactory outline for an emergency action plan, including fire and emergency reporting procedures, evacuation procedures, and a Spill Prevention/Control and Countermeasure Plan. Staff proposes condition of certification **SAFETY-2**, which requires Elk Hills to submit a final Operation's

Emergency Action Plan to Cal/OSHA, for review and comment, after an on-site consultation.

FIRE PROTECTION PLAN

Title 8, California Code of Regulations, section 3221 requires a Fire Protection Plan. The AFC contains an outline of a fire protection and prevention plan that is adequate for staff's analysis. The outline includes the appropriate components, including, training, fire control and emergency response, alarm systems, fire fighting equipment, and materials storage and disposal procedures.

Staff proposes that Elk Hills submit a Construction Fire Protection and Prevention Plan and an Operation Fire Protection Plan to the California Energy Commission Compliance Project Manager (CPM) and the KCFD for review and approval to satisfy proposed conditions of certification **SAFETY-1 and 2**.

PERSONAL PROTECTIVE EQUIPMENT PROGRAM

The purpose of the Personal Protective Equipment Program is to ensure that employers comply with applicable requirements for the provision and use of Personal Protective Equipment (PPE), and to provide employees with the information and training necessary to carry out the program. Elk Hills has provided a satisfactory outline that identifies minimum requirements of a proposed PPE program.

Under Title 8, California Code Regulations, sections 3380 - 3400, personal protective equipment will be required whenever hazards are encountered which, due to process, environment, chemicals, or mechanical irritants, can cause injury or impairment of body function as a result of absorption, inhalation, or physical contact. The project's operational environment will create potential situations where personal protective equipment is required.

Elk Hills' PPE Program should include a written policy on the use of protective equipment (and methods of communicating the information to the employees), selection of the proper type of equipment, training of employees on the correct use and maintenance of the equipment, enforcement of personal protective equipment use, and the use of devices that provide respiratory protection, hearing conservation, eye protection and head protection.

Staff believes that if Elk Hills develops and carries out a PPE Program similar to the format and elements listed above, the program will meet applicable regulations and will significantly reduce the potential for adverse impacts to workers.

GENERAL SAFETY

Besides the specific plans listed above, there are other requirements, some of which are called "safe work practices," imposed by various worker safety LORS applicable to this project. For the sake of clarity, staff has grouped these requirements as follows:

Lighting

American National Standards Practice for Industrial Lighting, ANSI/IES-RP-7, contains requirements to protect workers from inadequate lighting. Insufficient light leads to errors and sometimes accidents. An error may result from not seeing a situation that is dangerous and not being able to react quickly enough. The **Visual Resources** section of this PSA provides further detail concerning off-site consequences and performance requirements for exterior lighting.

Hazardous Materials Releases

Staff's analysis considered the system design and administrative procedures proposed to reduce the likelihood of an accidental release of acutely hazardous materials that could affect workers. See the **Hazardous Materials** section of this PSA for more detail.

Smoking

Elk Hills shall not allow smoking in areas designated in the National Electrical Code (NEC) as Class I, Divisions 1 and 2. These locations are areas where ignitable concentrations of flammable gases or vapors exist or where volatile flammable liquids or flammable gases are handled, processed, or used. Signs restricting smoking in these areas of the project site will be posted to protect the facility and workers.

Lock-out/Tag-out

Title 8, California Code of Regulations, sections 2320.4, 2320.5, 2320.6, 2530.43, 2530.86, 3314, and 6003 identify required lock-out and tag-out safety practices and programs which reduce employee exposure to moving equipment, electrical shock, and hazardous and toxic materials. Lock-out is the placement of a padlock, blank flange, or similar device on equipment to ensure that it will not be operated until the lock-out device is removed. Tag-out is the use of warning signs that caution personnel that equipment cannot be energized until the lock-out device is removed. Warning signs can also be used to alert employees about the presence of hazardous and toxic materials. Elk Hills' lock-out/tag-out program should include steps for applying locks and tags, steps for removing locks and tags, and employee training on lock-out/tag-out procedures.

Confined Spaces Entry Program

Title 8, California Code of Regulations, sections 5156 - 5159 identifies the minimal standards for preventing employee exposure to dangerous air contaminants and/or oxygen deficiency in confined spaces. A confined space is any space that limits the means of egress, is subject to toxic or flammable contaminants, or has an oxygen-deficient atmosphere. Examples of confined spaces are silos, tanks, vats, vessels, boilers, compartments, ducts, sewers, pipelines, vaults, bins and pits. Elk Hills shall take the following steps to ensure worker safety during work in confined spaces.

Before entering a confined space, site personnel will evacuate or purge the space and will shut off lines that provide access for substances into the space. The air in the vessels will be tested for oxygen deficiency, and the presence of both toxic and

explosive gases and vapors will be evaluated before entry into the confined space is allowed. Lifelines or safety harnesses will be worn by anyone entering the confined space, and a person will be stationed outside in a position to handle the line and to summon assistance in case of emergency. Appropriate respirators will be available whenever hazardous conditions may occur.

HOT WORK

Hot work is any type of work that causes a spark and can ignite a fuel source. Examples include welding, cutting and brazing. Before proceeding with hot work, workers will need to get a work authorization from the project's assigned Safety Officer. The control operator, together with the shift supervisor, will decide whether hot work is required on a job and if a work authorization will be required. Before hot work is undertaken, the area will be inspected, the job shall be posted and, depending on what is located in the area, additional safeguards may be implemented.

FACILITY CLOSURE

The project owner/operator is responsible for maintaining an operational fire protection system during closure activities. The project must also stay in compliance with all applicable health and safety LORS during that time.

CONCLUSION AND RECOMMENDATIONS

CONCLUSIONS

If Elk Hills provides a Construction Safety and Health Plan, and an Operation Safety and Health Plan, as required by conditions of certification **SAFETY-1** and 2; and provides the funding required by Conditions of Certification **SOCIO-2**, staff believes that the project will incorporate sufficient measures to ensure adequate levels of industrial safety and fire protection, and comply with applicable LORS.

RECOMMENDATIONS

If the Energy Commission certifies the project, staff recommends that the Energy Commission adopt the following proposed conditions of certification. The proposed conditions of certification provide assurance that the Project Construction and Operation Safety and Health Programs proposed by Elk Hills 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 LORS.

PROPOSED CONDITIONS OF CERTIFICATION

SAFETY-1 The project owner shall submit to the CPM a Project Construction Safety and Health Program, which shall include:

- A Construction Injury and Illness Prevention Program.
- A Construction Fire Protection and Prevention Plan.
- A Personal Protective Equipment Program.

Protocol: The Construction Injury and Illness Prevention Program and the Personal Protective Equipment Program shall be submitted to the California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA) Consultation Service, for review and comment concerning compliance of the program with all applicable Safety Orders.

The Construction Fire Protection and Prevention Plan shall be submitted to the KCFD for review and acceptance.

Verification: Thirty days prior to the start of construction, or a lesser period of time as mutually agreed to by the project owner and the CPM, the project owner shall submit to the CPM a copy of the Project Construction Safety and Health Program and the Personal Protective Equipment Program, with a copy of the cover letter of transmittal of the plan to CAL-OSHA. The project owner shall provide a letter from the KCFD stating that they have reviewed and accept the Construction Fire Protection and Prevention Plan.

SAFETY-2 The project owner shall submit to the CPM a Project Operation Safety and Health Program containing the following:

- An Operation Injury and Illness Prevention Plan.
- An Emergency Action Plan.
- An Operation Fire Protection Plan.
- A Personal Protective Equipment Program.

Protocol: The Operation Injury and Illness Prevention Plan, Emergency Action Plan, and Personal Protective Equipment Program shall be submitted to the Cal/OSHA Consultation Service, for review and comment concerning compliance of the program with all applicable Safety Orders.

Protocol: The Operation Fire Protection Plan and the Emergency Action Plan shall be submitted to the KCFD for review and acceptance.

Verification: At least 30 days prior to the start of operation, the project owner shall submit to the CPM a copy of the final version of the Project Operation Safety & Health Program. It shall incorporate Cal/OSHA's Consultation Service comments, stating that they have reviewed and accepted the specified elements of the proposed Operation Safety and Health Plan.

The project owner shall notify the CPM that the Project Operation Safety and Health Program (Injury and Illness Prevention Plan, Fire Protection Plan, the Emergency Action Plan, and Personal Protective Equipment requirements), including all records and files on accidents and incidents, is present on-site and available for inspection.

SAFETY-3 The project owner shall design and install all exterior lighting to meet the requirements contained in the Visual Resources conditions of certification and in accordance with the American National Standards Practice for Industrial Lighting, ANSI/IES-RP-7.

Verification: Within 60 days after construction is completed, the project owner shall submit a statement to the CPM that the illuminance levels contained in ANSI/IES RP-7 were used as a basis for the design and installation of the exterior lighting.

REFERENCES

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Dickson, Chuck, Assistant Fire Marshall Kern County Fire District, Letter discussing fire stations for La Paloma and Sunrise Cogeneration Plants, January 29, 1999.

EHPP (Elk Hills Power Project). 1999a. Application for Certification, Elk Hills Power Project, (99-AFC-1). Submitted to the California Energy Commission, February 16.

McElroy, Joe, Engineer with Kern County Fire District. Personnel communication with Ellen Townsend-Smith regarding location of local fire departments. November 16, 1998.

TRANSMISSION LINE SAFETY AND NUISANCE

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INTRODUCTION

According to the applicant, Elk Hills Power, LLC, (Elk Hills), the energy produced at the proposed Elk Hills Power Project (EHPP) will be transmitted to the existing PG&E power grid through a new double circuit, 230 kV overhead line. Three routes identified as Route 1A, Route 1B and a variation of Route 1B are proposed for this interconnection. Route 1A will be 9 miles while Route 1B or its variation will be 8.6 miles. (EHPP 1999a, pages 3-53 through 3-59, 1999c, page 36). The line within each route will be located to ensure a distance of at least 50 feet from an oil well (EHPP 1999a pages 5.7-16 and 5.7-17). Operating such a line could create several health and safety hazards as described by the applicant (EHPP 1999a pages 4-2 through 4-7). Such hazards will be reduced through compliance with laws, ordinances, regulations and standards (LORS) identified by Elk Hills Power as applicable to the proposed project (EHPP 1999a page 6-10).

The purpose of this analysis by the Energy Commission staff (staff) is to assess the proposed transmission line design, placement and operation for appropriate incorporation of measures necessary for compliance with applicable LORS. If found satisfactory, staff will recommend that the line design be approved for the routes proposed; if not, staff will recommend design or placement-related revisions to further mitigate the health and safety hazards that could result. The assessment will evaluate issues, which relate primarily to the physical presence of the line, or secondarily to the physical interactions of line electric and magnetic fields, as will be discussed later. These issues are:

Aviation safety;

- Interference with radio-frequency communication;
- Audible noise;
- Fire hazards;
- Hazardous shocks;
- Nuisance shocks; and
- Electric and magnetic field (EMF) exposure

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Discussed below by subject area are design-related LORS applicable to the physical impacts of transmission lines as proposed for the power facility.

FEDERAL

AVIATION SAFETY

Any hazard to area aircraft relates to the potential for collision with the line in the navigable air space. The applicable LORS are intended to ensure the distance and visibility necessary to avoid such collision.

- Title 14, Part 77 of the Federal Code of Regulations (CFR), "Objects Affecting the Navigation Space". Provisions of these regulations specify the criteria used by the Federal Aviation Administration (FAA) for determining whether a "Notice of Proposed Construction or Alteration" is required for potential obstruction hazards. 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. Such notification allows the FAA to ensure that the structure is located to avoid any significant hazards to area aviation.

- FAA Advisory Circular (AC) No. 70/460-2H, "Proposed Construction and or Alteration of Objects that may Affect the Navigation Space". This circular informs each proponent of a project that could pose an aviation hazard of the need to file the "Notice of Proposed Construction or Alteration" (Form 7640) with the FAA.

- FAA AC No. 70/460-1G, "Obstruction Marking and Lighting". This circular 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

Transmission line-related radio-frequency interference is one of the indirect effects of line operation as produced by the physical interactions of line electric fields. The level of such interference usually depends on the magnitude of the electric fields involved. Because of this, the potential for such impacts could be assessed from field strength estimates obtained for the line. The following regulations are intended to ensure that such lines are located away from areas of potential interference and that any interference is mitigated whenever it occurs.

- Federal Communications Commission (FCC) regulations in Title 47 CFR, Section 15.25. Provisions of these regulations prohibit operation of any devices producing force fields, which interfere with radio communications, even if (as with transmission lines) such devices are not intentionally designed to produce radio-frequency energy. 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 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 FCC requires each line operator to mitigate all complaints about interference on a case-specific basis. Staff usually recommends specific conditions of certification to ensure compliance with this FCC requirement. Since electric fields cannot penetrate the soil and other objects, underground lines do not produce the radio noise associated with overhead lines.

Several design and maintenance options are available for minimizing these electric field-related impacts. When incorporated in the line design and operation, such measures also serve to reduce the line-related audible noise discussed below.

STATE

- General Order 52 (GO-52), California Public Utilities Commission (CPUC). Provisions of this order govern the construction and operation of power and communications lines and specifically deal with measures to prevent or mitigate inductive interference. Such interference is produced by the electric field induced by the line in the antenna of a radio signal receiver.

- GO-128 “Rules for Construction of Underground Electric Supply and Communications Systems”. Provisions of this order establish requirements and minimum standards for the safe construction of underground AC power and communications circuits.

AUDIBLE NOISE

As with radio noise, any audible noise from a transmission line 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. Since (as with communications interference), the noise level depends on the strength of the line electric field, the potential for occurrence can be assessed from estimates of the field strengths expected during operation. Such noise is usually generated during wet weather and from lines of 345 kV or higher. It, therefore, is generally not expected at significant levels from lines of less than 345 kV. 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 100-ft right-of-way. There are no design-specific regulations to limit the audible noise from transmission lines. As with radio noise, such noise is limited instead through design and maintenance standards established from industry research and experience as effective without significant impacts on line safety, efficiency maintainability and reliability.

FIRE HAZARDS

The fires addressed through the following regulations 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.

- General Order 95 (GO-95), CPUC, "Rules for Overhead Electric Line Construction". This order specifies tree-trimming criteria to minimize the potential for power line-related fires.

- Title 14 Section 1250 of the California Code of Regulations, "Fire Prevention Standards for Electric Utilities". This code specifies utility-related measures for fire prevention.

HAZARDOUS SHOCKS

The hazardous shocks that are addressed by the following regulations and standards are those that could result from direct or indirect contact between an individual and the energized line. 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.

- GO-95, CPUC. "Rules for Overhead Line Construction". These rules specify uniform statewide requirements for overhead line construction regarding ground clearance, grounding, maintenance and inspection. Implementing these requirements usually ensures the safety of the general public and utility and non-utility workers. Non-utility workers in this case would include workers engaged in oil field or gas pipeline-related activities.

- Title 8, CCR, Section 2700 et seq., "High Voltage Electric Safety Orders". These safety orders establish essential requirements and minimum standards for safely installing, operating, and maintaining electrical installations and equipment. Compliance with the distancing and safety requirements in this order will prevent hazardous shocks among utility and non-utility workers working around utility and non-utility installations such as gas water and sewer lines, and oil wells.

- National Electrical Safety Code, (NESC) Part 2: Safety Rules for Overhead Lines. Provisions in this part of the code specify the national safe operating clearances applicable in areas where the line might be accessible to the public. Such requirements are intended to minimize the potential for direct or indirect contact with the energized line.

LOCAL

There are no local laws or regulations specifically aimed at the physical structure or dimensions of electric power lines to limit their obstruction or hazardous shock hazards, or eliminate the interactive effects of their electric or magnetic fields. All

the noted LORS are implemented industry wide to ensure that lines are uniformly constructed to reflect existing health and safety information while ensuring efficiency and reliability.

SETTING

As discussed by Elk Hills (EHPP 1999a page 5.7-11), the proposed transmission line will be located in an area with existing power lines of 115 kV and 230 kV lines. Route 1A will traverse areas of oil and gas production as well as undeveloped and commercial areas. It will also pass near a school, a church and a rural residential area, along the way. Route 1B and its variation will also traverse an oil production area, undeveloped areas, agricultural areas and rural residential areas. The electric and magnetic fields from the line will therefore contribute to any cumulative EMF human exposures in the area. The interactive effects of nearby lines have therefore been considered in assessing the potential for electric and magnetic field exposures along each route. Since the line will be connected to the existing PG&E transmission system, it will be designed according to PG&E's field-reducing design guidelines.

Individuals in the project area may be exposed to line-related fields for varying periods of time. The level of each exposure would depend on the distance from the line. Short-term exposure could occur while in transit or during short-term activities around the line. The general magnitude of such short-term exposures is well established, being generally lower than exposures from the use of common household appliances, such as hair dryers, toaster ovens, microwave ovens and electric shavers. Such exposures have not caused any significant health concerns in the past and are not the reason for the present concern about EMF exposure. As will be more fully discussed later, such concern is over the possibility of health effects from long-term, generally lower-level exposure, which is most commonly associated with living in houses near a line. Since such houses are normally located beyond the edge of the right-of-way, the long-term exposure at issue can be assessed from field strength estimates obtained for areas beyond the edge of the right-of-way. The continuing challenge is to meaningfully interpret such exposures in light of present uncertainty about possible health significance at any given level.

PROJECT DESCRIPTION

Project Description Figure 1 shows routes 1A, 1B and the variation on 1B as proposed for possible connect to the existing PG&E grid. As detailed by Elk Hills, (EHPP 1999a pages 3-53 through 5-64, 1999c page 36), the line in Route 1A will originate from the new project switchyard and extend 0.2 miles northwest to intercept the route of PG&E's existing 115 kV Midway-Taft transmission line. The line will then extend 1.8 miles north-northeast, running parallel to this Midway-Taft line to the extend allowed by the terrain and necessary to avoid area oil wells. The line will further extend eastwards for the PGE interconnection at a new substation along the route of the Midway-Taft line. This new substation will be within the ELK Hills Oil and Gas Field boundaries. Near the Town of Tupman, along the way, the line will pass within 500 ft of Elk Hills School. The nearest residence will be about 800 ft from the line (EHPP 1999a page 5.7-13).

The 8.6-mile line within Route 1B will originate from the new project switchyard and also extend 0.2 miles northwest to intercept the route of the existing PG&E 115 kV Midway-Taft line. It will then extend 4.1 miles north-northeast, running parallel to the Midway-Taft line to the extent allowed by the terrain and necessary to avoid area oil wells. The line will further extend 4.3 miles north to the Midway Substation. Along the way, the line will run parallel to the Midway-Taft line. It will also cross the California Aqueduct and pass by eight rural residences and a 10-unit agricultural camp. In the area with nearby residences, an existing PG&E 12-kV line will be relocated underground and the proposed line located within its existing right-of-way. The line will be located 100 ft or more from the nearest residences, on one side of the line. On the other side, such distancing from residences will result from the presence of an existing road and the corridor of an existing PG&E transmission line (EHPP 1999a page 5.7-14). The main difference between Route 1B and its variation is that this variation will, unlike Route 1B, replace, rather than run parallel to the Midway-Taft line as it extends from the power line to the Midway Substation.

The line within each route will be constructed with tubular steel poles as shown in Project Description Figure 4. These poles will be at least 30 ft from the ground in keeping with PUC's requirements and will be placed up to 1225 ft apart.
The conductor configuration and current flow pattern (phasing) were chosen to maximize the cancellation effects of fields from the line's conductors. (EHPP 1999a page 4-7). All three routes were chosen to parallel existing roads and line rights-of-way to the extent possible (EHPP 1999a pages 5.3-31 and 5.4-21). This is in keeping with present state policy encouraging location of new lines as close as possible to, or within existing utility rights-of-way.

IMPACTS

As noted in the LORS section, GO-95, GO- 128 and Title 8, CCR provide the minimum regulatory requirements necessary to avoid the direct or indirect contact previously discussed in connection with hazardous shocks and aviation hazards. Of secondary concern in project evaluation are the field-related impacts manifesting as nuisance shocks, electric and magnetic field exposure, and radio noise and communications interference, as also discussed above. These impacts are reduced through specific field-reducing design guidelines developed for each utility service area in the state. As will be more fully discussed later, these guidelines were established to ensure uniformity in EMF reduction approach, in light of present knowledge on field effects and the potential impacts of field control measures on line operations. The extent of such measures, together with the related field strengths, will vary according to environmental and other local conditions bearing on line safety, efficiency, reliability and maintainability. When the ground-level strengths of such fields are calculated, they can be used to assess each line for appropriate implementation of the applicable field-reducing measures. The impacts of most concern in terms of indirect effects are nuisance shocks and electric and magnetic field exposure. These secondary impacts are assessed for every project in addition to the primary issues of aviation safety, and hazardous shocks.

NUISANCE SHOCKS

Nuisance shocks around transmission lines are non-hazardous but unpleasant experiences caused by current flow at levels generally incapable of causing significant physiological harm. Such shocks mostly result from direct contact with metal objects in which electric charges are induced by fields from the energized line. For modern high-voltage lines, shocks of this type are effectively minimized through grounding procedures specified in the National Electrical Safety Code and the joint guidelines of the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE). As with lines of the type proposed, Elk Hills will be responsible in all cases for ensuring compliance with these grounding-related practices within the right-of-way. Staff will recommend specific conditions of certification to ensure that such grounding is made within the right-of-way by both Elk Hills and property owners.

ELECTRIC AND MAGNETIC FIELD EXPOSURE

The previously noted possibility of health effects of electric and magnetic fields has increased public fear in recent years about living near high-voltage lines. Both fields occur together whenever electricity flows, hence the general practice of considering both as EMF exposure. The available evidence as evaluated by CPUC and other regulatory agencies has not established that such fields pose a significant health hazard to exposed humans. However, Energy Commission 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 reduce such fields to some degree, where feasible, until the issue is better understood. The challenge has been to establish when, and how far to reduce them.

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

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

In light of the present health uncertainty, some regulatory agencies have opted for regulations ensuring that fields from new lines are similar to those from existing lines. Some states (Minnesota, Florida, New York, Montana New Jersey) have set specific environmental limits on one or both fields in this regard. These limits are, however, not based on any specific health effects. All regulatory agencies are of the opinion as is staff ,that health-based limits are inappropriate at this time. They

also have determined that the present knowledge of the issue does not justify any retrofit of existing lines.

Before the present health-based concern developed, measures to reduce field effects from power line operations were mostly aimed at the electric field component, whose effects can manifest as the previously noted radio noise, audible noise and nuisance shocks. The present focus is on the magnetic field because only it can penetrate building materials to potentially produce the types of health impacts at the root of the present concern. As one focuses on the strong magnetic fields from the more visible transmission and other high-voltage power lines, staff considers it important for perspective, to again consider the previously noted fact that an individual in a home could be exposed for short periods to much stronger fields while using some common household appliances (National Institute of Environmental Health Services and the U.S Department of Energy 1995). Scientists have not established which of these types of exposures would be more biologically meaningful in the individual. Energy Commission staff notes such exposure differences only to show that high-level magnetic field exposures regularly occur in areas other than the power line environment.

In California, the CPUC (which regulates the installation and operation of high-voltage lines in California) 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 required the previously noted EMF-reducing design guidelines of all utilities under its jurisdiction. 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. Utilities not within the jurisdiction of the CPUC voluntarily comply with these CPUC requirements.

In keeping with this CPUC policy, staff requires that each applicant provide evidence verifying that the proposed line will 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 issues bearing on safety, reliability efficiency and maintainability. It, therefore, is up to each applicant to ensure that such measures are applied in ways, and to an extent, without significant impacts on line operation. The extent of such applications will be reflected by the ground-level field strengths as measured during operation. When estimated or measured for the line, such field strengths can be used by staff and other regulatory agencies for comparison with fields of lines of similar voltage and current-carrying capacity. Such 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 structures, degree of cancellation from nearby conductors, distance between conductors and, in the case of magnetic fields, amount of current in the line.

Since the proposed line will be designed according to PG&E's EMF-reducing guidelines, their fields are required, under existing CPUC policies, to be similar to fields from similar lines in the PG&E service area. Conditions of certification **TLSN-3**) is proposed by staff to verify implementation of the reduction measures necessary.

PROJECT SPECIFIC IMPACTS

AVIATION SAFETY

As noted by Elk Hills, (EHPP 1999a page 4-2) there are no major aviation centers or airports in the vicinity of the proposed power plant. There is a gravel surfaced 3000-ft landing strip approximately 1.5 miles west of transmission line Route 1B or its variation. This landing strip is occasionally used for crop dusting operations. Staff considers the minimum 30-ft height of the transmission line design as adequate for unimpeded crop duster operations. An FAA "Notice of Construction or Alteration" will not be required for the proposed power line, according to existing regulatory criteria. From its consideration of all issues related to distance from the line and FAA safety requirements, staff is in agreement with Elk Hills that the proposed line will not pose a significant hazard to area aviation.

INTERFERENCE WITH RADIO-FREQUENCY COMMUNICATION

Experience has shown that spark gap discharges are mostly responsible for any radio interference around the type of transmission line proposed. Such interference is generally avoided through appropriate maintenance, which minimizes occurrence of the structural gaps involved. The previously noted provisions of the related FCC regulations are important in requiring each project owner to ensure mitigation of any such interference to the satisfaction of the affected individual. Energy Commission staff will recommend that Elk Hills be required to mitigate any such complaints on a case-specific basis. The applicant has further noted that the line's corona-reducing design would be adequate to prevent any radio noise-related complaints. This is as staff expects for a line of the voltage proposed. Staff has proposed a condition of certification **(TLSN-2)** to ensure mitigation of any interference-related complaints on a case-specific basis, as required by the FCC. **TLSN-1** has also been proposed by staff to ensure compliance with GO-52, also intended to prevent radio interference.

AUDIBLE NOISE

According to information from Elk Hills (EHPP 1999a pages 4-2 through 4-5) the low-corona design for the line could produce some corona-related noise, especially during foul weather. However, the calculated foul-weather noise level of 46.2 dB directly underneath the line is less than the levels generally associated with complaints, for example, in the service area of the Bonneville Power Authority (BPA). The fair-weather level of less than 24.7 dB would not add significantly to existing noise levels under normal conditions. These noise levels are below the applicable values specified in the Noise Ordinance of Kern County. Elk Hills, therefore, does not expect the noise from the proposed line design to generate any

complaints in the area. Staff is in agreement with Elk Hill's conclusions regarding the noise level expected for the line voltage and the conductor configuration proposed. For an assessment of the noise from all phases of the proposed power plant and related facilities, please refer to staff's analysis in the **Noise** section.

FIRE HAZARDS

The proposed line will be routed through a primarily agricultural or oil field area where adequate fire prevention and suppression measures will be implemented, as required by related regulations (EHPP 1999a page 4-7). Compliance with the requirements of GO-90, and Title 14 Section 1250 CCR will ensure the clearance necessary to prevent fires possible from direct contact between the transmission line, trees and other objects. Compliance with condition of certification **TLSN-4,** as staff proposes, will prevent accumulation of combustible materials that would contribute to such fires.

HAZARDOUS SHOCKS

Elk Hills has stated their intention to comply with the requirements of GO-95, and Title 8, CCR Section 2700 et.seq., as intended to prevent hazardous shocks from direct or indirect human contact with the overhead energized line (EHPP 1999a page 6-10). Staff does not expect such a hazard from the proposed line design and proposes a condition of certification (**TLSN-1)** to ensure implementation of the measures necessary.

NUISANCE SHOCKS AND ELECTRIC AND MAGNETIC FIELDS

Elk Hills calculated the maximum electric and magnetic field strengths expected from the line design proposed. Staff has verified the accuracy of Elk Hill's calculations with regard to parameters and assumptions bearing on field strengths and dissipation, and exposure assessment. Such calculations can allow staff to assess the potential contribution of the line to area electric and magnetic fields during operations.

A maximum magnetic field strength of 93.7 mG was calculated for the area directly underneath the line, while 26.1 mG was calculated for a distance of 50 ft from the centerline. These values are as expected by staff for lines of the same voltage class and current-carrying capacity. They are also, as noted by Elk Hills, much lower than levels established by states with regulatory limits on such fields.

A maximum electric field strength of 1.3 kV/m was calculated for the area directly under the line. This is similar to fields from lines of similar voltage and design. Experience has shown nuisance shocks to be mostly associated with field strengths significantly greater than 1.6 kV/m in the transmission line environment. For the proposed line design, the 1.3 kV/m field directly underneath, will diminish to around 0.45 kV/m at a distance of 50 feet from the centerline. Nuisance shocks of any significance are not expected, especially in light of the grounding measures to be implemented (EHPP 1999a pages 4-6 and 4-7). Condition of certification **TLSN-3** is proposed by staff to verify that the fields are reduced to the extent proposed by the applicant while conditions of certification **TLSN-5** and **TLSN-6** are proposed to

ensure the preventive measures necessary for nuisance shock mitigation in the case of property owners along the route.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Since electric or magnetic field health effects have neither been established nor ruled out for lines such as proposed for this project, the public health significance of any project-related field exposure cannot be characterized with certainty. The long-term, mostly residential magnetic exposure at the root of the present health concern will likely occur in the area beyond the edge of the right-of-way. Project-related exposures estimates for such areas are significantly below levels associated with similar lines in the PG&E service area. This is due to Elk Hill's proposed application of particularly effective EMF-reducing measures (EHPP 1999a pages 4-6 and 4-7). These field strengths are significantly lower than levels established by states with specific regulatory limits for such fields. Specific efforts are intended by Elk Hills Power to maximize the distance to the nearest residences. This should further serve to reduce long-term exposure below levels associated with similar lines.

Any nuisance shocks from such lines will be minimized through grounding and other measures to be implemented by Elk Hills. Compliance with GO-90, GO-128 and Title 8, Section 2700 et seq. of the California Code of Regulations will ensure the safety of humans around the line. Since the line will be located away from all area airports, any hazard to area aviation will be small. The use of an electric field-reducing conductor configuration together will minimize the potential for interference with radio-frequency communication.

RECOMMENDATIONS

Since the impacts of concern to staff will be mitigated to levels staff considers acceptable for lines of the type proposed, staff recommends approval for the line design as proposed for the two routes identified by Elk Hills. If such approval is granted, staff recommends that the Commission adopt the following conditions of certification to ensure implementation of the measures necessary to achieve the field levels assumed for the proposed line design by the applicant.

CONDITIONS OF CERTIFICATION

TLSN-1 The project owner shall construct the proposed transmission line according to the requirements of GO-95, GO-52, Title 8, Section 2700 et seq. of the California Code of Regulations and PG&E's EMF reduction guidelines.

Verification: Thirty days before start of transmission line construction, or as mutually agreed to by the project owner, and the Energy Commission Compliance Project Manager (CPM), the project owner shall submit to the Commission's CPM a letter signed by a California registered engineer affirming that the transmission line

will be constructed according the requirements of GO-95, Title 8, Section 2700 et seq. of the California Code of Regulations and PG&E's EMF reduction guidelines.

TLSN-2 The project owner shall make every reasonable effort to identify and correct, on a case-specific basis, all complaints of interference with radio or television signals from operation of the line and related facilities. In addition to any transmission repairs, the relevant corrective actions should include, but shall not be limited to, adjusting or modifying receivers, repairing, replacing or adding antennas, signal amplifiers, filters, or lead-in cables.

The project owner shall maintain written records for a period of five years, of all complaints of radio or television interference attributable to operation together with the corrective action taken in response to each complaint. All complaints shall be recorded to include notations on the corrective action taken. Complaints not leading to a specific action, or for which there was no resolution should be noted and explained. The record shall be signed by the project owner and also the complainant, if possible, to indicate concurrence with the corrective action or agreement, with the justification for a lack of action.

Verification: All reports of line-related complaints shall be summarized and included in the Annual Compliance Report to the CPM.

TLSN-3 The project owner shall engage a qualified consultant to measure the strengths of the line electric and magnetic fields before and after the line is energized. Measurements should be made at appropriate points along the route to allow verification of design assumptions relative to field strengths. The areas to be measured should include the facility switchyard and any residences within 100 feet of the right-of-way.

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

TLSN-4 The project owner shall ensure that combustible materials in close proximity to the energized conductors (e.g. tree branches) are cleared from the right-of-way as required under the provisions of section 4292 of the Public Resources Code and Section 1250 of the California Code of Regulations.

Verification: The project owner shall provide a summary of inspection results and any fire prevention activities carried out along the right-of-way, in a report to be filed at completion of construction and yearly, thereafter, for five years.

TLSN-5 The project owner shall send a letter to all owners of property within 100 feet or adjacent to the right-of-way at least 60 days prior to first transmission of electricity.

Protocol: The letter shall consist of the following;

A discussion of the nature and operation of a transmission line;

- A discussion of the project owner's responsibility for grounding existing fences, gates and other large permanent chargeable objects identified during transmission line construction within the right-of-way regardless of ownership;
- A discussion of the property owner's responsibility for grounding and to notify the project whenever the property owner adds or installs a metallic object; and
- A statement recommending against fueling motor vehicles or other mechanical equipment underneath the line;

Verification: The project owner shall submit the proposed letter to the CPM for review and approval 30 days prior to mailing to the property owners and shall maintain a record of correspondence (notification and response) related to this requirement, in a compliance file at the plant site. The project owner shall notify the CPM in the first Monthly Compliance Report that letters have been mailed and that copies are on file.

TLSN-6 The project owner shall ensure the grounding of any ungrounded permanent metallic objects identified during transmission line construction within the right-of-way, regardless of ownership. Such objects shall include fences, gates, and other large permanent chargeable objects. These objects shall be grounded according to procedures specified in the National Electrical Safety Code.

In the event of a refusal by the property owner to permit such grounding, the project owner shall so notify the CPM. Such notification shall include, when possible, the owner's written objection. Upon receipt of such notice, the CPM may waive the requirement for grounding the object involved.

Verification: At least 10 days before the line is energized, the project owner shall transmit to the CPM a letter confirming compliance with this condition.

REFERENCES

Elk Hills Cogeneration and Power Project (EHPP) 1999a. Application for Certification, Elk Hills Cogeneration Power Project. (99-AFC-1). Submitted to the California Energy Commission, February 24.

EHPP (Elk Hills Power Project) 1999c. Response to California Energy Commission (CEC) staff data requests nos. 1-44, Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission August 3, 1999.

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HAZARDOUS MATERIALS MANAGEMENT

Joseph M. Loyer

INTRODUCTION

The purpose of this analysis is to determine if the proposed Elk Hills Power Project (EHPP) will result in potential for significant impact on the public as a result of the use, handling or storage of hazardous materials at the proposed facility. If significant adverse impacts are identified, Energy Commission staff must also evaluate the potential for facility design alternatives or additional mitigation measures to reduce impacts to the extent feasible, as required pursuant to Title 20, California Code of Regulations, section 1748.5.

The only hazardous material proposed for use at the EHPP facility in quantities exceeding the reportable amounts defined in the California Health and Safety Code, Section 25532 (a) (P), is anhydrous ammonia. The use of anhydrous ammonia poses the principal risk of off-site impacts in the event of a major accidental release associated with the project. Anhydrous ammonia is a liquefied gas stored at elevated pressure which has a high internal energy. The 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, where it can be transported in the atmosphere and result in high down-wind concentrations.

Other hazardous materials stored in smaller quantities such as mineral and lubricating oils, corrosion inhibitors, water conditioners, hydrogen and caustics and acids will be present at the proposed facility. However, these materials pose minimal potential for off-site impacts as a result of the quantities on site, their relative toxicity, and/or their environmental mobility. Although no natural gas is stored, the project will also involve the construction and operation of a natural gas pipeline and handling of large amounts of natural gas. Natural gas poses risk of both fire and explosion. The natural gas pipeline is addressed below.

The EHPP will also require the transportation of anhydrous ammonia to the facility. Analysis of the risk associated with such deliveries is addressed in staff's **Traffic and Transportation** analysis.

LAWS, ORDINANCES, REGULATIONS, STANDARDS AND POLICIES

The following federal, state, and local laws and policies generally apply to the protection of public health and hazardous materials management. Their provisions have established the basis for staff's determination regarding the significance and acceptability of project-related impacts on public health due to accidental releases of hazardous materials.

FEDERAL

The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III and Clean Air Act of 1990 established a nationwide emergency planning and response program and imposed reporting requirements for businesses which store, handle, or produce significant quantities of extremely hazardous materials. The Acts (codified in 40 C.F.R., section 68.115, part F) require the states to implement a comprehensive system to inform local agencies and the public when a significant quantity of such materials is stored or handled at a facility. The requirements of these Acts are reflected in the California Health and Safety Code, section 25531 et seq.

STATE

The California Health and Safety Code, section 25534 directs facility owners, storing or handling acutely hazardous materials in reportable quantities, to develop a Risk Management Plan (RMP) and submit it to appropriate local authorities, the United States Environmental Protection Agency (EPA), and the designated local Administering Agency for review and approval. The plan must include an evaluation of the potential impacts associated with an accidental release, the likelihood of an accidental release occurring, the magnitude of potential human exposure, any preexisting evaluations or studies of the material, the likelihood of the substance being handled in the manner indicated, and the accident history of the material. This new, recently developed program supersedes the California Risk Management and Prevention Plan (RMPP).

Title 8, the California Code of Regulations, section 5189 requires facility owners to develop and implement effective safety management plans to insure 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 RMP process.

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.”

LOCAL AND REGIONAL

The Uniform Fire Code (UFC) contains provisions regarding the storage and handling of hazardous materials. These provisions are contained in Articles 79 and 80. The latest revision to Article 80 was in 1999 (UFC 1999). These articles contain minimum setback requirements for outdoor storage of ammonia.

The California Building Code contains requirements regarding the storage and handling of hazardous materials. The Chief Building Official must inspect and verify compliance with these requirements prior to issuance of an occupancy permit. A

further discussion of these requirements is provided in the **Facility Design** portion of this document.

SETTING

SITE AND VICINITY DESCRIPTION

Several factors associated with the area in which a project is to be located affect its potential to cause public health impacts from an accidental release of a hazardous material. These include:

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

Staff considered these factors, as discussed below, in assessing the potential public health impacts of the project.

METEOROLOGICAL CONDITIONS

Meteorological conditions, including wind speed, wind direction and air temperature, affect 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 level of public exposure to such materials and the associated health risks. When wind speeds are low and stable, dispersion is severely reduced and can lead to increased localized public exposure.

Recorded wind speeds and ambient air temperatures are described in the air quality section of the AFC (EHPP1999a, AFC Section 5.2). This data indicates that wind speeds below 1.5 meters per second and temperatures exceeding 100°F are not uncommon for the project area. Therefore, staff suggested that the applicant use F stability (stagnated air, very little mixing), 1.5 meters/second wind speed and an ambient temperature of 100° F in its modeling analysis of an accidental release to reflect worst case atmospheric conditions. These conditions were reflected in the modeling used to estimate the potential worst case impacts associated with an accidental ammonia release. Additional modeling of more likely accident scenarios and more realistic meteorological conditions were also evaluated.

TERRAIN CHARACTERISTICS

The location of elevated terrain (terrain above the release height) is often an important factor to be considered in assessing potential exposure. An emission plume resulting from an accidental release may impact high elevations before impacting lower elevations. The principal risk of accidental release at this facility is associated with anhydrous ammonia. Accidental releases of anhydrous ammonia typically result in denser than air plumes that do not rise. Thus, elevated terrain has no important effect on modeled results.

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 (Calabrese 1978). Also, the location of the population in the area surrounding a project site may have a large bearing on health risk. Figure 5.15-2 (EHPP 1999a) shows the locations of both populated areas and sensitive receptors in the project vicinity. The nearest resident is located 5.1 miles north of the proposed site. The nearest sensitive receptor (a school) is located 6.5 miles east of the proposed site in the town of Tupman. Elk Hills Road is a public road that runs north/south along the proposed power plant site, approximately 140 meters from the facility fence line. On the eastern side of Elk Hills Road (approximately 500 meters from the facility fence line), Occidental of Elk Hills, Inc. (OEHI) has several temporary structures that it intends to continue to operate as field offices for oil field development. There is also an existing cogeneration facility located west of the proposed facility.

IMPACTS

The Energy Commission staff has determined that anhydrous ammonia and natural gas are the only hazardous materials to be handled that pose any potential risk of off-site impacts. The following is a project specific analysis of the potential impacts associated with the handling of each of these materials:

ANHYDROUS AMMONIA

Anhydrous ammonia will be used in controlling the emission of oxides of nitrogen (NOx) from the combustion of natural gas in the facility. The accidental release of anhydrous ammonia can result in hazardous down-wind concentrations of ammonia gas. The anhydrous ammonia storage facility will have a capacity of 12,000 gallons, a spill containment wall, an ammonia vapor detection system, and an automated water deluge system. The anhydrous ammonia will be delivered by 8,000-gallon tank trucks. The unloading area will be paved with concrete and will include berms that will be sufficient to hold the volume of one delivery (EHPP 1999a, page 5.12-4).

To assess the potential impacts associated with an accidental release of ammonia, staff typically evaluates where four “bench mark” exposure levels of ammonia gas occur off-site. These include: 1) the lowest concentration posing a risk of lethality, 2,000 ppm; 2) the Immediately Dangerous to Life and Health level (IDLH) of 300 ppm; 3) the Emergency Response Planning Guideline 2 (ERPG) level of 200 ppm, which is also the RMP level 1 criterion used by EPA and California; and 4) the level considered by the Energy Commission staff to be without serious adverse effects on the public for one time exposure of 75 ppm. (A detailed discussion of the exposure criteria considered by staff and their applicability to different populations and exposure-specific conditions is provided in Appendix A of this analysis.) If the exposure associated with a potential release would exceed 75 ppm at any public receptor, staff will presume that the potential release poses a risk of significant impact. However, staff may also assess the probability of occurrence of the release

and/or the nature of the potentially exposed population. Staff may, based on such analysis, determine that the likelihood and extent of potential exposure are not sufficient to support a finding of potentially significant impact.

In their response to staff data request, Elk Hills provided the modeling results for three accidental release scenarios, a five inch hole in the anhydrous ammonia storage tank, a valve or piping failure and a valve or piping leak (EHPP 1999d). The five-inch hole in the anhydrous ammonia tank represents the worst case release scenario. A valve or piping failure represents a major release characteristic of an accident during the transfer of material from a tank truck to the storage facility. A smaller leak from the same valves or piping represents a minor accidental release characteristic of improper maintenance.

In conducting this analysis it was assumed that winds of 1.5 meters per second and category F stability would exist at the time of the accidental release. For each release scenario, the analysis includes results both with and without the water deluge system being activated. This screening analysis was designed to predict the maximum possible impacts based on distance from the storage tank without regard to specific direction of transport.

The analysis of the worst case release scenario was performed assuming that the water deluge system fails to operate, and assuming pessimistic meteorological conditions that result in exposures exceeding 75 PPM at the nearest residence, 5.1 miles away, and the nearest sensitive receptor, 6.5 miles away. However, the probability of this scenario occurring is very low. No other modeled scenarios resulted in any impact on either the nearest resident or the nearest sensitive receptor. However, all three scenarios resulted in high down-wind concentrations of ammonia at the nearby offices currently being used by OEHI and at Elk Hills Road. Traffic along Elk Hills Road is characterized as 20-40% truck traffic associated with the oil field development, an annual daily average of 900 vehicles and an annual peak hour of 90 vehicles (EHPP 1999a, page 5.11-8). Therefore, an accidental release of ammonia during the peak commute hour may result in very high down wind concentrations for 70 or more vehicles.

As a result of concerns regarding exposure levels on Elk Hills Road, Elk Hills provided an analysis of the probability of occurrence associated with the three modeled release scenarios. Elk Hills estimated the probability of the Worst Case scenario to be 3.72×10^{-5} over the life (30 years) of the power plant. This is equivalent to one accident out of 26,880 similar storage facilities over a 30-year period (EHPP 1999d). The worst case scenario also reflects the concurrent occurrence of F stability and 1.5 meters per second wind speeds and assumes winds directly toward OEHI Offices and Elk Hills Road. From data presented in Air Quality Appendix K of the AFC (EHPP 1999a, page K-2-24) the probability of occurrence of F stability and winds speed less than 2.01 meters per second in any direction is 2.04%. Therefore, the maximum risk of a Worst Case impact is 7.59×10^{-7} over the life of the power plant, or one accident in more than a million similar storage facilities located in a similar wind pattern over a 30 year period. Therefore, staff concludes that the worst case impact is not plausible.

In addition to spontaneous tank failure, accidental release of ammonia can also result from human error and external events. The primary human errors associated with release from fixed storage facilities occur during transfer operations. Staff believes that the potential for accidental releases will be reduced to insignificant levels by the implementation of safety management practices included in the RMP and Process Safety Management Program (PSM) for the facility. These plans will be reviewed by Cal OSHA, the local Administering Agency, EPA, and Energy Commission staff prior to the handling of anhydrous ammonia at the facility. The external hazards potentially affecting the ammonia storage tank at this facility include; earthquakes, fires, explosions and turbine overspeed failure. Staff concludes that the earthquake damage is sufficiently addressed by seismic code requirements. Staff has also determined that the anhydrous ammonia tank is located far enough from the natural gas pipeline, natural gas regulator and the combustion turbines that it will not be subject to fire, explosion, or overspeed hazards.

NATURAL GAS

Natural gas, which will be used as a fuel by the project, poses a fire and/or explosion risk as a result of its flammability. While natural gas will be used in significant quantities, it will not be stored on site. The risk of a fire and/or explosion from natural gas 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: 1) the use of double block and bleed valves for gas shut-off; 2) automated combustion controls; and 3) burner management systems. These measures will significantly reduce the likelihood of an explosion in fired equipment. Additionally, start-up procedures will require air purging of the gas turbines prior to start-up, thus precluding the presence of an explosive mixture. This facility will also require the installation of a natural gas pipeline that could result in accidental release of natural gas. The natural gas pipeline is discussed in staff's **Facility Design** analysis. It is staff's belief that these mitigation measures will reduce to insignificant levels the potential for impacts associated with the use of natural gas.

CUMULATIVE IMPACTS

With the mitigation proposed, the facility will cause a very small risk of any off-site impacts. A cogeneration power plant (known as 35R LOAP plant) located west of the EHPP proposed site is using and storing approximately 10,000 gallons of anhydrous ammonia. An off-site consequence analysis of the 35R storage tank will most likely result in slightly lower ammonia concentrations at Elk Hills Road, because it is farther way than the proposed site. The increase in risk from the EHPP anhydrous ammonia storage tank is very small (as previously discussed), thus the direct impacts of the project will not significantly add to any existing risk of an accidental release of anhydrous ammonia in the area.

FACILITY CLOSURE

The requirements for handling of hazardous materials remain in effect until such materials are removed from the site regardless of facility closure. Therefore, the

facility owners are responsible for continuing to handle such materials in a safe manner, as required by applicable laws. In the event that the facility owner abandons the facility in a manner which poses a risk to surrounding populations, staff will coordinate with the California Office of Emergency services, Kern County Environmental Health Department, and the California Department of Toxic Substances Control (DTSC) to ensure that any unacceptable risk to the public is eliminated. Funding for such necessary emergency action can be obtained through DTSC's RAPID Program until the cost can be recovered from the responsible parties.

MITIGATION

With the exception of potential impacts associated with anhydrous ammonia, the proposed project reflects the use of all feasible methods in reducing the potential for impacts associated with hazardous materials use and handling. While the use of anhydrous ammonia does pose some small risk of impact, staff does not believe that the risk is sufficient to require further mitigation. However if this risk is determined to be unacceptable, use of aqueous ammonia is a feasible mitigation that could be imposed.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSION

Staff's evaluation of hazardous materials handling and use for the proposed project indicates that they pose minimal potential for significant impacts on the public. With adoption of the proposed conditions of certification, EHPP will comply with all applicable LORS. In response to Health and Safety Code, section 25531 et seq., the applicant will be required to submit an RMP. The EPA, Kern County Environmental Health Department and staff will evaluate the RMP, including the hazardous materials storage and handling systems and the risk assessment provided by the applicant, and indicate whether they are satisfied with the proposed facilities. To insure adequacy of the RMP, staff's proposed conditions of certification require that the RMP be submitted for concurrent review by the Kern County Environmental Health Department and staff. In addition staff's proposed conditions of certification also require that confirmation of Kern County Environmental Health Department's approval be submitted prior to delivery of any hazardous materials to the facility. With adoption of staff's proposed conditions of certification, the project will also comply with Health and Safety Code, section 41700, as it will not pose any potential for significant impacts to the public from hazardous materials releases.

RECOMMENDATION

Staff recommends the Energy Commission impose the proposed conditions of certification presented herein to ensure that the project is designed, constructed and operated to comply with applicable LORS and to protect the public from significant risk of exposure to an accidental ammonia release.

PROPOSED CONDITIONS OF CERTIFICATION

HAZ-1 The project owner shall not use any hazardous material in reportable quantities, as specified in Title 40, Code Of Federal Regulations, Part 355, Subpart J, section 355.50, that are not identified in Appendix B unless approved in advance by the Compliance Project Manager (CPM).

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

HAZ-2 The project owner shall provide a Risk Management Plan and Process Safety Management Plan to Kern County Environmental Health Department and the CPM for review and approval at the time the plans are first submitted to the U.S. Environmental Protection Agency (EPA) and the California Occupational Safety and Health Administration (Cal OSHA). The project owner shall reflect all recommendations of the Kern County Environmental Health Department in the final document. A copy of the final plans, reflecting all comments, shall be provided to the Kern County Environmental Health Department and the CPM once reviewed by EPA and Cal OSHA.

Verification: At least sixty (60) days prior to the delivery of any hazardous materials to the facility, the project owner shall provide the final approved plans listed above for CPM approval.

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

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

Staff has chosen to use the National Research Council's 30 minute Short Term Public Emergency Limits (STPELs) to determine the potential for significant impact. These limits are designed to apply to accidental unanticipated releases and subsequent public exposure. Exposure at these levels should not result in "serious sequelae" 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 of the general public 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 MATERIAL MANAGEMENT
APPENDIX A TABLE 1
Acute Ammonia Exposure Guidelines

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

1) (EPA 1987) 2) (NIOSH 1994) 3) (NRC 1985) 4) (NRC 1972) 5) (AIHA 1989)
* The (NRC 1979), (WHO 1986), and (Henderson and Haggard 1943) all conclude that available data confirm the direct relationship to increases in effect with both increased exposure and increased exposure duration.
** The (NRC 1979) describes a study involving young animals which suggests greater sensitivity to acute exposure in young animals. The (WHO 1986) warns that the young, elderly, asthmatics, those with bronchitis and those that exercise should also be considered at increased risk based on their demonstrated greater susceptibility to other non-specific irritants.

REFERENCES

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.

AIHA, 1989, American Industrial Hygienists Association, Emergency Response Planning Guideline, Ammonia, (and Preface) AIHA, Akron, OH.

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 number 94-116.

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

ABBREVIATIONS

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

HAZARDOUS MATERIAL MANAGEMENT
Appendix B

Material	Use	Quantity Stored On-Site
Anhydrous Ammonia	NOx emission control	12,000 Gallons
Organic Phosphate Inhibitor Solution	Circulating water scale control	4,000 Gallons
Sodium Hypochlorite Solution	Circulating water biofouling control	2,500 Gallons
Sulfuric Acid	Circulating water pH reduction and demineralizer regeneration	7,500 Gallons
Sodium Hydroxide	Demineralizer regeneration	7,500 Gallons
Oxygen Scavenger Solution	Condensate oxygen control	250 Gallons
Alkaline Solution (e.g. Amine)	Condensate pH control	250 Gallons
Disodium and Trisodium	Boiler water scale control	1,000 Gallons
Hydrochloric acid	HRSG chemical cleaning	Temporary
Ammonium Bifluoride	HRSG chemical cleaning	Temporary
Citric Acid	HRSG chemical cleaning	Temporary
EDTA Chelant	HRSG chemical cleaning	Temporary
Sodium Nitrate	HRSG chemical cleaning	Temporary
Diesel Fuel Oil	Diesel fire pump	100 Gallons
Sulfuric Acid	Station batteries	3,000 Gallons
Hydrogen	Generator cooling	60,000 standard cubic feet

EHPP 1999a, AFC Table 3.4-4, Page 3-42

WASTE MANAGEMENT

Michael Ringer

INTRODUCTION

This analysis presents an assessment of issues associated with managing wastes generated from constructing and operating the Elk Hills Power Project (EHPP). It evaluates the proposed waste management plans and mitigation measures designed to reduce the risks and environmental impacts associated with handling, storing, and disposing of project-related hazardous and nonhazardous wastes. The technical scope of this analysis encompasses wastes generated during facility construction and operation, except wastewaters discharged to injection wells. Such wastewaters are discussed in the **Soil and Water Resources** section of this document.

Energy Commission staff's objectives in its waste management analysis are to ensure that:

- The management of wastes will be in compliance with all applicable laws, ordinances, regulations, and standards (LORS). Compliance with LORS ensures that wastes generated during constructing and operating the proposed project will be managed in an environmentally safe manner; and
- Disposal of project wastes will not result in significant adverse impacts to existing waste disposal facilities.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

FEDERAL

RESOURCE CONSERVATION AND RECOVERY ACT (42 U.S.C. SEC. 6921 ET SEQ.)

The Resource Conservation and Recovery Act establishes requirements for the management of hazardous wastes from the time of generation to the point of ultimate treatment or disposal. Section 6922 requires generators of hazardous waste to comply with requirements regarding:

- record keeping practices which identify quantities of hazardous wastes generated and their disposition,
- labeling practices and use of appropriate containers,
- use of a manifest system for transportation, and
- submission of periodic reports to the EPA or authorized state.

TITLE 40, CODE OF FEDERAL REGULATIONS, PART 260

These sections contain regulations promulgated by the EPA to implement the requirements of RCRA as described above. Characteristics of hazardous waste are described in terms of ignitability, corrosivity, reactivity, and toxicity, and specific types of wastes are listed.

STATE

CALIFORNIA HEALTH AND SAFETY CODE, SECTION 25100 ET SEQ. (HAZARDOUS WASTE CONTROL ACT OF 1972, AS AMENDED).

This act creates the framework under which hazardous wastes must be managed in California. It mandates the State Department of Health Services (now the Department of Toxic Substances Control under the California Environmental Protection Agency, or Cal EPA) to develop and publish a list of hazardous and extremely hazardous wastes, and to develop and adopt criteria and guidelines for the identification of such wastes. It also requires hazardous waste generators to file notification statements with Cal EPA and creates a manifest system to be used when transporting such wastes.

TITLE 14, CALIFORNIA CODE OF REGULATIONS, SECTION 17200 ET SEQ. (MINIMUM STANDARDS FOR SOLID WASTE HANDLING AND DISPOSAL)

These regulations set forth minimum standards for solid waste handling and disposal, guidelines to ensure conformance of solid waste facilities with county solid waste management plans, as well as enforcement and administration provisions.

TITLE 22, CALIFORNIA CODE OF REGULATIONS, SECTION 66262.10 ET SEQ. (GENERATOR STANDARDS)

These sections establish requirements for generators of hazardous waste. Waste generators must determine if their wastes are hazardous according to specified characteristics or lists of hazardous wastes. As in the federal program, hazardous waste generators must obtain EPA identification numbers, prepare manifests before transporting the waste off site, and use only permitted treatment, storage, and disposal facilities. Additionally, generators must use registered hazardous waste transporters for any off-site shipments. Requirements are also established for record keeping, reporting, packaging, and labeling of hazardous wastes, use of containers and tanks for hazardous waste storage, and limiting the amount of time that hazardous waste can be stored on site.

LOCAL

KERN COUNTY GENERAL PLAN PUBLIC FACILITIES ELEMENT

All generators and processors of hazardous waste are encouraged to develop long-term waste management programs. Large generators of hazardous waste should be encouraged to recycle, treat and detoxify their wastes on site. Many such processes could be implemented in existing industrial map designations, if zoned appropriately (Policy No. 17).

SETTING

PROJECT AND SITE DESCRIPTION

The proposed site is on about 12 acres in the center of the Elk Hills Oil and Gas Field, about 25 miles west of Bakersfield. The site is currently occupied by out-of-service tanks and related equipment formerly used for storage and loading of propane, butane, and natural gas liquid products. In addition, there are some aboveground pipelines that cross the power plant site. Please see the Project Description section for a more detailed description of the project and site.

The owner of the site, Occidental of Elk Hills, Inc., commissioned a Phase I Environmental Site Assessment (ESA) to determine the environmental condition of the site (EHPP 1999, AFC Appendix H). The ESA was performed in accordance with American Society for Testing and Materials practice E 1527-97. The ESA reports that no hazardous substances nor unidentified containers were observed on the property; no ground staining indicative of hazardous substances was observed, other than minimal staining from hydrocarbons such as from leaking trucks; there were no indications of solid waste disposal on the site; and there were no other visible indications of any conditions of concern. Additionally, reviews of relevant environmental databases and regulatory agency records did not find any evidence to suggest that any contamination might exist at the site. The ESA concluded that no on-site or off-site recognized environmental conditions were identified.

IMPACTS

PROJECT SPECIFIC IMPACTS

CONSTRUCTION

Project construction will generate both hazardous and nonhazardous wastes. The applicant estimates that up to 600 tons of nonhazardous solid wastes will be generated during construction of the power plant and associated linear facilities. (EHPP 1999, AFC p. 5.13-5). Nonhazardous wastes include debris requiring removal during site grading and excavation, excess lumber and concrete, scrap metal from welding and cutting operations, insulation, empty chemical containers, and paper, wood, glass, and plastic from packing materials. Those wastes which cannot be recycled will be disposed of at a Class III (nonhazardous) landfill (Id.).

Hazardous wastes that may be generated during construction include waste oil and grease, paint, spent solvent, welding materials, and cleanup materials from spills of hazardous substances. Such wastes will be collected in hazardous waste accumulation containers near the point of generation. The containers will be taken to the construction contractor's hazardous waste storage area and within 90 days will either be recycled or transported by a licensed hauler to licensed hazardous waste treatment and disposal facilities, as appropriate (EHPP 1999, AFC p. 5.13-9). Initial cleaning of the heat recovery steam generators will also generate waste

cleaning solutions. Washwater effluent will be temporarily stored onsite in portable tanks and disposed of off site by the licensed chemical cleaning contractor.

Wastes may also be generated if contaminated soils are encountered during demolition or excavation. If such soil is found, it will be segregated, sampled, and tested. Hazardous soil will be hauled to a Class I landfill or appropriate soil treatment and recycling facility (Id.). The Kern County Environmental Health Services Department will be notified if underground storage facilities are discovered during construction.

OPERATION

Under normal operating conditions, the proposed facility will generate both nonhazardous and hazardous wastes.

Nonhazardous wastes generated during plant operation include trash, office wastes, empty containers, broken or used parts, used packing material, used filters, spent demineralizer resin, and cooling tower basin sludge. On a daily basis, the quantities of other nonhazardous wastes generated from gas-fired facilities such as the EHPP are typically minor, with some of the material being recyclable. The applicant estimates that approximately 100 tons of solid waste will be generated on an annual basis (EHPP 1999, AFC p. 5.13-6). Nonhazardous waste will be recycled where practical and the remainder disposed of to a Class III (nonhazardous) landfill.

Hazardous wastes generated during routine project operation include cleaning solutions, spent air pollution control catalyst, used oil, used cleaning solvents, waste paint, contaminated cleanup materials, and empty chemical containers.

Selective catalytic reduction catalyst, used for NOx emissions control, must be replaced as it becomes contaminated, typically after several years' service. Classified as hazardous due to heavy metals content, Elk Hills estimates that about 70,000 pounds of spent catalyst will be returned to the manufacturer for reclamation or disposal every three to five years (EHPP 1999, AFC p. 5.13-10).

About 1,300 gallons of used crankcase and hydraulic oil will be generated annually and will be recycled by a licensed oil recycler (EHPP 1999, AFC p. 5.13-10). Oily rags and oil absorbent, used to contain small spills, will be collected near the point of generation and disposed of off site in a hazardous waste landfill, although the rags may be sent to an industrial cleaning service.

Used containers of hazardous substances, such as chemical containers or oil filters may be classified as hazardous wastes. However, if managed according to certain regulatory guidelines, such containers may be managed as nonhazardous (Cal. Code Regs., tit. 22, § 66261.7, 66266.130).

IMPACT ON EXISTING WASTE DISPOSAL FACILITIES

The Kern County Department of Waste Management owns and operates five class III (nonhazardous) landfills within 50 miles of the proposed project (EHPP 1999, AFC Table 5.13-1). EHPP's projected generation of solid waste (600 tons during

construction and 100 tons annually) is an insignificant fraction of the landfills' combined annual capacity of over 500,000 tons or their remaining capacity of almost eleven million tons. Even discounting the effects of recycling on the total amount of nonhazardous wastes destined for landfilling, staff concludes that the amount of such wastes generated during project construction and operation are insignificant relative to existing disposal capacity, and would not meaningfully impact any of the landfills' capacities or operating lifetimes.

Three Class I landfills in California are permitted to accept hazardous waste (EHPP 1999, AFC p. 5.13-3):

- Safety-Kleen's Buttonwillow facility in Kern County, with a permitted capacity of 13 million tons and an estimated remaining life of 40 years.
- Chemical Waste Management's Kettleman Hills landfill in Kings County, with a remaining capacity of about eight million cubic yards, and a remaining life of about 30 years.
- Safety-Kleen's Superstition Hills landfill in Imperial County, with an estimated remaining capacity of two million cubic yards and a remaining life of 50 years.

Much of the hazardous waste generated during facility construction and operation, such as used oil and spent catalysts, will be recycled. Even without recycling, however, amounts of hazardous waste generated by this type of facility is minor and would not significantly impact the capacity of any of the above Class I landfills.

CUMULATIVE IMPACTS

Staff's assessment of cumulative impacts includes wastes generated by the La Paloma, Sunrise, and Midway-Sunset projects in addition to EHPP. As mentioned above, combined cycle projects similar to EHPP do not generate significant amounts of either hazardous or nonhazardous wastes, and much of what is generated will be recycled. Discounting the effects of recycling, construction wastes are estimated to be less than 2500 tons (total) and operational wastes less than 6000 tons (annually), compared to a total annual capacity of over 500,000 tons for Kern County landfills. Due to the minor amounts of wastes generated during project construction and operation and the availability of regional landfills, cumulative impacts will be insignificant for both hazardous and nonhazardous wastes.

FACILITY CLOSURE

During any type of facility closure (see staff's **General Conditions** section which discusses planned, unexpected temporary, and unexpected permanent closure), the primary waste management related concern is that project wastes not pose any potentially significant problem to the public, workers, or the environment. Staff has determined that conditions of certification in the General Conditions section will adequately address waste management issues related to closure.

In the case of unexpected temporary closure, waste management practices normally required by LORS and already in place (such as limiting hazardous waste accumulation time to 90 days and requiring proper containment) would likely be adequate to avoid significant problems. In addition, staff's General Conditions for Facility Closure require preparation of an on-site contingency plan which shall provide for removal of hazardous wastes and draining of all chemicals from storage tanks and other equipment for temporary closures exceeding 90 days.

An approved on-site contingency plan is also required to protect public health and safety in the case of unexpected permanent closure. As above, the plan must provide for the removal of hazardous materials and hazardous wastes, draining of all chemicals from storage tanks and other equipment, and the safe shutdown of all equipment.

For planned permanent closure, Elk Hills is required to develop a facility closure plan at least twelve months prior to commencement of closure.

COMPLIANCE WITH APPLICABLE LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Energy Commission staff concludes that EHPP will be able to comply with all applicable LORS regulating the management of hazardous and nonhazardous wastes during project construction and operation. Because hazardous wastes will be produced during project construction and operation, Elk Hills must acquire and maintain an EPA identification number as a hazardous waste generator. Accordingly, Elk Hills will be required to properly store, package and label waste, use only approved transporters, prepare hazardous waste manifests, and keep detailed records. Pursuant to California Code of Regulations, title 22, section 67100.1 et seq., a hazardous waste source reduction and management review may be required, depending on the amounts of hazardous waste ultimately generated.

MITIGATION

Elk Hills intends to implement the following mitigation measures during construction and operation of the proposed project (EHPP 1999, AFC pp. 5.13-11,12):

- A detailed hazardous waste management plan will be prepared prior to start-up to assure proper storage, labeling, packaging, record keeping, manifesting, minimization, and disposal of hazardous waste.
- Procedures to minimize hazardous waste generation will be established. Nonhazardous materials will be used instead of hazardous materials and wastes will be recycled whenever possible.
- Chemical spill control and management procedures will be included in a spill contingency plan developed prior to commercial operation.

Energy Commission staff has examined the mitigation measures proposed by Elk Hills and concluded that the measures together with applicable LORS will adequately assure that no significant environmental impacts will result from the management and disposal of project-related waste.

In the project application phase, certain details concerning plant construction and operation remain to be finalized, including specific methods of waste management. Elk Hills has proposed general methods of managing project related wastes, which staff concludes are adequate to prevent significant environmental impacts. However, staff will propose that Elk Hills prepare a waste management plan which will specify how project wastes will be managed once all details of plant operation are determined (see proposed condition of certification **WASTE-3**).

CONCLUSIONS AND RECOMMENDATIONS

Management of the wastes generated during construction and operation of the EHPP project will not result in any significant adverse impacts if Elk Hills implements the mitigation measures proposed in the Application for Certification (99-AFC-1), the additional measure proposed by staff below, and the proposed conditions of certification.

Staff recommends that if potentially contaminated soil is unearthed during excavation at either the proposed site or linear facilities as evidenced by discoloration, odor, or other signs, Elk Hills has an environmental professional (as defined by American Society for Testing and Materials practice E 1527-93 Standard Practice for Phase I environmental Site Assessments) determine the need for sampling to confirm the nature and extent of contamination. If significant remediation may be required, Elk Hills should also contact representatives of the Kern County Environmental Health Services Department and the Sacramento Field Office of the California Department of Toxic Substances Control for possible oversight.

CONDITIONS OF CERTIFICATION

WASTE-1 The project owner shall obtain a hazardous waste generator identification number from the Department of Toxic Substances Control prior to generating any hazardous waste.

Verification: The project owner shall keep its copy of the identification number on file at the project site and notify the CPM via the monthly compliance report of its receipt.

WASTE-2 Upon becoming aware of any impending enforcement action, the project owner shall notify the CPM of any such action taken or proposed to be taken against it, or against any waste hauler or disposal facility or treatment operator with which the owner contracts.

Verification: The project owner shall notify the CPM in writing within 10 days of becoming aware of an impending enforcement action.

WASTE-3 Prior to the start of both construction and operation, the project owner shall prepare and submit to the CPM, for review and comment, a waste management plan for all wastes generated during construction and operation of the facility, respectively. The plans shall contain, at a minimum, the following:

- A description of all waste streams, including projections of frequency, amounts generated and hazard classifications; and

- Methods of managing each waste, including treatment methods and companies contracted with for treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/reduction plans.

Verification: No less than 60 days prior to the start of construction, the project owner shall submit the construction waste management plan to the CPM for review. The operation waste management plan shall be submitted no less than 60 days prior to the start of project operation. The project owner shall submit any required revisions within 30 days of notification by the CPM (or mutually agreed upon date). In the Annual Compliance Reports, the project owner shall document the actual waste management methods used during the year compared to planned management methods.

WASTE-4 The project owner shall have an environmental professional (as defined by American Society for Testing and Materials practice E 1527-97 Standard Practice for Phase I environmental Site Assessments) available for consultation during soil excavation activities. If potentially contaminated soil is unearthed during excavation at either the proposed site or linear facilities as evidenced by discoloration, odor, or other signs, prior to any further construction activity at that location, the environmental professional shall inspect the site, determine the need for sampling to confirm the nature and extent of contamination, and file a written report to the project owner stating the recommended course of action. If, in the opinion of the environmental professional, significant remediation may be required, the project owner shall contact representatives of the Kern County Environmental Health Services Department and the Sacramento Field Office of the California Department of Toxic Substances Control for guidance and possible oversight.

Verification: The project owner shall notify the CPM in writing within 5 days of any reports filed by the environmental professional, and indicate if any substantive issues have been raised.

REFERENCES

EHPP (Elk Hills Power Project). 1999. Application for Certification, Elk Hills Power Project, (99-AFC-1). Submitted to the California Energy Commission, February 24.

LAND USE

Amanda Stennick

INTRODUCTION

The land use analysis of the Elk Hills Power Project (EHPP) focuses on two main issues: the project's consistency with local land use plans, ordinances and policies; and the project's compatibility with existing and planned land uses. Indirect land use impacts such as noise, traffic, visual resources, air quality, biology, transmission line safety and nuisance, or public health are discussed in those specific areas of this staff assessment.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

KERN COUNTY GENERAL PLAN

The general plan is the legal document that acts as a constitution for land use and development in Kern County. It consists of the seven mandatory elements: land use, circulation, open space, conservation, housing, safety and seismic safety, and noise; and four optional elements: recreation, energy, hazardous waste management, and public services and facilities (Kern County 1994). The following land use designations of the Kern County General Plan are specific to the proposed project.

LAND USE DESIGNATIONS

NONJURISDICTIONAL LAND

State and Federal Land - All property under the ownership and control of various state and federal agencies.

RESOURCE

Intensive Agriculture

Applies to areas devoted to the production of irrigated crops or having the potential for such use. Other agricultural uses may be consistent with the intensive agriculture designation. Minimum parcel size is 20 acres gross. Permitted uses include, but are not limited to:

- Primary: irrigated cropland, orchards, vineyards, ranch and farm facilities, etc.; one single-family dwelling unit.
- Compatible: livestock grazing, water storage, mineral and petroleum exploration and extraction, and public utility uses, etc., pursuant to provisions of the Zoning Ordinance.

Extensive Agriculture

Applies to agricultural uses involving large amounts of land with relatively low value-per-acre yields. Minimum parcel size is 20 acres gross, except lands not under Williamson Act Contract, in which case the minimum parcel size shall be 80 acres gross. Permitted uses include, but are not limited to:

- Primary: livestock grazing, dry land farming, ranching facilities, wildlife and botanical preserves, timber harvesting, etc.; one single-family dwelling unit.
- Compatible: irrigated croplands, water storage or ground water extraction, recharge areas, mineral and petroleum exploration, recreational activities, etc.

Mineral and Petroleum

Applies to areas, which contain producing, or potentially productive, petroleum fields and mineral deposits. Uses are limited to activities directly associated with resource extraction. Minimum parcel size is 5 acres gross. Permitted uses include, but are not limited to:

- Primary: mineral and petroleum exploration and extraction.
- Compatible: extensive and intensive agriculture, mineral and petroleum processing, pipelines, power transmission facilities, communication facilities, equipment storage yards, and one single-family dwelling unit (subject to a Conditional Use Permit).

Public Facilities

Applies to areas designated for basic physical structures and infrastructure including roads, water distribution and large storage systems, sewage collection and treatment facilities, and flood control and storm drainage systems.

Physical Constraints

Includes overlay zones denoting physical constraints. Those applicable include:

- Steep Slopes: Land with an average slope of 30 percent or steeper.
- Flood Hazard: Based on the Flood Hazard Boundary Maps of the US Department of Housing and Urban Development and the Kern County Water Agency. These areas include, for example, flood channels and watercourses, riverbeds, and gullies. Development within these areas is subject to review by the County and will include conformity with adopted ordinances.

Special Treatment Areas

These are areas for which area-wide land use plans have been prepared or approved. They include both “Accepted County Plan Areas” and “Rural Community” plans:

- Accepted County Plan Areas: Specific land use areas for which plans have been prepared and approved.
- Rural Community: Settlements in the County that have individual character and are recognized as unique communities meriting Specific Plan level of detail.

INDUSTRIAL

Commercial and industrial activities which involve outdoor storage or use of heavy equipment which produces significant air or noise pollution.

The following tables indicate the Kern County General Plan land use designations and existing land uses of the proposed project and transmission line corridors.

GENERAL PLAN LAND USE DESIGNATIONS WITHIN THE STUDY AREA

The existing general plan land use designations for the facility are represented in **LAND USE Table 1**.

LAND USE Table 1

Location or Linear Facility	Land Use Designation
Elk Hills Power Plant	Mineral and Petroleum
Transmission Line Route 1A	Mineral and Petroleum/Special Treatment Areas/Mineral and Petroleum-Flood Hazard
Transmission Line Route 1B and 1B Variation	Mineral and Petroleum/Extensive Agricultural/Intensive Agricultural
Water Supply Line Route 2	Mineral and Petroleum/Non-Jurisdictional Land/Extensive Agricultural/ Mineral and Petroleum-Flood Hazard/Public Facilities-Flood Hazard
Wastewater Supply Line Route 3	Mineral and Petroleum
Natural Gas Supply Line Route 4	Extensive Agricultural/Mineral and Petroleum

EXISTING LAND USES WITHIN THE STUDY AREA

The existing land uses for the facility are represented in **LAND USE Table 2**.

LAND USE Table 2

Location or Linear Facility	Existing Land Uses
Elk Hills Power Plant	Oil and Gas Production
Transmission Line Route 1A	Oil and Gas Production/Undeveloped/School/ Church/Residential
Transmission Line Route 1B and 1B Variation	Commercial/Oil and Gas Production/Conservation/Undeveloped/ Agriculture/Rural Residences
Water Supply Line Route 2	Oil and Gas Production/Undeveloped/West Kern Water District Distribution Center
Wastewater Supply Line Route 3	Oil and Gas Production
Natural Gas Supply Line Route 4	Oil and Gas Production

LAND USE PLANS AND POLICIES RELATED TO EHPP

The following provisions of the Kern County General Plan, McKittrick Rural Community Plan, Buttonwillow Community Development Plan, U.S. Fish and Wildlife Service, and Caliente Resource Management Plan are specific to the proposed project. Please refer to the **Socioeconomic Resources** and **Noise** sections of the Preliminary Staff Assessment (PSA) for a discussion of the applicable policies of the Kern County General Plan. Please refer to the **Biological Resources** section of the PSA for a discussion of the applicable policies of the U.S. Fish and Wildlife Service and the California Department of Fish and Game.

NONJURISDICTIONAL LAND

- Coordination and cooperation will be promoted among the County, the incorporated cities and the various special districts where their planning decisions and actions affect more than a single jurisdiction (Policy No. 1).
- Land under state and federal jurisdiction will be considered as land designated for “Resource Management” on the General Plan map (Policy No. 4).

PHYSICAL CONSTRAINTS

- Kern County will not permit new developments to be sited on land that is environmentally unsound to support such development (Policy No. 1).
- Development will not be allowed in natural hazard areas pending the adoption of ordinances that establish conditions, criteria and standards in order to minimize risk to life and property posed by those risks (Policy No. 2).
- Zoning and other land use controls will be used to regulate and, in some instances, to prohibit development in hazardous areas (Policy No. 3).

- New development will not be permitted in areas of landslide or slope instability as designated in the Safety and Seismic Safety Element of the General Plan, and as mapped on the Kern County Seismic Hazard Atlas (Policy No. 6).
- Regardless of percentage of slope, development on hillsides will be sited in the least obtrusive fashion, thereby minimizing the extent of topographic alteration required (Nonjurisdictional Land - Policy No. 1, p. 1 - Policy No. 9)
- Development proposed in areas with steep slopes will be reviewed for conformity to the adopted Hillside Development Ordinance to ensure that appropriate stability, drainage, and sewage treatment will result (Policy No. 10).
- Designated flood channels and watercourses, such as creeks, gullies, and riverbeds will be preserved as resource management areas or, in the case of the urban areas, as linear parks (Policy No. 12).
- New development will be required to demonstrate the availability of adequate fire protection and suppression facilities (Policy No. 13).
- Kern County will evaluate the potential noise impacts of any development-siting action or of any applications it acts upon that could significantly alter noise levels in the community and will require mitigative measures where significant adverse effects are identified (Policy No. 14).
- The air quality effects of a proposed land use will be considered when evaluating development proposals (Physical Constraints - Policy No. 15, p. 2-3).
- Kern County will disapprove projects found to have significant adverse effects on Kern County's air quality, unless the Board of Supervisors, Board of Zoning Adjustment, or the Director of Planning and Development Services, acting as Hearing Officer or Parcel Map Advisory Agency makes findings under CEQA (Policy No. 16).

Special Treatment Areas

- In areas designated "Specific Plan Required" with more than one owner, the interim designations will reflect the existing zoning pattern until the County prepares and adopts a Specific Plan (Policy 3(b)).

Resource

- Areas designated agricultural use, which include Class I and II agricultural soils with surface water delivery systems will be protected against residential and commercial subdivision and development activities (Policy No. 1).
- Areas identified by the Soil Conservation Service as having high range-site value will be reserved for extensive agricultural use or as resource reserves if located within a County water district (Policy No. 2).
- In areas with a Resource designation on the General Plan map, only industrial activities which directly and obviously relate to the exploration, production, and

transportation of the particular resource will be considered to be consistent with this plan (Policy No. 4).

- Development will be constrained, pending adoption of ordinances, which establish conditions, criteria, and standards, in areas containing valuable resources in order to protect the access to and economic use of these resources (Policy No. 9).
- Rivers and streams in the County are important visual and recreational resources and wildlife habitats. Areas of riparian vegetation along rivers and streams will therefore be preserved when feasible to do so (Policy No. 11).
- The County will maintain and enhance air quality for the health and well being of County residents by encouraging land uses which promote air quality and good visibility (Policy No. 13).
- Habitats of threatened or endangered species should be protected to the greatest extent possible (Policy No. 14).
- Management which are presently under Williamson Act Contracts will have a minimum parcel size of 80 acres until such time as a contract expires or is canceled, at which time the minimum parcel size will become 20 acres (Policy No. 15).

General Provisions

- Prior to issuance of any development or use permit, the County shall make the finding, based on information provided by California Environmental Quality Act (CEQA) documents, staff analysis, and the applicant, that adequate public or private services and resources are available to serve the proposed development. The developer shall assume full responsibility for costs incurred in service extensions or improvements that are required as a result of the proposed project (Policy No. 3).

- The air quality implications of new development will be considered in approval of major developments or area wide land use designations (Policy No. 15).

- The County will promote the preservation of designated historic buildings and the protection of cultural resources which provide ties with the past and constitute a heritage value to residents and visitors (Policy No. 16).

- Maintain the County's inventory of areas of potential cultural and archaeological significance (Implementation G).

McKittrick Rural Community Plan

The McKittrick Rural Community Plan has been developed using the criteria, goals, policies, and implementing ordinances of the Kern County General Plan. Programs and document framework for the McKittrick Plan are the same as those used in the Kern County General Plan.

Buttonwillow Community Development Plan

Open Space

- Encourage continuing dual use of transmission line easements as open space or possibly greenbelt areas (Implementation P. 23).

- Continuance of land use contracts under the provisions of the Williamson Act and maintenance of the A (Exclusive Agricultural) zoning classification for agricultural lands (Implementation, P. 25).

- Encourage continuance of land use contracts under the provisions of the California Land Conservation Act of 1965, as amended, and commonly referred to as “The Williamson Act” (Implementation, P. 30).

Fish and Wildlife

- Encourage programs to locate and determine populations of rare and endangered species (Implementation, P. 85).

BLM - Caliente Resource Management Plan

Resource Policy and Management Guidance

- All lands in the resource area are available for cooperative management agreements with local governments and/or private organizations, provided that proposed management conforms to plan objectives and land use allocations (Policy No. 14).

- BLM shall not jeopardize the continued existence of any plant or animal that is listed as threatened or endangered by the federal or state government, or is either proposed for listing or is a candidate for listing by the federal government (Policy No. 19).

- Efforts to avoid adverse effects to cultural resources will be implemented (Policy No. 26).

- Proposals for future development activities will require additional NEPA analysis (Policy No. 27).

- Protection of paleontological resources will include the assessment of the threat to these resources, along with the implementation of measures designed to mitigate these impacts (Policy No. 27).

- The authorized office may approve the use of motor vehicles on any public lands in the resource area (Policy No. 40).

Resource Guidance and Decisions

- Improve the management efficiency of federal lands, improve resources protection and provide lands for public and private uses through land tenure adjustment (Objective No. 5).
-
- Accommodate requests for land use authorizations while minimizing residual impacts to sensitive resources (Objective No. 6).
-
- Manage public lands to enhance, protect and minimize impacts to sensitive resources, including cultural and paleontological resources; and air and water quality (Objective No. 10).

Resource Area-Wide Allocations

- Unless otherwise identified, all public lands shall be retained in federal ownership (Allocation No. 1).

- Lands where BLM manages the mineral estate only (split estate lands) will be available for exchange through Section 206 of the Federal Land Policy Management Act (FLPMA), on a case by case basis (Allocation No. 6).

- Management Action shall conform to Visual Resource Management (VRM) classifications (Allocation No. 22).

- Activities on public land, including construction, road maintenance and improvement, oil development, pipeline corridors, and powerline corridors must comply with local Air Pollution Control District requirements (Allocation No. 29).

Lokern Area of Critical Environmental Concern (ACEC)

- Cooperative of local landowners and local, state, and federal government agencies to manage the Lokern ACEC as a natural ecosystem for the benefit of threatened and endangered species and their habitats, while recognizing the rights and needs of authorized users of public land.

Management Prescriptions

- This ACEC is open for leasing of oil, gas, and geothermal resources subject to the following stipulation: LSU-Protected Species, LSU-Sensitive Species.

- In evaluating a development application, Kern County will consider impacts on the local school district(s) (Policy No. 8).

- A large part of the short-term threat to public health and local government resources is due to transportation of hazardous waste (as well as hazardous material in general). Disposal capacity will be permitted for waste streams which minimize the volume and distance of transportation (Policy No. 13).

- All generators and processors of hazardous waste are encouraged to develop long-term waste management programs. Large generators of hazardous waste should be encouraged to recycle, treat and detoxify their wastes on site. Many such processes could be implemented in existing industrial map designations, if zoned appropriately (Policy No. 17).

- Include consideration of fiscal impacts of development proposals, so that the character and extent of possible public service or facility deficiencies can be identified during the course of the normal project review process (Implementation B).

- Determine the local cost of facility and infrastructure improvements and expansion which are necessitated by new development of any type and prepare a schedule of charges to be levied on the developer at the time of approval of the Final Map (Implementation E).

- Ensure that the Superintendent of Schools and the respective school boards are informed of development proposals and are afforded the opportunity of evaluating their potential effect on the physical capacity of school facilities and their fiscal impact on locally originating revenue requirements. Their reports on these impacts should be available on a timely fashion prior to final consideration and action by Kern County on a development application (Implementation J).

- Roads and highways utilized for commercial shipping of hazardous waste destined for disposal will be designated as such pursuant to Vehicle Code Sections 31030 et seq. Permit applications shall identify the commercial shipping routes they propose to utilize for particular waste streams (Implementation O).

ENERGY ELEMENT OF THE KERN COUNTY GENERAL PLAN

- The County shall encourage the development and upgrading of transmission lines and associated facilities (e.g., substations) as needed to serve Kern County's residents and access the County's generating resources, insofar as

transmission lines do not create significant environmental or public health and safety hazards (Policy No. 1).

- The County shall review proposed transmission lines and their alignments for conformity with the Land Use Element of the Kern County General Plan (Policy No. 2).

- In reviewing proposals for new transmission lines and/or capacity, the County shall assert a preference for upgrade of existing lines and use of existing corridors where feasible (Policy No. 3).

- The County shall work with other agencies in establishing routes for proposed transmission lines (Policy No. 4).

- The County shall discourage the siting of above ground transmission lines in visually sensitive areas (Policy No. 5).

- The County should encourage new transmission lines to be sited/configured to avoid or minimize collision and electrocution hazards to raptors (Policy No. 6).

- The County should monitor the supply and demand of electrical transmission capacity locally and statewide (Implementation A).

- The County shall continue to maintain provisions in the Zoning Ordinance and update as necessary to provide for transmission line development (Implementation B).

KERN COUNTY ZONING CODE

The Kern County Zoning Ordinance was adopted in July 1997. The ordinance implements the Kern County General Plan by applying development standards and construction requirements on land as it is developed within the unincorporated areas of the county. The following sections of the Kern County Zoning Ordinance apply to the project: Section 19.80.30 of Chapter 19.80 (Special Development Standards – Commercial and Industrial Districts); Sections 19.82.030 and 19.82.090 of Chapter 19.82 (Offstreet Parking - Design and Development Standards); and Section 19.86.060 of Chapter 19.86 (Landscaping Standards – Industrial Uses). The following divisions of the Kern County Zoning Ordinance apply to the project.

ZONING DISTRICTS

EXCLUSIVE AGRICULTURE (A)

Areas that are suitable for agricultural uses. This designation is designed to prevent the encroachment of incompatible uses onto agricultural lands and the premature

conversion of such lands to non-agricultural uses. Permitted uses in the "A" District are limited primarily to agriculture and other activities compatible with agriculture.

LIMITED AGRICULTURE (A-1)

Areas that are suitable for a combination of estate-type residential development, agricultural uses, and other compatible uses.

ESTATE (E)

Areas that are suitable for larger lot residential living environments. Uses are limited to those typical of and compatible with, quiet residential neighborhoods. Uses permitted in the Estate District include agricultural, residential, commercial utility, communication facilities, resource extraction and energy development uses.

LOW-DENSITY RESIDENTIAL (R1)

Areas that are suitable for traditional smaller lot, single-family homes and compatible uses. Maximum density is limited to ten dwelling units per net acre.

MEDIUM INDUSTRIAL (M-2)

Areas suitable for general manufacturing, processing and assembly activities and other compatible uses.

MOBILE HOME COMBINING (MH)

Areas suitable for mobile homes and compatible uses.

GENERAL COMMERCIAL (C-2)

Areas suitable for retail commercial activities including regional shopping, heavy commercial and compatible uses.

AIRPORT APPROACH HEIGHT COMBINING DISTRICT (H)

The purpose of this District is to minimize aviation hazards by limiting the height of buildings, structures, and trees in approach zones around airports. The standards established by the H District shall be in addition to the regulations of the base district with which the H District is combined.

The following tables indicate the Kern County zoning designations of the proposed project and linear corridors.

In addition to the table, the following chapters of the Kern County Zoning Ordinance apply to the project: Section 19.80.30 of Chapter 19.80 (Special Development Standards – Commercial and Industrial Districts); Sections 19.82.030 and 19.82.090 of Chapter 19.82 (Offstreet Parking - Design and Development Standards); and Section 19.86.060 of Chapter 19.86 (Landscaping Standards – Industrial Uses).

Zoning Designations Within The Affected Environment

Location or Linear Facility	Zoning Designations
Elk Hills Power Plant	Limited Agriculture (A-1)
Transmission Line Route 1A	Limited Agriculture (A-1), Estate (E-20, E-10), Low Density Residential Mobile Home (R1-M H), General Commercial (C-2)
Transmission Line Route 1B And 1B Variation	Limited Agriculture (A-1), Exclusive Agriculture (A), Airport Approach Height Combining (H)
Water Supply Line Route 2	Limited Agriculture (A-1), Exclusive Agriculture (A),
Wastewater Supply Line Route 3	Limited Agriculture (A-1), Exclusive Agriculture (A),
Natural Gas Supply Line Route 4	Limited Agriculture (A-1)

SETTING

The proposed project is located in western Kern County, about 25 miles west of Bakersfield, California. The site is located at the intersection of Elk Hills Road and Skyline Road and is characterized by sparse vegetation, and out-of-service tanks and related equipment formerly used for storage and loading of propane, butane, and natural gas liquid products. No permits are required from the Kern County Planning Department for demolition and removal of existing equipment. Please refer to **Waste Management** regarding demolition and removal of existing equipment from the site.

There are no residences, parks, recreational, educational, religious, health care facilities, or commercial uses on the site or within a five-mile radius of the site. The project is located within the administrative boundaries of the Elk Hills Oil and Gas Field (Division 1998). With the exception of Elk Hills Road, the entire 74 square mile Elk Hills Oil and Gas Field is closed to public access (EHPP 1999). EHPP proposes to lease a 12-acre portion of a 640-acre parcel of record (Assessor's Parcel Number 158-090-05) from Occidental of Elk Hills, Inc. (OEHI) for the project site. Please refer to the **Project Description** section for a map showing the regional location of the project.

TRANSMISSION LINES

Transmission Line Route 1A passes through land zoned A-1, E-20, E-10, R1-MH, and C-2. Transmission Line Route 1B (and Route 1B Variation) pass through land zoned A-1, A, and A/H. Under the Kern County Zoning Ordinance, transmission lines are permitted by right in all zones, and require no discretionary permits from the county (Kern County Zoning Ordinance Section 19.08.090). The proposed routes for 1B and 1B Variation are slightly different. Route 1B is parallel to the existing Midway-Taft 115 kV line that runs between the EHPP power plant site and the Midway substation. 1B Variation would replace the existing line and transmission structures (lattice towers and steel poles) with steel poles rather than adding more structures to the landscape. The existing land uses for linear facilities are represented in **Land Use Table 2.** Sensitive receptors along the corridor of

Route 1A include a school (800 feet), a church, and residences (800 -1,200 feet). Please refer to the **Transmission Line Safety and Nuisance** section for a discussion of sensitive receptors near transmission lines.

IMPACTS

DIRECT IMPACTS

DEPARTMENT OF CONSERVATION'S DIVISION OF OIL, GAS, AND GEOTHERMAL RESOURCES

A March 18, 1999 letter from Department of Conservation's Division of Oil, Gas, and Geothermal Resources (Division) states that the proposed project is located within the administrative boundaries of the Elk Hills oil field. Review of the AFC by the Division determined that there are three production wells within proximity to the subject site and numerous plugged and abandoned, idle, producing, and injection wells near the project's proposed transmission line and water pipeline routes. The Division letter also states that Class V wells need to be permitted by both the Division and the Regional Water Quality Control Board (RWQCB). The Division will issue the permit to drill the well, while the RWQCB is required to approve the injection fluid. Please refer to the **Transmission Line Safety and Nuisance** and **Water Quality** sections for a discussion of compliance with LORS, impacts and proposed mitigation in this area.

CONSTRUCTION OF POWER PLANT

The project site is situated on land within the Elk Hills Oil and Gas Field and the land is used for oil and gas production facilities. With the exception of Elk Hills Road, the entire Elk Hills Oil and Gas Field is closed to public access. Therefore, construction of the proposed project would not result in a change in land use in the area. EHPP proposes to lease a 12-acre portion of a 640-acre parcel of record (Assessor's Parcel Number 158-090-05) from Occidental of Elk Hills, Inc. (OEHI). Therefore, certain requirements of the Subdivision Map Act apply to the project. Kern County has stated to EHPP that to fulfill the requirements of the Subdivision Map Act, EHPP file an application for a lot line adjustment, which is a Categorical Exemption under the California Environmental Quality Act (CEQA). At this time, EHPP has not submitted their application for a lot line adjustment to Kern County (Sweeny 1999).

The project site is designated Mineral and Petroleum in the Kern County General Plan. Based on policies in the Kern County General Plan, the project is compatible with the existing land use designation. The site is zoned "A-1" (Limited Agriculture). Power plants are a conditional use in this zone. Therefore, for the project to be consistent with the Kern County Zoning Ordinance, the project must comply with certain conditions of approval, set forth by the Kern County Planning Department, and specified under **MITIGATION** below.

CONSTRUCTION OF TRANSMISSION LINE ROUTES

Fifty-four transmission poles will be used for Transmission Line Route 1A; 68 transmission poles will be used for Transmission Line Route 1B; and 66 transmission poles will be used for Transmission Line Route 1B Variation. Transmission Line Route 1A passes through land zoned A-1, E-20, E-10, R1-MH, and C-2. Transmission Line Route 1B (and Route 1B Variation) pass through land zoned A-1, A-1/H, A, and A/H. Under the Kern County Zoning Ordinance, transmission lines are permitted by right in all zones and require no discretionary permits from the county. As stated above, Transmission Line Route 1B passes through an area zoned A-1/H and A/H (Airport Approach Height Combining District). The purpose of this combining district is to minimize aviation hazards by limiting the height of trees and structures in approach zones around airports. Permitted uses in an H District are those uses permitted by the base district with which the H District is combined, in this case A-1 (Limited Agriculture) and A (Exclusive Agriculture).

Currently, there are three existing concrete transmission line poles (71 feet in height) and one existing lattice tower (105 feet in height) in the Airport Approach Height Combining District. All four existing structures will be removed and replaced with four concrete poles, between 100 and 130 feet in height. Because the replacement pole height is potentially greater than the tallest existing lattice height, EHPP is required to seek approval from Federal Aviation Administration (FAA) for Federal Air Regulations Part 77 for replacement of the structures. EHPP will also submit a letter from FAA to Kern County which states that the proposed development does not constitute a hazard to air traffic and does not violate any federal regulations. The letter shall include any special conditions imposed by FAA. In addition to the letter, EHPP will submit to Kern County a site development plan indicating among other requirements, the elevations of all permanent structures. At this time, Energy Commission staff has not received confirmation from FAA or Kern County regarding compliance with Regulation 77.

AGRICULTURAL RESOURCES

Information contained in the AFC states that Transmission Line Route 1A will not cross agricultural lands. This route is entirely within the Elk Hills Oil and Gas Field, and the area is used for oil and gas extraction. The last segment of Transmission Line Route 1B (about 3.5 miles) is within an existing transmission right-of-way (the undeveloped shoulder of Wasco Way) and adjacent to agricultural lands. The total number of acres taken out of production due to construction of the route is 0.01. This land is considered Prime agricultural land as defined by the California Department of Conservation (EHPP 1999). No other agricultural lands affected by construction of the transmission line routes are considered Prime, Unique, or Farmland of Statewide Importance as defined by the California Department of Conservation (EHPP 1999). As stated above, transmission lines in the A and A-1 districts are permitted by right, and require no discretionary permits from the county. Therefore, because of the minimal amount of agricultural land affected by the construction of the transmission line routes, Energy Commission staff does not consider this an adverse or significant impact to agricultural use.

CUMULATIVE IMPACTS

In general, Energy Commission staff considers conversion of agricultural lands to non-agricultural uses, and changes in land use patterns to be significant cumulative impacts.

The project is located within the administrative boundaries of the Elk Hills Oil and Gas Field (Division 1998). With the exception of Elk Hills Road, the entire 74 square mile Elk Hills Oil and Gas Field is closed to public access (EHPP 1999). Numerous petroleum recovery and storage facilities, electric and petroleum transmission facilities, and access roads characterize the project area. In general, existing land use in western Kern County is characterized by oil fields and natural resource development, with land designated and zoned for agricultural use, grazing, resource extraction, and energy development uses. In addition to the proposed project, other regional projects include La Paloma and Sunrise. Because La Paloma and Elk Hills are located within existing oil fields, no conversion of agricultural lands or changes in land use patterns are expected to occur as a result of project construction and operation. In addition, staff considers Route 1B Variation to be environmentally superior to Route 1B because it would replace existing towers with poles and reduce the number of transmission structures in the landscape. For these reasons, Energy Commission staff finds that the La Paloma, Sunrise, and Elk Hills projects will not have a significant adverse cumulative impact on land use in western Kern County.

CONSISTENCY WITH LAND USE PLANS, POLICIES, AND REGULATIONS

The project site is designated Mineral Petroleum in the Kern County General Plan. Based on policies in the Kern County General Plan, the project is compatible with this land use designation. The site is zoned Limited Agriculture (A-1). The proposed transmission line route will traverse lands zoned Exclusive Agriculture and Limited Agriculture. The Kern County Zoning Ordinance states that transmission lines, resource extraction, and energy development uses in these zones are permitted by right, and require no discretionary permits from the county. However, power plants are a conditional use in this zone. Therefore, to satisfy certain provisions of Chapters 19.12, 19.86, and 19.82 of the Kern County Zoning Ordinance, Energy Commission staff has required EHPP to prepare a site development plan that includes provisions to satisfy the following fourteen requirements of the Kern County Zoning Ordinance (please refer to **MITIGATION**, below).

In addition, EHPP proposes to lease a 12-acre portion of a 640-acre parcel of record (Assessor's Parcel Number 158-090-05) from Occidental of Elk Hills, Inc. (OEHI). Therefore, certain requirements of the Subdivision Map Act apply to the project. Kern County has stated to EHPP that to fulfill the requirements of the Subdivision Map Act and the Kern County Land Division Ordinance, EHPP file an application for a lot line adjustment, which is a Categorical Exemption under the California Environmental Quality Act (CEQA).

As stated above, EHPP is required to seek approval from FAA for Federal Air Regulations Part 77 for replacement of the existing poles and lattice tower in the Airport Approach Height Combining District. At this time, Energy Commission staff has not received confirmation from EHPP regarding compliance with FAA Regulations Part 77.

Energy Commission staff finds that with eventual approval of the lot line adjustment, compliance with FAA Regulations Part 77, and proposed condition of certification **LAND-1**, EHPP will comply with all federal, state, and local applicable laws, ordinances, regulations, standards, plans and policies. As stated above, EHPP currently has not filed for a lot line adjustment with Kern County. EHPP has filed with the FAA but the status of that application is unknown to Energy Commission staff at this time.

FACILITY CLOSURE

PLANNED CLOSURE

Planned closure occurs at the end of a project's life, 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. Facility closure would have to comply with all applicable policies in the Kern County General Plan and ordinances in effect at the time of closure.

UNEXPECTED TEMPORARY CLOSURE

This unplanned 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.

UNEXPECTED PERMANENT CLOSURE

This unplanned closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unexpected closure where the owner remains accountable for implementing the on-site contingency plan. It can also include unexpected closure where the project owner is unable to implement the contingency plan, and the project is essentially abandoned.

In February 1997, the Compliance Office of the Energy Commission conducted a Plant Closure Survey. The survey was sent to various local and state agencies to determine whether these agencies had any regulations or compliance procedures regarding the closure of power plants and other large industrial facilities. At that time, Kern County responded that they had no requirements for a closure plan and no requirements for site restoration. At present, Kern County has no specific requirements regarding closure and site restoration. However, they have requested that any closure plans required by the Energy Commission be subject to an advisory review by Kern County. In that way, Kern County could provide site/project specific comments at that time (Rickels 1999).

MITIGATION

EHPP has proposed four mitigation measures that they will implement for the proposed project to avoid or minimize land use impacts associated with the construction and operation of the generating plant, transmission line route, and offsite pipeline facilities. Staff has incorporated EHPP's four mitigation measures (listed below) into the proposed conditions of certification as **LAND-1**. These conditions will be part of the site development plan that EHPP submits to the Kern County Planning Department.

- Comply with regulatory agency permits and requirements concerning land use issues.
- Develop small-scale construction scheduling where appropriate to avoid conflicts with agricultural operations.
- Where applicable, place tower structures to minimize direct adverse effects on agricultural areas (including row and/or field crops) and other important land use features. Time construction activities to avoid impacts to cultivated areas to the extent practical.
- If agricultural facilities (e.g. irrigation systems, fences, and gates) are damaged, repair or replace these facilities.

Kern County normally would require a conditional use permit for this type of project. However, local agency requirements are superseded by Energy Commission action on certification. Therefore, staff has required EHPP to prepare a development plan that complies with Kern County's zoning conditions of approval (**LAND-1**). Kern County's zoning conditions of approval are stated below. Energy Commission staff (Land Use, Water and Soils, Worker Safety, Public Health, Air Quality, Visual, Facility Design) have analyzed the project's need to comply with the following conditions for LORS compliance. Energy Commission staff whose technical areas are affected by the conditions are indicated in parentheses (). LORS compliance is indicated in those technical sections and cross-referenced to the Land Use section.

1. Prior to the issuance of any building or grading permits, the method of water supply and sewage disposal shall be as required by the Kern County Environmental Health Services Department (Water, Public Health).

2. Fire protection equipment, access and fire protection facilities shall be as required by the Kern County Fire Department (Worker Safety, Facility Design).

3. Prior to the issuance of any building or grading permits, a plan for the disposal of drainage waters originating on site and from adjacent road rights-of-way shall be reviewed by the Kern County Engineering and Survey Services Department/Floodplain Management Section, if required and commented on. Easements or grant deeds shall be given to the County of Kern for drainage purposes or access thereto, as necessary (Facility Design).

4. The development shall comply with any requirements of the San Joaquin Valley Unified Air Pollution Control District (Air Quality).

5. The applicant shall comply with requirements of the Subdivision Map Act and Kern County Land Division Ordinance (Land Use).

6. The property owner shall record an irrevocable offer of dedication of road right-of-way to the County of Kern of all subject property within 30 feet of the centerline of Elk Hills Road, including a 20 foot by 20 foot corner cutoff at intersecting streets, for local street alignment purposes. Prior to recordation, said offer of dedication shall be reviewed by the Rights-of-Way Section of the Kern County Roads Department (Land Use).

7. All of the subject property within 30 feet of the centerline of Elk Hills Road shall be improved to Type B Subdivision Standards, local street amended to provide base and pavement tie to existing pavement if constructed to secondary highway or major highway standards. Existing pavement shall be saw cut at match point (Land Use).

8. All obstructions, including utility poles and lines, trees, pole signs, or similar obstructions, shall be removed from the ultimate road rights-of-way in accordance with Section 18.55.030 of the Land Division Ordinance. Compliance with this requirement is the responsibility of the applicant and may result in significant financial expenditures (Land Use).

9. All water storage and pressure tanks shall be painted an earthen hue color (Visual Resources).

10. A minimum of 13 on-site parking spaces shall be provided (Land Use).

11. All vehicle parking and maneuvering areas and access roads shall be surfaced with a minimum of two inches of Asphalt Concrete paving or material of higher quality (Land Use).

12. All vehicle parking and maneuvering areas shall be surfaced with one of the following: three inches of decomposed granite, three inches of compacted rock dust, three inches of gravel, or three inches of a material of a higher quality (Land Use).

13. Vehicle parking spaces shall be 9 feet by 20 feet or larger in size and shall be designated by white painted stripes, except as provided in Sections 19.82.030 and 19.82.040 of the Zoning Ordinance (Land Use).

14. Parking lot or site illumination shall be directed away from adjoining properties and public roads (Visual Resources).

15. A comprehensive landscaping and maintenance irrigation plan shall be approved by the Planning Director in accordance with the requirements of

Chapter 19.86 of the Zoning Ordinance. A minimum of five percent of the total developed area shall be landscaped and continuously maintained in good condition. If the required parking area contains more than ten spaces, a minimum of 5 percent of the interior parking area shall be landscaped, with trees planted at a ratio of one tree per ten spaces. Parking area landscaping, if necessary, shall be in accordance with Section 19.82.090 of the Zoning Ordinance and may be used in the calculation of total landscaping requirements. Landscaping shall be installed or bonded for prior to occupancy of the building or site (Land Use).

16. During all on-site grading and construction activities, adequate measures shall be implemented to control fugitive dust (Air Quality).

17. All trash receptacles shall be screened in such a manner so that they are not visually obtrusive from any off-site location (Visual Resources).

18. The areas devoted to outside storage shall be treated with a dust binder or other dust control measure, as approved by the Director of the Kern County Planning Department. Screening, if required by the base district regulations, shall also be provided (Land Use).

19. All signs shall be approved by the Director of the Kern County Planning Department prior to installation (Visual Resources).

CONCLUSION AND RECOMMENDATION

Energy Commission staff's analysis indicates that the project by itself, and cumulatively, will have no land use impacts that cannot be mitigated to a level below significance. If staff's conditions of certification are implemented, the project will comply with all applicable laws, ordinances, regulations, standards, plans and policies. If the Commission certifies the proposed project, staff recommends that it adopt the following condition of certification.

PROPOSED CONDITIONS OF CERTIFICATION

LAND USE-1 Prior to the start of construction, the project owner shall submit a site development plan for the project to Kern County for their review and comment, and to the California Energy Commission Compliance Project Manager (CPM) for review and approval. The site development plan shall comply with all applicable provisions of Chapters 9.12, 19.86, and 19.82 of the Kern County Zoning Ordinance. The project owner shall provide a letter of comment from the Kern County Planning Director stating that the project is consistent with the provisions of the Kern County General Plan and Zoning Ordinance.

Protocol: The project owner shall submit to the CPM for review and approval a site development plan, including a landscaping plan. The project owner shall submit a letter from the Kern County Planning Director stating that the site development plan conforms to Kern County's Zoning Code and

has been approved by the County. If the CPM notifies the project owner that revisions of the plan are needed before the CPM will approve the plan, the project owner shall prepare and submit to the CPM a revised plan. The landscaping shall not be planted before the plan is approved. The project owner shall notify the CPM when the landscaping has been planted and is ready for inspection.

Verification: At least 60 days prior to the start of any ground disturbance related to construction, the project owner shall submit the proposed site development plan and landscape plan and a copy of the letter of comment from the Kern County Planning Director to the CPM for review and approval. The project owner shall submit any required revisions within 30 days of notification by the CPM. The project owner shall complete installation of the landscaping by the end of the first planting season following first electricity generation. The project owner shall notify the CPM within seven days after the landscaping is planted that the landscaping is ready for inspection.

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TRAFFIC AND TRANSPORTATION

Eric Knight

INTRODUCTION

The Traffic and Transportation section of the Preliminary Staff Assessment (PSA) addresses the extent to which the Elk Hills Power Project (EHPP) may impact the transportation system within the vicinity of its proposed location. The analysis identifies the regional and local traffic and transportation setting for the proposed project, the anticipated transportation impacts resulting from the project and their likely significance, proposed and recommended mitigation measures to eliminate or reduce those impacts, and measures to monitor the compliance and effectiveness of those mitigation measures.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

FEDERAL

The federal government addresses transportation of goods and materials in Title 49, Code of Federal Regulations:

- Title 49, Code of Federal Regulations, sections 171-177, governs the transportation of hazardous materials, the types of materials defined as hazardous, and the marking of the transportation vehicles.
- Title 49, Code of Federal Regulations, sections 350-399, and Appendices A-G, Federal Motor Carrier Regulations, addresses safety considerations for the transport of goods, materials and substances over public highways.

STATE

The California Vehicle Code and the Streets and Highways Code contain requirements applicable to the licensing of drivers and vehicles, the transportation of hazardous materials and right-of-way. In addition, the California Health and Safety Code addresses the transportation of hazardous materials. Specifically, these codes include:

- California Vehicle Code, section 353 defines hazardous materials.
- California Vehicle Code, sections 31303-31309, regulates the highway transportation of hazardous materials, the routes used, and restrictions thereon.
- California Vehicle Code, section 31030, requires that permit applications shall identify the commercial shipping routes they propose to utilize for particular waste streams.
- California Vehicle Code, sections 31600-31620, regulates the transportation of explosive materials.

- California Vehicle Code, sections 32000-32053, regulates the licensing of carriers of hazardous materials and includes noticing requirements.
- California Vehicle Code, sections 32100-32109, establishes special requirements for the transportation of inhalation hazards and poisonous gases.
- California Vehicle Code, sections 34000-34121, establishes special requirements for the transportation of flammable and combustible liquids over public roads and highways.
- California Vehicle Code, sections 34500, 34501, 34501.2, 34501.4, 34501.10, 34505.5-7, 34507.5 and 34510-11, regulate the safe operation of vehicles, including those which are used for the transportation of hazardous materials.
- California Vehicle Code, sections 2500-2505, authorize the issuance of licenses by the Commissioner of the California Highway Patrol for the transportation of hazardous materials including explosives.
- California Vehicle Code, sections 13369, 15275, and 15278, address the licensing of drivers and the classifications of licenses required for the operation of particular types of vehicles. In addition, it requires the possession of certificates permitting the operation of vehicles transporting hazardous materials.
- California Streets and Highways Code, sections 117 and 660-72, and California Vehicle Code 35780 et seq., require permits for the transportation of oversized loads on county roads.
- California Streets and Highways Code, sections 660, 670, 1450, 1460 et seq., 1470, and 1480, regulate right-of-way encroachment and the granting of permits for the encroachment on state and county roads.
- California Health and Safety Code, sections 25160 et seq., address the safe transport of hazardous materials.

LOCAL

KERN COUNTY

The Circulation Element of the Kern County General Plan sets up local goals and guiding policies about building transportation improvements. It introduces planning tools essential for achieving the local transportation goals and policies (Kern County, 1992). Relevant goals and policies include, in part, the following:

PRIVATE DEVELOPMENT ACCESS TO EXISTING ROADWAY NETWORK

As a condition of private development approval, developers shall build roads needed to access the existing road network. Developers shall build these roads to County standards (Policy No. 1).

GROWTH BEYOND 2010

The County should monitor traffic volumes and patterns on County major highways (Policy No. 1).

Development applications must demonstrate that sufficient transportation capacity is available to serve the proposed project at Level of Service "D" (LOS D) or better (Policy No. 2).

TRUCKS ON HIGHWAYS

Make the California Department of Transportation (Caltrans) aware of heavy truck activity on Kern County's roads (Policy No. 1).

Start a program that monitors truck traffic operations (Policy No. 2).

Promote a monitoring program of truck lane pavement condition (Policy No. 3).

TRUCK ROUTES

The County's Transportation Management Department should oversee truck travel patterns and be aware of locations where heavy trucks traverse residential areas (Policy No. 1).

TRANSPORTATION OF HAZARDOUS MATERIALS

State maintained highways are acceptable as commercial hazardous waste transportation routes (Policy No. 1).

Kern County and affected cities should reduce use of County maintained roads and city maintained streets for transportation of hazardous materials (Policy No. 3).

Restrict commercial transportation of hazardous materials in accordance with Vehicle Code section 31303. The Circulation Element charts routes where commercial hazardous materials shipments can go (Policy No. 4).

DAMAGED ROAD PAVEMENT

The County shall continue to maintain pavement conditions and check operating conditions by collection and review of traffic flow and accident data to rate the circulation system (Policy No. 1).

SETTING

REGIONAL DESCRIPTION

FREEWAYS AND HIGHWAYS

The project site is located about 25 miles west of Bakersfield, California, and about 10 miles north of the community of Taft. The project area is primarily served by: Interstate 5 and State Route (SR) 99, which are four-lane divided highways (oriented north/south); and State Routes 119, 58 and 166, which are two-lane highways (oriented east/west). Please refer to **TRAFFIC AND TRANSPORTATION Figure 1**.

RAILROADS

The Burlington-Northern & Santa Fe (BN&SF) and Union Pacific Railroads provide rail service to the Bakersfield area. There are four rail line corridors within the region surrounding the project: the BN&SF Railroad main line; the Southern Pacific main line (Union Pacific); the Southern Pacific Buttonwillow Branch line (Union Pacific); and the BN&SF Sunset Pacific Branch line currently operated by Union Pacific (EHPP 1999a, AFC page 5.11-6). Please refer to **TRAFFIC AND TRANSPORTATION Figure 1**.

SITE AND VICINITY DESCRIPTION

The power plant site is adjacent to Elk Hills Road, a two-lane local road maintained by Kern County that runs north/south through the Elk Hills Oil and Gas Field. Access to the site from the south will occur from SR 119 to Elk Hills Road and then north to the project site north of Skyline Road (a private road that serves the Elk Hills Oil and Gas Field). To provide access to the power plant site from Elk Hills Road, the applicant proposes to pave an existing dirt road that lies about 1,100 feet north of Skyline Road (see Application for Certification (AFC) Figure 3.2-2). The site access road will be paved with asphalt and will be 30 feet wide and 600 feet long, extending from a new controlled-access gate off Elk Hills Road. The plant's administration building parking lot and road encircling the power blocks will also be asphalt paved. Other roads within the plant site will be surfaced with gravel (EHPP 1999a, AFC page 3-51 and 5.11-6).

LINEAR FACILITIES

Potentially affected roadways are those adjacent to or crossed by the proposed project linear components (i.e., transmission line, natural gas pipeline, and water supply and wastewater pipelines).

TRANSMISSION LINE ROUTE 1A

Transmission line alternative Route 1A has a total length of 9.0 miles. Route 1A originates at the power plant switchyard and extends 0.2 miles northwest to intercept the route of the PG&E 115 kV Midway-Taft transmission line. Route 1A

TRAFFIC AND TRANSPORTATION Figure 1
Regional Transportation Setting

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will parallel the Midway-Taft line for 1.8 miles. This segment of Route 1A crosses Elk Hills Road. Route 1A then heads 7 miles to the east towards the town of Tupman, running along dirt roads within the Elk Hills Oil and Gas Field. Near the terminus of this segment, Route 1A crosses Tupman Road. Along this segment of Route 1A, spur roads will be constructed from existing oil field roads to provide access to the transmission line. These spur roads will be kept to a minimum (EHPP 1999, AFC page 3-53).

Transmission Line Route 1B (and Route 1B Variation)

Transmission line alternative Route 1B has a total length of 8.6 miles. From the plant switchyard to milepost 2.0 (see AFC Figure 3.2-1), Route 1B follows the same routing as alternative Route 1A. Route 1B would then extend 2.3 miles north-northwest, running parallel to the Midway-Taft transmission line. Spurs from existing oil field roads will provide access to the transmission line along this segment of Route 1B. Route 1B then extends 4.3 miles north to the Midway substation, continuing parallel to the Midway-Taft line and running along the eastern side of Wasco Way within the road right-of-way (EHPP 1999, AFC page 3-59). A variation on Route 1B would replace the Midway-Taft line from milepost (MP) 4.3 to MP 8.6 and be located on the western side of Wasco Way (EHPP 1999c, data response #42). Roadways crossed by Route 1B include Elk Hills Road, Stockdale Highway (a county road), Bright Road and SR 58.

Natural Gas Pipeline

Natural gas will be delivered to the power plant site via a new 2,500-foot underground pipeline. The route of the new supply pipeline lies entirely within the Elk Hills Oil and Gas Field and would cross two oil field access roads (EHPP 1999a, AFC page 3-65 and 5.11-10).

Water Supply Pipeline

Water for the EHPP will be delivered via a new 9.8-mile water supply pipeline extending from the West Kern Water District (WKWD) facilities located east of the power plant site and adjacent to SR 119. The water supply pipeline will begin as an underground pipeline, travelling alongside existing underground pipelines for 4.1 miles. For the remaining 5.7 miles to the plant site, the pipeline will be constructed above ground but will pass underground at any road crossings. Along its route the water supply pipeline will cross a number of oil service roads, Tupman Road, Elk Hills Road, and SR 119. The crossings at SR 119, Tupman Road, and Elk Hills Road will be constructed by drilling underneath these roadways (EHPP 1999a, AFC page 3-65 and 5.11-9).

Wastewater Pipeline

Wastewater discharge for the EHPP will be sent via a new 4.4-mile pipeline to new disposal wells south of the power plant site. The wastewater pipeline will be constructed above ground but will pass underneath Elk Hills Road, Skyline Road and other oil field access roads. After crossing Skyline Road, the pipeline will travel south to the disposal wells alongside an existing aboveground pipeline and generally parallel to Elk Hills Road (EHPP 1999a, AFC page 3-66 and 5.11-10).

EXISTING TRAFFIC CONDITIONS

When assessing a project's potential impact on the local transportation system, levels of service measurements are the foundation for analytic evaluations. Essentially, levels of service (LOS) measurements represent the flow of traffic. In general, LOS ranges from A, free flowing traffic, to F, which is heavily congested with stoppage of the flow. A threshold of LOS D is the minimum standard accepted by both Caltrans and Kern County.

Data pertaining to the existing traffic characteristics on highways potentially affected by the proposed project are presented in **TRAFFIC AND TRANSPORTATION Table 1**. This information includes annual average daily traffic (AADT), peak hour traffic, average daily truck traffic, highway capacity, and LOS. Highways potentially affected by the project are currently operating at acceptable levels of service. The highways serving the project area are characterized by a significant amount of truck traffic due to local agricultural and oil-related industries (EHPP 1999a, AFC page 5.11-7). As shown in Table 1, truck traffic on SR 119, the principal highway serving the EHPP site, ranges from 19 to 22 percent.

The AFC provides accident data from a 1998 Caltrans report, which shows that highways in the project area have accident rates that typically range from 0.26 to 5.03 accidents per million vehicle miles traveled. Statewide average accident rates for similar transportation facilities range from a low of 0.71 for freeways to a high of 2.27 for conventional multi-lane facilities. Roadway segments with accident rates higher than statewide averages include the SR 119 junction with SR 99 (4.11) and the SR 43 junction with SR 58 (2.90) (EHPP 1999a, AFC page 5.11-9). In a data request to the applicant, staff requested clarification for the accident rate provided for the SR 43/58 junction since SR 58 joins SR 43 at two locations (please refer to **TRAFFIC AND TRANSPORTATION Figure 2**). The 2.90 accident rate actually applies to a 0.6-mile segment of SR 43, north of the intersection with I-5. The accident rates for the intersections of SR 43 and SR 58 are 0.7 at the north intersection and 0.55 at the south intersection (EHPP 1999f, data response #78).

Data pertaining to existing traffic conditions on Elk Hills Road and other local roadways potentially affected by the project are presented in **TRAFFIC AND TRANSPORTATION Table 2**. The information includes AADT, capacity, and LOS. Since LOS data was not available from Kern County, it was calculated by dividing the volume of traffic (AADT) by the capacity of the roadway, a standard acceptable practice as presented in the Kern County General Plan Circulation Element. As determined by the volume to capacity ratio (V/C), LOS on local roadways serving the project site is characterized by free flowing (LOS A) operating conditions. Truck traffic counts on local roadways also is not available from Kern County. Traffic in the project vicinity is generally characterized by a large ratio of trucks to cars because the EHPP site is located within the Elk Hills Oil and Gas Field. It is assumed that 20 to 40 percent of traffic along Elk Hills Road are trucks (EHPP 1999, AFC page 5.11-7). Kern County Roads Department agreed that this estimate is accurate (Hayslett 1999a, pers. comm.).

TRAFFIC AND TRANSPORTATION Table 1

Existing Traffic Characteristics on Highways in the Project Area

Highway/ Mile Post	Location	Annual Average Daily Traffic[1]	Peak Hour Traffic[1]	Annual Average Daily Truck Traffic[2]	Percent of Truck Traffic[3]	Highway Capacity[4]	LOS[1]
State Route 33							
17.89	Jct. Rte. 119 East	8,500	830	2,210	26	1,410	D
33.45	Jct. Rte. 58 West	2,700	410	1,061	39	1,380	C
34.29	Jct. Rte. 58 East	2,700	440	1,061[5]	39	1,380	C
State Route 58							
31.46	SB I-5 Ramp	5,300	750	1,705[5]	32	1,680	B
39.96	Jct. Rte 43 North	5,500	560	1,705	31	1,710	B
State Route 119							
0.00	Jct. Rte. 33	3,750	480	712	19	3,720	D
18.17	Jct. Rte 43 North	8,400	1,050	1,848	22	1,860	B
19.77	Jct. I-5	5,800	700	1,102	19	1,860	B
31.28	Jct. Rte. 99	9,900	960	2,178	22	1,860	D
Interstate 5							
38.79	Jct. Rte. 119	22,400	3,350	4,256	19	3,560	B
41.19	Jct. Rte 43	22,500	2,850	4,725	21	3,560	B
52.15	Jct. Rte 58	23,500	2,750	7,520	32	3,560	B
State Route 43							
0.11	Jct. Rte. 119	3,800	420	1,102	29	1,700	B
1.90	Jct. I-5	3,800	420	1,102	29	1,700	B
8.11	Jct. Rte. 58 East	3,100	340	899	29	1,740	B
9.16	Jct. Rte. 58 West	9,600	1,150	2,688[5]	28	1,740	B
State Route 99							
17.50	Jct. Rte. 119 West	32,500	3,050	8,125	25	3,560	B
23.51	Jct. Rte. 58 East	99,000	9,300	25,760	26	3,520	B
25.65	Jct. Rte. 58 West	112,000	11,600	25,760	23	3,520	B

SOURCE: EHPP 1999a, AFC Table 5.11-2

[1] Source: 1996 Traffic Volumes on the California State Highway System (Caltrans 1998).

[2] Source: 1996 Truck Volumes on the California State Highway System (Caltrans 1998).

[3] Source: Percentages calculated using average daily truck traffic as a percentage of AADT.

[4] Vehicles per hour per direction. Source: 1996 Traffic Volumes on the California State Highway System (Caltrans 1998).

[5] Data not available from Caltrans. Extrapolated from data on adjacent highway segments.

TRAFFIC AND TRANSPORTATION Table 2
Existing Traffic Characteristics on Local Roads in the Project Area

Roadway	Location	Annual Average Daily Traffic[1]	Annual Peak Hour Traffic[2]	Capacity (C)	LOS[3] (V/C)
Elk Hills Road	North of SR 119	740	74	8,000	A
Elk Hills Road	South of Skyline Road	900	90	8,000	A
Tupman Road	Northeast of SR 119	360	36	8,000	A
Wasco Way	South of SR 58	1,000	100	8,000	A
Valley West Road	East of Elk Hills Road	500	50		A

SOURCE: EHPP 1999a, AFC Table 5.11-3
[1] Source: Kern County Roads Department, 1999.
[2] Based on 10 percent of AADT
[3] LOS calculated by dividing volume (V) by capacity (C); and using the V/C ratio.

IMPACTS

According to Appendix G of the California Environmental Quality Act (CEQA), a project may have a significant effect on traffic and transportation if the project will:

- 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 for roads or highways.
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections).
- Result in inadequate parking capacity.

POWER PLANT

CONSTRUCTION PHASE

COMMUTE TRAFFIC

Construction of the EHPP will occur over an estimated 15-month period and will require a total construction workforce of 242 workers on average per month, assuming a single shift and a 40-hour workweek. During the peak construction period (the 8th month in the construction schedule) an estimated 350 construction workers will be required for the project (EHPP 1999a, AFC page 5.11-11 and AFC Table 5.8-5). The traffic analysis presented in the AFC assumes a worst-case scenario of each construction worker driving a separate vehicle to the project site, making two trips per day (one round trip from home to the site and back). Therefore, construction of the EHPP could result in a total of approximately 480 vehicle trips per day on average, and about 700 vehicle trips per day during peak construction (EHPP 1999a, AFC page 5.11-16).

From statistics on the distribution of labor and population within Kern County, the AFC makes assumptions about the origins of construction workforce commute trips (EHPP 1999a, AFC page 5.11-16). **TRAFFIC AND TRANSPORTATION Table 3** presents vehicle trip generation and the distribution of workers commuting to and from the EHPP site from the various cities and towns in Kern County. As shown in the table, nearly two-thirds of the commute traffic is expected to originate in Bakersfield.

TRAFFIC AND TRANSPORTATION Table 3
EHPP Construction Vehicle Trip Generation and Distribution

Origin of Trip Distribution To/From EHPP Site	**Average Workforce**	**Average Vehicle Trips**	**Peak Workforce**	**Peak Vehicle Trips**
Bakersfield	152	304	221	442
Taft/Ford/Maricopa	13	26	20	40
Shafter/Wasco	11	22	15	30
Other Areas of Kern County/Southern California	66	132	96	192
TOTAL	242	484	352	704

SOURCE: EHPP 1999f, data response #63-65

The AFC also makes assumptions about preferred travel routes for construction workers commuting to the project site (EHPP 1999a, AFC pages 5.11-16 – 17). For instance, it is assumed that workers commuting from Bakersfield will primarily travel on SR 99 to SR 119 to Elk Hills Road. Using these travel patterns, the increase in traffic on highways in the project area during construction is presented in **TRAFFIC AND TRANSPORTATION Table 4** and illustrated in **TRAFFIC AND TRANSPORTATON Figure 2**. As shown in Table 4, except for one section of SR 119, daily and peak hour LOS for highways in the project area is not expected to be significantly affected as a result of construction workers commuting to and from the project site. The traffic analysis provided by the applicant determined that construction traffic would significantly impact the SR 119 junction with SR 43, which would drop from LOS D to E during the peak hour. To mitigate this impact, the applicant stated that carpooling by approximately 55 percent of workers would be necessary during the peak construction period, and that this level of carpooling is reasonable for projects such as EHPP (EHPP 1999f, data response #71).

Staff requested that Caltrans review the traffic analysis for the EHPP to assist staff in determining the most appropriate measure to mitigate the adverse impact to the SR 119/SR 43 junction. On October 20, 1999 staff received a letter from Caltrans which states their disagreement with the applicant's conclusion that it is reasonable

TRAFFIC AND TRANSPORTATION Table 4
Distribution of Construction Workforce Traffic on Highways

TRAFFIC AND TRANSPORTATION Figure 2
Distribution of Construction Workforce Traffic on Highways and Local Roads

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to expect 55 percent of the construction workers to carpool, and that this level of carpooling would be difficult to monitor and ensure (Caltrans, 1999a). The Kern Council of Governments also expressed doubts about this level of carpooling, stating in a letter to Energy Commission staff that "without a concerted effort and employee inducements, a 50 percent carpool usage would appear to be unrealistic" (Kern COG, 1999).

After further consultation with Caltrans staff, it was determined that the traffic data provided by the applicant for SR 119 at SR 43 and SR 119 at SR 99 was not based upon the most recent traffic counts. The peak hour traffic counts provided by the applicant for existing conditions at the SR 119/43 junction were higher than the actual measured counts taken by Caltrans in July 1997 (Barnes, pers. comm., 1999). Using the most recent traffic data, peak hour LOS at the SR 119/43 junction will not be significantly affected by the project during the peak construction period. Since LOS will remain at its current LOS D, Caltrans will not require any mitigation at the SR 119/43 junction (Caltrans, 1999b). However, because peak hour traffic counts provided by the applicant for the SR 119/99 junction were lower than the actual measured counts, it was determined that the project will have a significant impact on the SR 119/99 junction during the construction period. The project will cause LOS at the SR 119/99 junction to drop from D to E during the peak hour.

According to Caltrans, a traffic signal is already planned and funded for the SR 119/99 junction, and therefore Caltrans would not require Elk Hills to fund improvements at this junction (Caltrans, 1999b). However, it is not known when the signal will be constructed. If the traffic signal is not in place prior to the start of construction of the EHPP, Caltrans recommends that the applicant provide traffic control at the SR 119/99 junction through the use of a policeman/flagman. The use of a policeman/flagman will require that the project owner submit a Traffic Control Plan to Caltrans prior to issuance of a permit. Staff agrees that this is the most appropriate mitigation measure to mitigate the temporary impacts to this junction and has proposed a condition of certification requiring the provision of traffic control at the SR 119/99 junction.

Traffic increases during the construction period to roadway segments with accident rates higher than the statewide average would be minimal. At the junction of SR 119 with SR 99, traffic would increase by 354 vehicles (3.6 percent of AADT) during the peak construction period. At the junction of SR 43 with SR 58, traffic would increase by 38 vehicles (1.2 percent of AADT) during peak construction.

The impact of construction-related traffic on the local roads that provide access to the project site is presented in **TRAFFIC AND TRANSPORTATION Table 5**, as well as illustrated in **TRAFFIC AND TRANSPORTATION Figure 2**. As shown in Table 5, Elk Hills Road will be the most heavily affected local road, with a 64 percent increase in vehicle trips per day north of SR 119 during the peak construction period. As shown in Table 2, Elk Hills Road and the other local roads potentially affected by the project have a design capacity of 8,000 vehicles per day. Because existing average daily traffic is minimal (360 to 1,000 average daily trips), these

TRAFFIC AND TRANSPORTATION Table 5
Distribution of Construction Workforce Traffic on Local Roads

roads will be able to accommodate the increased traffic without reducing their LOS to a significant adverse level (i.e., LOS E or F).

The proposed site access road may have a significant impact because it could potentially create a traffic hazard on Elk Hills Road. According to Mr. Barry Hayslett with Kern County Roads Department, the proposed location of the access road (about 1,100 feet north of Skyline Road) would not be acceptable because it would be in close proximity to the crest of the hill and would not provide safe and adequate site distance (Hayslett 1999a, pers. comm.). This issue is of particular concern to staff because truck traffic on Elk Hills Road has been estimated as high as 40 percent, and operation of the power plant will require 1 truck delivery of anhydrous ammonia (8,000 gallons) every three weeks. To provide safe access to the site during both construction and operation of the project, Mr. Hayslett suggested that the applicant use the existing access road at Skyline Road. It is staff's understanding that the applicant has recently been out to the project site with Kern County Roads Department staff, and an alternative site access road that would branch off Skyline Road instead of directly off Elk Hills Road has been identified. Staff further understands that the applicant will be submitting a supplemental filing that will describe the new access road.

TRUCK TRAFFIC

Construction materials, such as concrete, wire, pipe, cable, and steel will be delivered to the site by truck. Deliveries will include hazardous materials to be used during construction, such as gasoline, diesel fuel, and oil and lubricants (see AFC Table 5.11-13). Whenever possible, the applicant will schedule deliveries of construction materials between the hours of 6:00 a.m. and 6:00 p.m. on weekdays (EHPP 1999a, AFC page 5.11-19). Vehicles that exceed the load size and limits of certain roadways will require transportation permits from Caltrans and Kern County. Staff has proposed a condition of certification that ensures compliance with these permit requirements.

In total, construction of the EHPP is estimated to require approximately 3,500 truck deliveries to the power plant site over the 15-month construction period (on average about 233 truck deliveries of construction materials per month). Assuming 20 workdays per month and two trips for each truck delivery (to and from the site), the project will produce approximately 24 truck trips per day on average (EHPPa 1999, AFC page 5.11-19).

The applicant assumes that about 70 percent of truck deliveries will originate in Bakersfield. These drivers would use SR 99 south to SR 119, west to Elk Hills Road, and then north to the power plant site. About 20 percent would travel from the Los Angeles area via SR 99 or I-5 north to SR 119, then west to Elk Hills Road and north to the site. The remaining 10 percent would originate north of Bakersfield, travelling south on I-5 to Stockdale Highway, then west to Elk Hills Road and south to the site (EHPP 1999a, AFC page 5.11-19).

Using the travel patterns described above, **TRAFFIC AND TRANSPORTATION Table 6** presents a comparison of project-related truck traffic travelling to the site

with existing truck traffic. The increase of 12 trucks per day on average is minimal compared to existing truck traffic on highways in the project area, and represents a negligible increase (0.2 percent to 2 percent) in truck traffic. Therefore, the impact of construction-related truck traffic on highways will not be significant.

TRAFFIC AND TRANSPORTATION Table 6
Distribution of Plant Construction-Related Truck Traffic on Highways

Highway	Existing AADT	Existing Truck AADT	Projected Average Truck Trips/Day	Average Increase in Truck Traffic
Interstate 5				
@ jct. SR 119	22,400	8,000	22	Less than 1%
@ jct. SR 58	23,500	7,520	2	Less than 1%
Highway 99				
@ jct. SR 119	32,500	8,125	17	Less than 1%
SR 119				
@ I-5	5,800	1,102	22	2%
@ SR 99	9,900	2,178	17	Less than 1%

SOURCE: EHPP 1999a, AFC Tables 5.11-8 and 5.11-2; AFC page 5.11-19

The primary county road that will be used by trucks travelling to the project site will be Elk Hills Road. Construction-related truck traffic will result in a 12 to 14 percent average increase in truck traffic on Elk Hills Road north of SR 119. Due to the size and weight of these trucks, these increases will contribute to some wear on Elk Hills Road and may increase the need for regular roadway maintenance to meet safety standards (EHPP 1999a, AFC page 5.11-21). Staff has proposed a mitigation measure to ensure that the project owner repair any damage to Elk Hills Road as a result of construction-related truck traffic.

Whenever possible and cost-effective, the applicant intends to use railroad lines to minimize truck transport of heavy equipment and machinery (EHPPa 1999, AFC page 5.11-19). The preferred rail line will be Union Pacific's Buttonwillow Branch, where cargo will be unloaded at the Buttonwillow Station located 8 miles to the north of the EHPP site. From the Buttonwillow Station, heavy equipment and machinery will be transported by truck south along Mirasol Avenue, west on Bright Road and south on Elk Hills Road.

Small quantities of hazardous wastes, such as waste oil and solvents, will be generated during project construction. During construction, about 4 truck trips per month will be required to haul hazardous waste for off-site disposal (EHPP 1999a, AFC Table 5.11-3A). The applicant has stated its intent to comply with all applicable regulations governing the transportation of hazardous wastes (EHPP 1999a, AFC page 5.11-21 – 22). Staff has proposed a condition of certification to ensure compliance.

OPERATIONAL PHASE

COMMUTE TRAFFIC

Operation of the EHPP will require about 20 full-time employees. Assuming that each employee drives a separate vehicle to work and makes one round trip from home to work per day, operation of the power plant will generate about 40 vehicle trips per day. The applicant will provide adequate on-site parking for power plant employees (EHPP 1999a, AFC page 5.11-24). It is assumed that the majority of the plant's workers will reside in Bakersfield and their preferred route to work will be west along SR 119 to Elk Hills Road, then north to the site. The commute traffic generated by operation of the project represents less than 1 percent of existing AADT on SR 119 and an estimated 5 percent of existing AADT on Elk Hills Road. This minimal amount of traffic will not have a significant impact on the state highways and local roads serving the project.

TRUCK TRAFFIC

The transportation of hazardous substances associated with the project can increase roadway hazard potential. During operation, about 1 truck delivery every three weeks of anhydrous ammonia will be made to the power plant site (EHPP 1999a, AFC page 5.11-24). Other hazardous materials, including hydrogen, will be delivered by truck to the plant site on a less frequent basis. (Please refer to AFC Table 5.11-3A for a complete list of the hazardous materials to be transported to the site and the quantity and frequency of delivery.) Hazardous wastes generated during project operation will be transported offsite for disposal or recycling by licensed hazardous waste transporters about once every 90 days (EHPP 1999a, AFC page 5.11-25 and Table 5.11-3A).

The applicant has identified several potential routes for the delivery of anhydrous ammonia. The two routes from Interstate-5 are: from the north, SR 43 to SR 119 to Elk Hills Road; and from the south, SR 119 to Elk Hills Road. The anticipated route from Bakersfield is SR 58 to SR 43 to SR 119 to Elk Hills Road. The state highways along these routes have been approved by the California Highway Patrol for use in the transportation of inhalation-related hazardous materials (Horgan, 1999, pers. comm.).

Visual observations by staff of State Routes 43, 58, and 119 did not identify any unusual traffic safety hazards. At-grade railroad crossings on SR 43 north of Stockdale Highway, and on SR 119 west of SR 99, are provided with active controls (lights, gates). In addition, staff spoke with the officer in charge at the Buttonwillow office of the California Highway Patrol, who stated that there are no unusual hazards or improperly designed facilities along the state highway routes with accident rates higher than the statewide average (SR 119/SR 99 junction [4.11] and the SR 43/SR 58 junction [2.90]) (CHP, 1999). Staff also contacted Caltrans in regards to the SR 119/99 and SR 43/58 junctions. While the accident rates are higher than the statewide average, the types of accidents occurring at these junctions does not indicate that these facilities are improperly designed (Sorensen, pers. comm., 1999). At staff's request, Caltrans looked into another junction with an

accident rate higher than the statewide average, SR 43 at Panama Lane, just north of I-5. The majority of the accidents at this junction involved vehicles travelling too fast in the fog and running the stop sign on Panama Lane at SR 43. A recent field check by Caltrans indicated that no changes are warranted at this junction (Sorensen, pers. comm., 1999). Staff also contacted the Kern County Roads Department to inquire about known traffic hazards on Elk Hills Road. Barry Hayslett stated the accident rate on Elk Hills Road is not exceptionally higher than any other county road, and that it can be traveled in a safe manner by safe and prudent drivers (Hayslett, 1999b, pers. comm.).

Federal and state regulations are in place to ensure that the handling and transportation of hazardous materials on all roadways are done in a manner that protects public safety. Federal laws specific to this issue are Title 49, Code of Federal Regulations, Sections 350-399 and Appendices A-G, of the Federal Motor Carrier Safety Regulations. These sections address safety considerations for the transportation of goods, materials, and substances over public highways. In addition, truck tank design for anhydrous ammonia and other hazardous materials are federally mandated by U.S. Department of Transportation specifications, and are designed for impact safety.

The California Vehicle Code and the Streets and Highways Code (Sections 31600 through 34510) are equally important to ensure that the transportation and handling of hazardous materials are done in a manner that protects public safety. Enforcement of these statutes is under the jurisdiction of the California Highway Patrol. The State Department of Motor Vehicles specifically licenses all drivers who carry hazardous materials. Drivers are required to carry a manifest, available for inspection by the California Highway Patrol inspection stations along major highways and interstates; check for weight limits and conduct periodic brake inspections. Commercial truck operators handling hazardous materials are also required to take first aid instruction and procedures on handling hazardous waste spills.

Potential impacts of the transportation of hazardous materials are mitigated to a level of insignificance by compliance with federal and state standards established to regulate the transportation of hazardous substances. The applicant has stated its intent to comply with all federal and state requirements for the transportation of hazardous materials (EHPP 1999a, AFC Table 6.1-1, page 18). Staff has proposed conditions of certification that ensure compliance with federal, state and local permit and safety requirements.

LINEAR FACILITIES

CONSTRUCTION PHASE

TRANSMISSION LINE

Construction of the transmission line is anticipated to take 9 months and require on average 24 workers per month[1]. The construction workforce will peak at 32 workers during the 7th month in the construction schedule (EHPP 1999a, AFC Table 5.8-5). This peak construction period does not coincide with the peak construction period for the power plant (the 8th month in the schedule). The power plant site will be used as a staging area. Workers will report to the plant site at the beginning of each workday, and distribute themselves as needed to various work sites along the transmission line route. Several crews will work simultaneously along the route to minimize the overall construction period (EHPP 1999a, AFC page 5.11-22).

During peak construction of the transmission line, it is estimated that 16 pieces of heavy equipment will be used, including various trucks (pickup, boom, cement, and digger/auger) mobile cranes, cable puller, and infrequently, a helicopter. Construction materials such as pole foundation sections and tubular steel poles will also be delivered by truck to staging sites along the transmission line route (EHPP 1999a, AFC page 5.11-23).

Elk Hills Road and Wasco Way will provide access to transmission line Routes 1A and 1B during construction. These roads currently operate at LOS A. Given the small number of truck deliveries along the transmission line routes, delivery of construction equipment and materials is not expected to have significant traffic impact on Elk Hills Road and Wasco Way. Existing oil field access roads will also provide access to the transmission line during construction. Use of these roads will further reduce impacts to the county-maintained roadways.

Route 1A will cross Elk Hills Road and Tupman Road. County roads crossed by Route 1B include Elk Hills Road, Stockdale Highway, and Bright Road. In addition, from MP 4.3 to 8.6 Route 1B (and Route 1B variation) would be installed within the right-of-way of Wasco Way. Construction of Route 1B (and Route 1B variation) may require the closure of a single lane along Wasco Way (a two-lane road). To minimize inconvenience to traffic (1,000 AADT), the applicant will only close one lane, and only during off-peak hours. The applicant has committed to using road signs and flagmen to caution and direct traffic around construction, as well as signs at nearby intersections to alert drivers to the construction and direct them to alternate routes (EHPP 1999c, data response #20). The crossings of Elk Hills and Tupman Roads and the work within the right-of-way of Wasco Way will require an encroachment permit from Kern County. The applicant has stated its intent to comply with Kern County encroachment permit requirements and staff has

[1] The workforce required for construction of the project linear facilities (transmission line, gas pipeline, water supply and wastewater pipelines) have already been accounted for in the total construction workforce for the EHPP.

proposed a condition of certification ensuring compliance with Kern County limitations for encroachment into public rights-of-way.

Route 1B will also require the crossing of State Route 58. SR 58 could be closed for short periods of time to accommodate the installation of conductors. Average daily traffic along SR 58 is approximately 4,800 vehicles, while peak traffic is approximately 700 vehicles per hour. Closure will be limited to off-peak hours. During construction, road signs and flagman will be used to caution and direct traffic. The applicant will follow Caltrans encroachment permit requirements for traffic control. If required by Caltrans, netting may be used to minimize the duration of the closure of SR 58. If Caltrans requires it, the applicant will post signs along SR 58 to notify motorists that delays may occur and advise them to take alternate routes (EHPP 1999c, data response #21). Staff has proposed conditions of certification requiring that the applicant comply with Caltrans limitations for encroachment into public rights-of-way.

State highways and local roads along the transmission line routes will continue to operate at acceptable levels of service. Use of routine construction safety measures and compliance with encroachment permit requirements should be sufficient to ensure no impacts.

PIPELINES

Construction of the natural gas, water supply and wastewater pipelines is anticipated to take 9 months and require on average 23 workers per month (EHPP 1999a, AFC Table 5.8-5). Due to the small size of the construction workforce, staff does not anticipate any significant impacts to local roads and highways from commute traffic.

NATURAL GAS PIPELINE

The gas pipeline will be entirely on Occidental of Elk Hills, Inc. (OEHI) property and will not cross any local roads. No significant impact is anticipated.

WATER SUPPLY PIPELINE

An estimated 18 pieces of heavy equipment will be used during the peak construction period of the water supply pipeline (the 12th month in the construction schedule). In addition to heavy equipment, construction materials such as piping, concrete, rebar, and steel will be delivered by truck to staging sites along the pipeline route. Private roads, primarily Skyline Road, will provide access to the pipeline during construction. At crossings of minor roads, such as oil field roads, the pipeline will be installed by open cut trenching. The crossings at Tupman Road, Elk Hills Road, and SR 119 will be by drilling (EHPP 1999a, AFC page 5.11-23). Given the small number of truck deliveries, and their distribution among multiple staging sites and work areas, and the use of drilling at major road crossings, no significant impacts to the local and state highways are anticipated from construction of the water supply line.

The wastewater pipeline only crosses one local road, Elk Hills Road, and is entirely on OEHI property. The crossing of Elk Hills Road will be by drilling underneath the roadway. Private oil field roads will provide access to the pipeline during construction. For these reasons, no significant impact to local roads and highways is expected from construction of the wastewater pipeline.

CUMULATIVE IMPACTS

The cumulative analysis for traffic and transportation takes into consideration the La Paloma Generating Project, the Sunrise Cogeneration Project, and the Midway-Sunset Project. As shown in Table 5.18-12 of the EHPP AFC, the construction schedules for all of these projects will overlap to some degree. It should be noted that delays could occur in the permitting process for these projects, affecting the start date for construction.

Due to the distances between the EHPP and La Paloma, Sunrise, and Midway-Sunset projects, traffic for the EHPP will not use the same county roads as the other power plant projects. Therefore, staff does not anticipate any significant cumulative impacts to local roads during construction and operation of the EHPP.

Commute traffic for the La Paloma project will primarily use State Routes 33, 58, and 166. The majority (80 percent) of construction-related truck traffic for the La Paloma project will use SR 58 west to SR 33. The remaining 20 percent will use SR 166 to SR 33 (LPGP, 1998a). These are not the primary highways to be used by commute and truck traffic travelling to the EHPP. Therefore, staff would not expect any significant cumulative impacts to state highways as a result of the EHPP and La Paloma projects.

It is assumed that commute traffic for the Sunrise project will use SR 43, SR 58, SR 99, and SR 119 (SCPP 1999a, AFC page 8.10-14). These are the same highways that will be used by EHPP commute traffic. Sunrise would add 266 vehicle trips per day to the SR 119/43 junction during the peak construction period of the Sunrise project (SCPP 1999a, AFC Table 8.10-7). If the majority (e.g., 80 percent) of these trips were made during the peak hour, LOS would drop to E with EHPP and Sunrise traffic combined. However, in the Sunrise case, staff has proposed a condition of certification (**TRANS-4**) requiring the preparation of a traffic control plan which establishes construction work hours outside of peak traffic periods (CEC 1999). In addition, staff would expect that some workers will carpool, and there are alternate routes from Bakersfield (e.g., SR 58) that likely will be used by workers commuting to the EHPP and Sunrise project sites, thereby reducing the number of vehicles at the SR 119/43 junction. Thus, staff does not anticipate a significant cumulative impact at the SR 119/43 junction. Sunrise traffic travelling through the SR 119/99 junction would amount to an additional 125 vehicle trips per day or about 50 peak hour trips. These trips will not result in a further decrease in Peak Hour LOS (i.e., LOS F) at the SR 119/99 junction. For this reason, and the reasons stated above (i.e., off-peak travel, alternate routes), staff would anticipate any cumulative impact at the SR 119/99 junction to be less than significant. Other segments of the state highways shared by EHPP and Sunrise traffic will operate at peak hour levels-of-

service ranging from LOS A to LOS C during peak construction of the EHPP. Therefore, staff concludes that adequate capacity is available on these highway segments to accommodate both the EHPP and Sunrise projects without a reduction in LOS to significant adverse level (i.e., LOS E or F).

An AFC for the Midway-Sunset project is expected sometime in November 1999. Staff would anticipate cumulative impacts to the state highways to be less than significant considering that construction of the Midway-Sunset project would not begin until sometime after peak construction of the EHPP and Sunrise projects, and by that time the traffic impacts of these projects would be declining.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS AND STANDARDS

FEDERAL

The applicant has stated its intention to comply with all federal LORS. Staff has proposed a condition of certification to ensure compliance. Staff believes such compliance will not present any unusual difficulties. Therefore, the project is considered consistent with identified federal LORS.

STATE

The applicant has stated its intention to comply with all state LORS. Staff has proposed a condition of certification to ensure compliance. Staff believes such compliance will not present any unusual difficulties. Therefore, the project is considered consistent with identified state LORS.

LOCAL

The applicant has stated its intent to comply with Kern County requirements for encroachment into public rights-of-way and the goals and policies contained in the Kern County General Plan Circulation Element (EHPP 1999a, AFC Table 6.1-1, page 18). The project will be consistent with the following applicable policies from the Kern County Circulation Element:

<u>Private Development Access to Existing Roadway Network:</u> Requires private developments to provide access to the existing road network and that these roads be constructed to County standards. Compliance with this requirement will be ensured by staff's proposed condition of certification **LAND-1** (please see the **LAND USE** section of this report).

<u>Growth Beyond 2010:</u> Developers must demonstrate that sufficient transportation capacity is available to serve the proposed project at LOS D or better. All county roadways potentially affected by the project or currently operating at LOS A. The EHPP will not reduce LOS on these roadways during construction or operation of the project.

Transportation of Hazardous Materials: This policy states that Kern County and affected cities should reduce the use of county maintained roads for the transportation of hazardous materials. Staff contacted the Kern County Roads Department to inquire if any restrictions are in place on the transportation of hazardous materials on Elk Hills Road. Mr. Hayslett stated that no restrictions apply to legal vehicles (Hayslett, 1999a, pers. comm.).

Damaged Road Pavement: This policy states that the County shall continue to maintain pavement conditions. Staff has proposed a condition of certification requiring the applicant to repair any damage to Elk Hills Road as a result of construction truck traffic.

FACILITY CLOSURE

There are at least three circumstances in which a facility closure can take place: planned closure, unexpected temporary closure and unexpected permanent closure.

PLANNED CLOSURE

Planned closure occurs at the end of a project's life, 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. The applicant will prepare a Facility Closure Plan for submittal to the Energy Commission for review and approval, at least twelve months prior to the proposed closure. At the time of closure, all then-applicable LORS will be identified and the closure plan will address with how these LORS will be complied.

UNEXPECTED TEMPORARY CLOSURE

Unexpected 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. In the event of temporary closure, the effects on traffic and transportation would be similar to those for normal operation of the power plant facility, and the applicant would have to comply with all applicable LORS section with respect to transportation permits for hazardous materials and equipment deliveries and removal.

UNEXPECTED PERMANENT CLOSURE

Unexpected permanent closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unexpected closure where the owner remains accountable for implementing the on-site contingency plan. It can also include unexpected closure where the project owner is unable to implement the contingency plan, and the project is essentially abandoned. Staff assumes that the facility will either remain idle until such time that new ownership is established, or dismantling of the facility will occur. In any event, the owner will have to secure applicable transportation permits to satisfy the LORS requirements as stated in this report.

In the event of permanent closure, the effects would be similar to those associated with project construction. Permanent closure will involve a peak work period with commute traffic. In either instance, the roadway systems within the vicinity of the project should be able to handle closure-related traffic without a significant impact on the current LOS of the area roads.

MITIGATION

The applicant has indicated its intention to comply with all LORS relating to: 1) the transport of oversized loads, 2) the transport of hazardous materials, and 3) Caltrans and Kern County requirements for encroachment permits for construction activities within public rights-of-way.

If the traffic signal planned for the State Route 119/99 junction has not been installed prior to the start of construction of the EHPP, staff has proposed a mitigation measure to address the temporary impact to this junction during the construction phase of the project. Staff has also proposed mitigation for the repair of roadway pavement due to heavy truck traffic on Elk Hills Road during construction of the project.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

POWER PLANT

1. During the construction phase, except for one section of highway, increased roadway demand resulting from the daily movement of workers and materials, while noticeable, will not increase beyond thresholds established by local and state authorities. For the roadway segment that will drop to a significant adverse level (LOS E), staff has proposed mitigation (if necessary).

2. During the operational phase, increased roadway demand resulting from the daily movement of workers and materials will be minimal.

3. The issue has been raised by Kern County Roads Department that the proposed access road for the project will create a traffic hazard on Elk Hills Road and has recommended that the applicant use the existing access road at Skyline Road. The applicant has identified an alternate site access road which staff understands will comply with Kern County's request.

4. All transportation and handling of hazardous substances can be mitigated to insignificance by compliance with federal and state standards established to regulate hazardous substances.

LINEAR FACILITIES

5. Construction of the transmission lines will have minimal impacts on the function of area roadways. Construction of transmission line Route 1B may require closure of Wasco Way (one lane only) and State Route 58 for short periods of time. Closure will be restricted to off-peak hours. Routine construction safety measures and required encroachment permits should be sufficient to ensure no impacts.

6. Construction of the supply pipelines will have minimal impacts on the function of area roadways. Major roadway crossings (Elk Hills Road, Tupman Road, and State Route 119) will be constructed by drilling underneath these roadways, resulting in minimal impacts to traffic. In addition, development will take place in compliance with Kern County and Caltrans limitations for encroachment into public rights of way.

RECOMMENDATION

If the Energy Commission certifies the EHPP, staff recommends that the Commission adopt staff's proposed conditions of certification.

CONDITIONS OF CERTIFICATION

TRANS-1 The project owner shall comply with Caltrans and Kern County limitation on vehicle sizes and weights. In addition, the project owner or its contractor shall obtain necessary transportation permits from Caltrans and all relevant jurisdictions for roadway use.

Verification: In the Monthly Compliance Reports during construction, and in the Annual Compliance Reports during operation, the project owner shall submit copies of any oversize and overweight transportation permits received during that reporting period. In addition, the project owner shall retain copies of these permits and supporting documentation in its compliance file for at least six months after receipt of these permits.

TRANS-2 The project owner or its contractor shall comply with Caltrans and Kern County limitations for encroachment into public rights-of-way and shall obtain necessary encroachment permits from Caltrans and all relevant jurisdictions.

Verification: In Monthly Compliance Reports during construction, and in the Annual Compliance Reports during operation, the project owner shall submit copies of any encroachment permits received during the reporting period. In addition, the project owner shall retain copies of these permits and supporting documentation in its compliance file for at least six months after receipt of these permits.

TRANS-3 The project owner shall require as a condition of its contract with independent truckers hired to haul hazardous materials that permits and/or licenses be obtained from the California Highway Patrol and/or Caltrans for the transport of hazardous materials.

Verification: The project owner shall provide the CPM with a copy of permits/licenses of haulers contracted to transport hazardous materials in the Monthly Compliance Report.

TRANS-4 The project owner or its contractor shall install crossing structures and netting, if required by Caltrans, across State Route 58 as a safety precaution and to reduce the potential for damage from falling construction materials or equipment during cable-stringing activities. Prior to cable stringing, the project owner shall consult with Caltrans, and prepare and submit to the CPM a safety plan and implementation program.

Verification: At least 30 days prior to wire stringing, the project owner shall provide to the CPM for review and approval, a copy of its safety plan and implementation program.

TRANS-5 Following construction of the power plant and all related facilities, the project owner shall meet with the CPM and Kern County to determine if any actions are necessary and develop a schedule to complete the repair of any roadways damaged due to project construction.

Protocol: Prior to start of construction, the project owner shall photograph the road pavement on Elk Hills Road from the junction of State Route 119 north to the project site. The project owner shall provide the CPM and Kern County with a copy of these photographs. Following project construction, the project owner will meet with the CPM and Kern County to determine the project-related road damage, if any.

Verification: Within 30 days of the completion of project construction, the project owner shall meet with the CPM and Kern County and determine if any roadway repairs are necessary. The project owner shall provide a copy of a letter from Kern County acknowledging satisfactory completion of the roadway repairs, if necessary, in the first Annual Compliance Report following start of operation of the Elk Hills Power Project.

TRANS-6 If the traffic signal planned for the State Route 119/99 junction is not in place prior to the start of construction of the Elk Hills Power Project, the project owner shall provide traffic control at the SR 119/99 junction during construction of the EHPP through the use of a policeman/flagman during peak traffic hours. The project owner shall provide traffic control during the construction phase of the Elk Hills Power Project until the traffic signal is installed.

Protocol: Protocol: The use of a policeman/flagman requires that a Traffic Control Plan be submitted to Caltrans prior to issuance of a permit.

Verification: At least 45 days prior to start of project construction, the project owner shall submit a Traffic Control Plan to Caltrans for approval. The project owner shall provide the CPM a copy of a letter from Caltrans acknowledging approval of the Traffic Control Plan at least 15 days prior to the start of construction.

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NOISE

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INTRODUCTION

The construction and operation of any power plant creates noise. The character and loudness of this noise, the times of day or night during which it is produced, and the proximity of the facility to sensitive receptors combine to determine whether a proposed project will meet applicable noise control laws and ordinances, and whether it will exhibit significant adverse environmental impacts.

The purpose of this analysis is to identify the likely noise impacts from the Elk Hills Power Project (EHPP) and to recommend conditions to ensure that the resulting noise impacts will comply with all applicable laws, ordinances, regulations and standards.

Before certifying the EHPP, the Energy Commission must find that the project:

1. will likely be built and operated in compliance with all applicable noise laws, ordinances, regulations and standards; and
2. will present no significant adverse noise impacts, or none that have not been mitigated to the extent feasible.

For a description of the terms used to describe noise and methods to measure and evaluate noise, please see **"NOISE: Appendix A"**.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

Under the Occupational Safety and Health Act of 1970 (29 USC § 651 et seq.), the Department of Labor, Occupational Safety and Health Administration (OSHA) has adopted regulations (29 CFR § 1910.95) that establish maximum noise levels to which workers at a facility may be exposed. These 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 during which the worker is exposed. (Please see **Noise: Appendix A, Table A4** immediately following this section.) OSHA regulations also dictate hearing conservation program requirements and workplace noise monitoring requirements. The administering agency for the above authority is the Federal Occupational Safety and Health Administration (Fed-OSHA).

Noise Control Act of 1972 42 USC 6 4901 et seq. 40 CFR Parts 201-211. This Act sets performance standards for noise emissions from "major sources." The Environmental Protection Agency (EPA) has identified a day/night level (Ldn) of

55 dBA[1] as providing reasonable protection against community annoyance and activity interference due to noise. The Noise Control Act is administered by EPA.

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

STATE

Similarly, there are no state regulations governing off-site (community) noise. Rather, state planning law (Gov. Code, § 65300) requires that all counties and cities prepare and adopt a General Plan. Government Code section 65302(f) requires that a noise element be prepared as part of the General Plan. This element is to "address existing and foreseeable noise problems…." Other state laws, ordinances, regulations and standards (LORS) include the California Environmental Quality Act (CEQA) and the California Occupational Safety and Health Act (Cal-OSHA).

California Vehicle Code, sections 23130 and 23130.5, sets noise limits for highway vehicles. The California Highway Patrol and the Kern County Sheriff's Office administer the vehicle code.

CAL-OSHA

California Occupational Safety and Health Administration (Cal-OSHA) has promulgated Occupational Noise Exposure Regulations that set employee noise exposure limits.

Cal-OSHA regulations (Cal. Code Regs., tit. 8, § 5095 et seq.) are the same as the federal OSHA criteria described above. The criteria are based on a worker's noise level exposure over a specific time period. Maximum permissible worker noise exposure levels to protect against damage to the workers' hearing have been established. The administering agency is Cal-OSHA.

CEQA

California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified, and that such impacts be eliminated or mitigated to the extent feasible. The applicable CEQA Guidelines (Cal. Code Regs., tit. 14, §15000 et seq., Appendix G § XI) explain that a significant effect from noise may exist if a project would result in:

(a) 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.

(b) Exposure of persons to, or generation of, excessive ground borne vibration or ground borne noise levels.

[1] Please see **Noise: Appendix A,** immediately following this section, for the definition of dBA and other definitions used throughout this report.

(c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

(d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

LOCAL

KERN COUNTY GENERAL PLAN - NOISE ELEMENT

The Kern County General Plan 1989 contains a Noise Element that establishes environmental noise limits based on the land use of the property receiving the noise. The permissible noise levels are outlined below in **NOISE: Table 1**. The administering agency for the above authority is the Kern County Department of Planning and Development Services.

These standards limit L_{50} or median noise levels during the day to 50 dBA, and at night to 40 dBA at highly noise-sensitive locations such as isolated rural residences.

NOISE: Table 1
Kern County General Plan-Noise Element

Land Use Category	Maximum Permissible Sound Level		
	L_{50} (Day)	L_{50} (Night)	CNEL
Non-sensitive Land Uses	65	60	75
Moderately Sensitive Land Uses	60	55	70
Sensitive Land Uses	55	45	65
Highly Sensitive Land Uses	50	40	60

SETTING

The proposed power plant site is near the center of the Elk Hills Oil and Gas Field and is surrounded by oil wells and other oil field related equipment such as large reciprocating engines, pumps, compressors and a gas turbine powered cogeneration plant.

The nearest residence is approximately 5.1 miles to the northeast of the power plant site. Isolated farms exist at this distance to the northeast beyond the California Aqueduct. The nearest communities include Valley Acres and Dustin Acres 6 miles to the southeast, Tupman 6.9 miles east, Derby Acres 7.5 miles west-southwest, Buttonwillow 8.3 miles north and McKittrick 8.75 miles west.

There are no schools, hospitals or other sensitive receptors within a 2-mile radius of the powerplant (identified by staff as an area outside which construction and operation of a powerplant project is not likely to cause noise impacts). Please see the Project Description section for more details on the site and setting.

AMBIENT NOISE SURVEY

The Energy Commission's power plant certification regulations require that noise measurements be made at noise-sensitive locations where there is a potential for an increase of 5 dBA or more over existing background noise levels during construction or operation of a proposed power plant.

A recent noise survey performed within an oil field near the edge of the town of McKittrick (LPGC, 1998) indicates that hourly L_{90} background levels range from 34 dBA to 43 dBA. The minimum background level was about the same, at 34 to 34.5 dBA, regardless of location. The uniformity of the minimum background levels occurs because the background is a composite of noise from many distant sources. Background levels as low as 40 dBA are rarely found in developed areas (EPA, 1974), but they can be experienced in remote areas distant from freeways and other sources of man-made noise. The very low minimum background level of 34 dBA measured near McKittrick is assumed to be representative throughout the study area for the EHPP.

The power plant will not cause an increase in the noise levels as it will be significantly below ambient noise levels at the nearest receptor. Noise Levels projected from the powerplant at the nearest noise-sensitive location, a residence about 5.1 miles from the power plant site, will be about 22 dBA, whereas the existing minimum background levels at any residence are about 34 dBA. Consequently, no noise measurements are necessary (Baker, 1998).

SIGNIFICANCE CRITERIA

The most stringent noise level required by any of the applicable LORS is the controlling criterion in the design of the noise control features of the project. In this case, the most stringent criterion is the hourly nighttime median noise level (L_{50}) of 40 dBA as specified in the Kern County General Plan. The level is applicable at the nearest residence approximately 5.1 miles to the north-northeast of the EHPP. Isolated rural residences are considered highly noise-sensitive receptors.

The significance of a noise impact is also a function of the change or increase in noise levels over existing ambient noise levels at any noise-sensitive receptor. An increase of 5 dBA or greater is considered significant.

ENVIRONMENTAL NOISE IMPACTS

Noise will be produced at the power plant site and along the corridors for linear project features during the construction and operation of the project. This assessment includes impacts from both construction and operation activities and their potential effects at the nearest sensitive receptors, and to power plant operations personnel. An essential part of this assessment is a comparison of expected noise levels with acceptable noise levels presented in applicable LORS, and with existing background levels at noise-sensitive receptors.

CONSTRUCTION NOISE

POWER PLANT

Construction of the project is expected to take up to 16 months, with varying degrees of activity occurring during the different phases of construction. The construction of the power plant can generally be divided into five phases, which utilize different types of construction equipment. The five phases are: 1) site preparation and excavation; 2) concrete pouring; 3) steel erection; 4) mechanical; and 5) clean-up (Miller et al. 1978). The typical high-pressure steam blow activity performed during the final stage of construction is assessed separately below because of the high noise levels and potential for a greater noise impact.

Both the US EPA Office of Noise Abatement and Control and the Empire State Electric Energy Research Company have extensively studied noise from individual pieces of construction equipment as well as from construction sites of power plants and other types of facilities (US EPA 1971, Barnes et al. 1976). The loudest equipment types generally operating at a site during each phase of construction are presented in **NOISE: Table 3**. The composite average or equivalent site noise level, representing noise from all equipment, is also presented in the table for each phase.

NOISE: Table 3
Construction equipment and composite site noise levels.

Construction Phase	Noise Construction Equipment	Equipment Noise Level (dBA)	Composite Site Noise Level @ 50 ft. (dBA)
Excavation	Pile driver Dump truck Rock drill	101 91 98	89
Concrete pour	Truck Concrete mixer	91 85	78
Steel erection	Derrick crane Jack hammer	88 88	87
Mechanical	Derrick crane Pneumatic tools	88 86	87
Clean-up	Truck Steam blow (unmuffled)	91 110 @ 1,000'	89

Source: EPA, 1971 and Barnes, 1976.

The composite noise levels were based on intensive noise monitoring during the construction of 15 actual power plants. The noise monitoring for the composite levels was done at locations selected to avoid undue excess attenuation from atmospheric conditions and terrain. The construction equipment were characterized as typical.

One important consideration in using these data is that the measurements are almost 30 years old. Thus, they probably overestimate actual construction noise since there has been a trend towards quieter equipment in the intervening years. In spite of this consideration, these data are comprehensive and have the advantage

of integrating significant variability to arrive at an average impact from each phase of construction.

LINEAR FACILITIES

The plant switchyard will be connected to the PG&E transmission system via a new, 230 kV transmission line. Three alternatives have been identified. Route 1A (9 miles long), route 1B (8.6 miles long), and route 1B revised (8.5 miles long).

Natural gas is conveyed to the power plant site via a new 2,500-foot, 10-inch supply pipeline. The route lies entirely within the Elk Hills Oil and Gas Field boundaries. The new pipeline is positioned above ground on pipe supports.

West Kern Water District (WKWD) will supply water for the project. The water will be conveyed via a new 9.8 mile, 16-inch water pipeline extending from the existing WKWD facilities. A portion (4.1 miles) of the pipeline will be underground and the rest (5.7 miles) will be above ground on pipe supports.

COMMUNITY NOISE EXPOSURE (CONSTRUCTION)

POWER PLANT

Average or equivalent construction noise levels projected to the nearest residence from the power plant site were developed using the computer model NoiseCALC (Driscoll, 1985). Average noise levels during construction are projected to range between 3 dBA and 15 dBA, depending upon construction phase, at the nearest residence at a distance of 5.1 miles from the power plant site. These levels are well below ambient noise levels at the location, and the noise will be inaudible under all conditions. All sensitive receptors, such as schools, hospitals, elderly care facilities or other highly noise-sensitive facilities, are located more than 6 miles from the power plant site and are well beyond the potential area of impact.

High-pressure steam blows produce noise levels of approximately 130 dBA at 100 feet. This attenuates to a level of about 11 dBA at the nearest residence at 5.1 miles. Steam blow noise attenuates faster with distance than other construction noise dominated by diesel engines because it is at a higher frequency. The steam blowing will be inaudible at the nearest residence.

WORKER NOISE EXPOSURE (CONSTRUCTION)

POWER PLANT AND LINEAR FACILITIES

A reference distance of 100 feet was used in the AFC to evaluate on-site construction noise levels and their potential impacts on workers. The noise levels will vary significantly depending on whether a worker is closer to or conducting a noisy activity, but the L_{eq} levels are projected to average between 75 and 85 dBA during the first four phases of construction. Undoubtedly, some workers will occasionally be exposed to noise levels above 85[2] dBA during construction. The

[2] OSHA does not consider noise levels of 85 dBA or less hazardous to employee health.

applicant predicts that construction noise levels will not reach levels that require worker protection, but will put in place the use of engineering controls, administrative controls, and hearing protection devices.

To ensure that workers are adequately protected, staff has proposed a condition of certification (see proposed Condition of Certification **NOISE-3**, below).

OPERATIONAL NOISE

POWER PLANT

Noise levels produced by a GE Frame 7F Combustion Turbine/Generator Package and similar power plant equipment were modeled using the NoiseCALC computer model (Driscoll 1985). Attenuating mechanisms employed by the model included divergence of the sound wave and atmospheric absorption. No ground effects attenuation due to vegetation or terrain were included in the modeling. In modeling the noise impacts to the sensitive receptors, the major pieces of equipment were assumed to operate continuously.

The model determined the total noise level that would be expected at various distances from the power plant site. Since specific equipment has not yet been selected, noise levels for standard power plant equipment of the appropriate size and fitted with typical silencing measures were employed in the modeling exercise.

The analysis shows that the expected power plant noise level at the nearest residence to the north-northeast, at a distance of 5.1 miles is about 22 dBA. Since this level is well below the Kern County standard of 40 dBA for highly sensitive land uses, and well below existing ambient noise levels, no additional noise control measures will be necessary. Furthermore, all sensitive receptors, such as schools, hospitals, elderly care facilities or other highly noise-sensitive facilities, are located more than 6 miles from the power plant site and are thus well beyond the potential area of impact.

COMMUNITY NOISE IMPACTS (OPERATION)

POWER PLANT

During its operating life, the project will represent essentially a steady, continuous and broadband noise source day and night. Occasional short-term increases in noise level will occur as steam relief valves open to vent pressure, or during startup or shutdown as the plant transitions to and from steady-state operation. At other times, such as when the plant is shut down for lack of dispatch or for maintenance, noise levels will decrease.

TONAL AND INTERMITTENT NOISES

One possible source of noise annoyance would be strong tonal noises, individual sounds that, while not louder than the permissible levels, stand out in sound quality. To ensure the avoidance of such tonal sound, the noise control design of the EHPP

can be balanced to bring as many noise sources as possible to the same relative sound level, causing them all to blend without any one source standing out.

The project owner proposes that no prominent tonal noise emissions will be present. The generators, transformers, and combustion turbine compressor inlet produce tonal sound levels; however, the generator enclosure and combustion turbine inlet silencers will be designed to reduce the tonal emissions from these sources to levels below the general plant noise. In addition, the transformer tonal noise emissions will be below the broadband plant noise. Therefore, any equipment tonal emissions will not be distinctly audible at any off-site locations.

Another potentially annoying source of noise from a power plant is the intermittent or occasional actuation of steam relief valves. The hissing noise from these valves can be largely mitigated by the installation of adequate mufflers. To ensure that adequate measures are taken to mitigate tonal and intermittent noise sources, staff has proposed measures (see proposed Condition of Certification **NOISE-4**, below) to ensure that tonal and intermittent steam relief noises are not allowed to cause a problem.

Linear Facilities

Transmission line alternative routes 1B and 1B revised pass close to five rural residences. The nearest residence is approximately 80 feet from the transmission line right-of-way and the others are more than 100 feet from the right-of-way.

High voltage transmission lines can produce a hissing sound as a result of corona discharge from the conductors. The noise level is a function of voltage and is most evident at higher voltages. Power lines with voltages less than 230 kV rarely produce an audible corona discharge noise because there is little or no discharge at these lower voltages. The sound from 230 kV lines, as proposed for EHPP, is generally inaudible at distances greater than 50 feet from the conductor bundle except during rainy or high humidity conditions. Noise from the EHPP transmission lines will not produce a significant noise impact at any residence because of the infrequency of rainy or high humidity conditions and the low noise level on the rare occasions that it does occur.

For transmission line alternative Route 1A, a switchyard located at the point of interconnection with the existing 230 kilovolt (kV) transmission line will also emit a low level of noise similar to the transmission line. The noise from the switchyard will generally be inaudible at the switchyard property line. The noise from the switchyard will not be audible at the nearest residence in Tupman, which is more than 2,000 feet from the switchyard.

Water pumps to be constructed at the West Kern Water District (WKWD) water storage and distribution yard for the water supply pipeline will produce noise levels of approximately (-----) at 50 feet while operating but will not impact the nearest rural residence, which is located more than (-----) feet from the pumps.

NOISE IMPACTS TO WORKERS (OPERATION)

POWER PLANT AND LINEAR FACILITIES

Workers will be exposed to noise levels in the range of 70 to 90 dBA, depending upon their distance from equipment. All equipment will be specified to produce near-field noise levels of 85 dBA or less as a means of reducing employee noise exposures. However, due to the additive effect of noise, some areas will experience levels higher than 85 dBA.

These areas will be marked, as "High Noise" areas and hearing protection will he required. All employees who have the potential to receive a noise exposure greater than 85 dBA over an 8-hour work shift will be included in a hearing conservation program that includes all the elements required by OSHA regulations. The noise exposures of all employees will be maintained below the OSHA level of 90 dBA over an 8-hour shift through the use of engineering controls, administrative controls, and hearing protection devices. Staff has proposed measures (see proposed Condition of Certification **NOISE-5**, below) to ensure compliance.

CUMULATIVE IMPACTS

The cumulative impacts discussion for the EHPP is based on CEQA and the CEQA Guidelines which require that the discussion of cumulative impacts be "guided by the standards of practicality and reasonableness" (Public Resources Code (PRC) §21083(b)); and that "the discussion include a list of past, present, and reasonably anticipated future projects producing related or cumulative impacts" (California Code of Regulations (CCR) §15130(b)(1)(A)). The CEQA Guidelines require that cumulative impacts are discussed when they are significant, and that the discussions of cumulative impacts reflect the severity of the impacts and their likelihood of occurrence. However, the Guidelines states that the cumulative impacts discussion need not be provided in as great detail as is provided for the proposed project.

Therefore, the purpose of this analysis is to:

1. Identify past, present, and reasonably foreseeable actions in the project area that could affect noise at the EHPP.

2. Determine if the impacts of the EHPP and the other actions would overlap in time or geographic extent.

3. Determine if the impacts of the proposed project would interact with, or intensify, the impacts of the other actions.

4. Identify any potentially significant cumulative impacts.

<u>Projects within the EHPP Area of Influence:</u> The EHPP includes a generating plant and ancillary facilities (i.e., transmission line, natural gas pipeline, and water supply and wastewater disposal pipelines). For this discussion of cumulative impacts, the

general geographic area of influence is defined as an approximate 15-mile radius around the power plant, or within 1 mile of the linear facilities.

Projects identified for consideration in this discussion of cumulative impacts include those: 1) where an application has been submitted to local jurisdictions for required approvals and permits; and/or 2) that have been previously approved and may be implemented in the near future. Projects within the area of influence are La Paloma, Sunrise, and Midway-Sunset power plants.

All of the projects identified above fall under the review and certification process of the Energy Commission. All of the projects are within 15 miles of EHPP and have a construction schedule that overlaps with EHPP. These three projects are considered in the cumulative impact analysis. A fourth project, Pastoria Power Project, is more than 15 miles from EHPP and was therefore not included in the cumulative analysis.

The nearest planned project is the La Paloma Generating Project about 6.7 miles to the west. Due to this great distance, there will be no significant cumulative noise impacts. No significant, unavoidable adverse cumulative impact on noise resources is anticipated during the construction and operation of the EHPP.

MITIGATION MEASURES

The construction and normal operation of the EHPP can create noise impacts. Noise control measures typical of standard combustion turbine powered plants and considered in this analysis include (to be employed as appropriate):

1. standard outdoor/weather enclosures for the combustion turbine generator packages and air inlet silencers on the combustion turbines; and

2. an outdoor thermal/acoustical lagging over the steam turbine.

These sorts of noise attenuation measures have been employed for years on similar facilities, and their noise control abilities are well known. Staff has proposed measures (see proposed Condition of Certification **NOISE-4** below) to ensure that these noise mitigation measures are carried out, and that they are effective.

The project will be designed to meet the Kern County noise limit, which is 40 dBA at night. Since the plant will operate at an essentially constant noise level, daytime levels will be similar. No mitigation measures, other than those already included in the standard plant design, are necessary.

In addition, construction is customarily performed during the daytime, and would cause no impacts at night, when quiet is most important. Staff has proposed a noise complaint process (see **NOISE-1** and **NOISE-2**, below) that will allow any person suffering annoyance to address the problem with the applicant. Staff has also proposed a condition (see **NOISE-6**, below) to restrict noisy construction work to daytime hours.

Staff believes no significant adverse noise impacts are likely to occur due to construction or operation of the transmission line.

Construction workers may be exposed to significant noise levels, occasionally exceeding 85 dBA. An effective hearing conservation program, noise monitoring and hearing protection required under **NOISE-3** will constitute effective mitigation measures to safeguard employee health.

FACILITY CLOSURE

Upon closure of the facility, all operational noise will cease; no further adverse impacts from operation will be possible. The remaining potential noise source will be that caused by dismantling of the structures and equipment, and any site restoration work that may be performed. Since this noise will be similar to that caused by the original construction of the project, it can be treated similarly. That is, noisy work can be performed during daytime hours, with machinery and equipment properly equipped with mufflers. Any noise laws, ordinances, regulations and standards then in existence would apply; applicable Conditions of Certification included in the Energy Commission Decision would also apply unless properly modified.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Staff concludes that the EHPP will likely be built and operated to comply with all applicable noise laws, ordinances, regulations and standards. Staff further concludes that the EHPP will likely present no significant adverse noise impacts. The EHPP will likely represent an unobtrusive, nearly undetectable addition to existing noise levels.

RECOMMENDATIONS

Staff recommends the conditions of certification proposed below be included in the Commission Decision.

PROPOSED CONDITIONS OF CERTIFICATION

NOISE-1 At least 15 days prior to the start of rough grading, the project owner shall notify all residents within Valley Acres, by mail or other effective means, of the commencement of the EHPP construction. 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 EHPP. If the telephone is not staffed 24 hours per day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This telephone number shall also be posted at the EHPP site during construction in a manner visible to passersby. This telephone

number shall be maintained until the EHPP has been operational for at least one year.

Verification: The project owner shall transmit to the Compliance Project Manager (CPM) in the first monthly construction report following the start of rough grading, a statement signed by the project manager attesting that the above notification has been performed, describing the method of that notification, and including a sample letter, poster or other notice, as appropriate. This statement shall also attest that the telephone number has been established and posted at the site.

NOISE-2 Throughout the construction and operation of the EHPP, the project owner shall document, investigate, evaluate, and attempt to resolve all project related noise complaints.

Protocol: The project owner shall:

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

Verification: Within 30 days of receiving a noise complaint, the project owner shall file a copy of the Noise Complaint Resolution Form, or similar instrument approved by the CPM, with Kern County and with the CPM documenting the resolution of the complaint. If mitigation is required to resolve a complaint, and the complaint is not resolved within a 30-day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is finally implemented.

NOISE-3 Prior to the start of construction of EHPP, the project owner shall submit to the CPM for review a noise control program. The noise control program shall be used to reduce employee exposure to high noise levels during construction and also to comply with applicable OSHA standards.

Verification: At least 30 days prior to the start of rough grading, the project owner shall submit to the CPM the above referenced program. The project owner shall make the program available to OSHA upon request.

NOISE-4 Upon the EHPP first achieving an output of 80 percent or greater of rated capacity, the project owner shall conduct a 25-hour community noise survey, utilizing the same monitoring sites employed in the pre-project ambient noise survey as a minimum. The survey shall also include the octave band pressure levels to ensure that no new pure-tone noise components have been introduced. No single piece of equipment shall be allowed to stand out as a dominant source of noise that draws complaints. Steam relief valves shall be adequately muffled to preclude noise that draws complaints. The noise contributed by the EHPP operation at the nearest residence in Valley Acres shall not exceed 40 dBA L_{50} (night) under normal operating conditions. If the results from the survey indicate that power plant noise levels are in excess of 40 dBA L_{50} (night) at the nearest residence, additional mitigation measures shall be implemented to reduce noise to a level of compliance with this limit. The mitigation measures (to be employed as required) may include (but not be limited to):

1. Provide standard outdoor/weather enclosures for the combustion turbine generator packages.
2. Provide air inlet silencers for the combustion turbines.

Protocol: The measurement of power plant noise for purposes of demonstrating compliance with this Condition may alternatively be made at an acceptable location closer to the plant (e.g. 400 to 1,000 feet from the plant boundary) and this measured level then mathematically extrapolated to determine the plant noise contribution at the nearest sensitive receptor in Valley Acres. However, notwithstanding the use of this alternative method for determining the noise level, the character of plant noise shall be evaluated at the nearest sensitive receptor to determine the presence of pure tones or other dominant sources of plant noise.

Verification: Within 30 days after completing the survey, the project owner shall submit a summary report of the survey to Kern County and the CPM. Included in the report will be a description of any additional mitigation measures necessary to achieve compliance with the above listed noise limits, and a schedule, subject to CPM approval, for implementing these measures. Within 30 days of completion of installation of these measures, the project owner shall submit to the CPM a summary report of a new noise survey, performed as described above and showing compliance with this condition.

NOISE-5 The project owner shall conduct an occupational noise survey to identify the noise hazardous areas in the facility. The survey shall be conducted within thirty (30) days after the facility is operating at an output of 80% of rated capacity or greater, and shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations sections 5095-5100 (Article 105) and Title 29, Code of Federal Regulations, Part 1910. The survey results shall be used to determine the magnitude of employee noise exposure. The project owner shall prepare a report of the survey results and, if necessary, identify proposed mitigation measures that will be employed to comply with the applicable state 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 upon request.

NOISE-6 Noisy construction work (that which causes off-site annoyance, as evidenced by the filing of a legitimate noise complaint) shall be restricted to the hours of: 7 a.m. to 7 p.m. on weekdays and from 8 a.m. to 6 p.m. on weekends and holidays.

Verification: The project owner shall transmit to the CPM in the first Monthly Construction Report a statement certifying that the above restrictions will be observed throughout the construction of the project.

NOISE COMPLAINT RESOLUTION FORM

Elk Hills Power Project
(99-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 3 feet from noise source _____ dBA Date: _____
Initial noise levels at complainant's property: _____ dBA Date: _____

Final noise levels at 3 feet from noise source: _____ dBA Date: _____
Final noise levels at complainant's property: _____ dBA Date: _____

Description of corrective measures taken:

Complainant's signature: _____ Date: _____

Approximate installed cost of corrective measures: $ _____
Date installation completed: _____
Date first letter sent to complainant: _____ (copy attached)
Date final letter sent to complainant: _____ (copy attached)

This information is certified to be correct:

Plant Manager's Signature: _____

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

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NOISE: APPENDIX A
FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

Noise levels can be measured in a number of ways. One common measurement, the equivalent sound level (L_{eq}), is the long-term A-weighted sound level that is equal to the level of a steady-state condition having the same energy as the time-varying noise, for a given situation and time period. (See NOISE: Table A1, below.) A day-night (L_{dn}) sound level measurement is similar to L_{eq}, but has a 10 dB weighting added to the night portion of the noise because noise during night time hours is considered more annoying than the same noise during the day.

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, dB	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 5 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}	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.
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.

Source: California Department of Health Services 1976.

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 dBA levels.

NOISE Table A2 Typical Environmental and Industry Sound Levels			
Source and Given Distance from that Source	A-Weighted Sound Level in Decibels (dBA)	Environmental Noise	Subjectivity/ Impression
Civil Defense Siren (100')	140-130		Pain Threshold
Jet Takeoff (200')	120		
Very Loud Music	110	Rock Music Concert	Very Loud
Pile Driver (50')	100		Very Loud
Ambulance Siren (100')	90	Boiler Room	Very Loud
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	Quiet
Large Transformer (200')	40		
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing
Source: Peterson and Gross 1974			

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 (Kryter 1970) 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 3-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 10-dB change is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response.

COMBINATION OF SOUND LEVELS

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

NOISE Table A3
Addition of Decibel Values

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

Source: Thumann, Table 2.3

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: OSHA Regulation

RELATIONSHIPS

$L_{dn} = 10 \log (1/24)[15x10^{(Ld/10)} + 9x10^{(Ln+10)/10}]$

Note: the 10-dB weighting added to the nighttime noise level. Daytime and nighttime are 15 hours (0700~2200 hrs) and 9 hours (2200~0700 hrs) respectively. L_d and L_n are the L_{eq} values over the 15 and 9 hours respectively. L_{dn} does not contain any consideration for tonal sounds, since it is derived from L_{eq} measurements.

CNEL is essentially the same as L_{dn}, except that different time segments are used in computation. The 24-hour period is divided into three segments instead of two. The day period (0700~1900 hours), evening (1900~2200 hours) and night (2200~0700 hours). The evening period is assigned 5-dB weighting and the nighttime is assigned 10-dB weighting. The extra 5 dB weighting during the evening results in higher values for CNEL that L_{dn}, but the difference is not statistically significant.

NOISE ATTENUATION

$[L_p]$ (at x = r) = $[L_p]$(at r = y) – 20log(x/y).

Where: x = distance to point where noise level is to be determined.
y = reference point.

$\Delta_{Loss} = 20\log (x/y)$.

Special case where x = 2y
$\Delta_{Loss} = 20\log (2y/y) = 20\log (2) = 6$

∴ As we double the distance, from a point source in free space, the noise level decreases by 6 dB.

VISUAL RESOURCES

David Flores

INTRODUCTION

Energy Commission staff analyzed both the potential visual impacts of the proposed Elk Hills Power Project (EHPP) and the compliance of the project with applicable laws, ordinances, regulations, and standards. Staff concludes that the project may cause significant adverse visual impacts in the area of Key Observation Points 1, 3, and 5 that are views of the power plant and proposed electrical transmission lines. These significant adverse visual impacts will be mitigated to less than significant levels by implementation of mitigation measures (light reflectors and color treatment at power plant and color treatment of power poles) requirements identified in this analysis. Also, the project after mitigation would not conflict with local policies regarding visual resources that are part of the applicable laws, ordinances, regulations, and standards. **VISUAL RESOURCES Table 2** provides an overall summary of staff's conclusion based on consideration of each Key Observation Point analyzed and the resultant values for visual impacts.

PURPOSE

Visual resources are the natural and cultural features of the environment that can be viewed. This analysis focuses on whether the EHPP would cause significant adverse visual impacts and whether the project would be in conformance with applicable laws, ordinances, regulations, and standards. The determination of the potential for significant impacts to visual resources resulting from the proposed project is required by the California Environmental Quality Act (CEQA) Public Resources Code section 21000 et seq. and Title 20, California Code of Regulations, section 1701 et seq.[1]. The determination of the conformance of the proposed project with applicable laws, ordinances, regulations, and standards is required by Public Resources Code, section 25525.

ORGANIZATION OF ANALYSIS

This analysis is organized as follows:

- describes staff's analysis methodology;
- describes applicable laws, ordinances, regulations and standards;
- assesses the visual setting of the proposed power plant site, including linear facility routes;
- evaluates the visual impacts of the proposed project on the existing setting;
- evaluates compliance of the project with applicable laws, ordinances, regulations, and standards; and

[1] The California Energy Commission's power plant siting regulations.

- recommends measures needed to mitigate any potential significant adverse visual impacts of the proposed project and to achieve compliance with applicable laws, ordinances, regulations, and standards.

METHODOLOGY

The methodology used in this visual assessment is described below and includes a description of the approach and process used, identification of the criteria used for visual assessment, and identification of the basis for identifying relevant significance criteria used in evaluating the impacts of the proposed project.

SIGNIFICANCE CRITERIA

Energy Commission staff considered the following criteria in determining whether a visual impact would be significant.

STATE

The CEQA Guidelines 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. "(Cal. Code Regs., tit.14, § 15382.)"

Appendix G of the Guidelines, under Aesthetics, includes four questions to be addressed regarding whether the potential impacts of a project are significant. These questions ask whether the project would:

a) have a substantial adverse effect on a scenic vista;

b) substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;

c) substantially degrade the existing visual character or quality of the site and its surroundings; or

d) create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

LOCAL

Energy Commission staff considers any local goals, policies or designations regarding visual resources. Conflicts with such laws, ordinances, regulations, and standards can constitute significant visual impacts. See the section on Applicable Laws, Ordinances, Regulations, and Standards.

PROFESSIONAL STANDARDS

Professionals in visual impact analysis have developed a number of questions as a means of evaluating the potential significance of visual impacts (see, e.g., Smardon 1986). The questions listed below address issues commonly raised in visual analyses for energy facilities:

- Will the project substantially alter the existing viewshed, including any changes in natural terrain?
- Will the project deviate substantially from the form, line, color, and texture of existing elements of the viewshed that contribute to visual quality?
- Will the project eliminate or block views of valuable visual resources?
- Will the project result in significant amounts of backscatter light into the nighttime sky?
- Will the project be in conflict with directly identified public preferences regarding visual resources?
- Will the project result in a significant reduction of sunlight, or the introduction of shadows, in areas used extensively by the community?
- Will the project result in a substantial visible exhaust plume?

KEY OBSERVATION POINTS

Energy Commission staff selected Key Observation Points[2](KOPs) to provide the basis for evaluation of project impacts by comparing the appearance before and after project construction. KOPs include locations that are chosen to be representative of the most critical locations from which the project would be seen.

EVALUATION PROCESS

For each KOP, Energy Commission staff considered the existing visual setting and the visual changes that the project would cause to determine impact significance. The applicant used Viewing Positions in the visual resources section of the application (EHPP 1999a). Energy Commission staff evaluated the appropriateness of these locations for its analysis and agreed with the selection of locations.

ELEMENTS OF THE VISUAL SETTING

To assess the existing visual setting, staff considered the following four elements:

Visual Quality - The value of visual resources. This analysis used an approach that considers visual quality as ranging from outstanding to low. Outstanding visual quality is a rating reserved for landscapes that would be what a viewer might think of as “picture postcard” landscapes. “Low visual quality describes landscapes that are often dominated by visually discordant human alterations, and do not provide views that people would find inviting or interesting” (Buhyoff et al., 1994). For projects in an urban setting such as the proposed project, visual quality typically ranges from high, such as for a park or major water view, to low, such as for an area of heavy industry.

Visual Sensitivity - A measurement of the level of interest or concern of viewers regarding the visual resources in an area. Official statements of public values and goals reflect viewers’ expectations regarding a visual setting. This analysis also

[2] The use of KOPs or similar view locations is common in visual resource analysis. The US Bureau of Land Management and the US Forest Service use such an approach.

employed land use as an indicator of viewer sensitivity. Uses associated with 1) designated parks, monuments, and wilderness areas, 2) scenic highways and corridors, 3) recreational areas, and 4) residential areas are highly sensitive. Commercial uses, including business parks, are generally moderately sensitive, with landscaping, building height limitations, and prohibition of above-ground utility lines demonstrating concern for visual quality. Large scale industrial uses are typically the least sensitive because workers are focused on their work, and generally are working in surroundings with relatively low visual value.

Visibility - Visibility can differ substantially between view locations, depending on screening and the angle of view. The smaller the degree of screening, the higher a feature's visibility is. The closer the feature is to the center of the view area, the greater its visibility.

Viewer Exposure - The degree to which viewers are exposed to a view is affected by distance, the number of viewers, and the duration of view. Viewer exposure can range from having high values for all three factors, such as a foreground view from a large number of residences, to having low values for all three factors, such as a brief background view for a few travelers.

TYPES OF VISUAL CHANGE

To assess the visual changes the project would cause, staff considered the following factors:

Dominance - One measure of change is *scale dominance* - the apparent size of an object relative to the visible expanse of the landscape and to the total field of view. Another measure of change is *spatial dominance* - the measure of the dominance of an object due to its location in the landscape. Dominance can range from subordinate to dominant.

Contrast – Visual contrast was evaluated in regard to the elements of color, form, line, and scale.[3] The degree of contrast can range from high to low.

View Blockage – View blockage is the blockage from view or elimination by the project of any previously visible components. Blockage of higher quality visual elements by lower quality elements causes adverse impacts. The degree of view blockage can range from strong to none.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

FEDERAL AND STATE

The proposed project, including the linear facilities, is located on private lands and is thus not subject to federal land management requirements. Likewise, no roadway in the project vicinity is a designated or eligible State Scenic Highway.

[3] Scale contrast is the scale of an object relative to other distinct objects or areas in the landscape.

Therefore, no federal or state regulations pertaining to scenic resources are applicable to the project

LOCAL

COUNTY OF KERN

GENERAL PLAN

Kern County has no specific policies on visual or aesthetic resources that apply to the Elk Hills project. However, these issues are addressed in the Kern County General Plan, Open Space Element, and are implemented by the Kern County Planning and Development Services Department (Kern County, 1994). This element of the General Plan requires public notification and review of any projects that may adversely impact visual resources. In accordance with Chapter 19.86 of the Kern County Zoning Code, the applicant is required to prepare a Landscape Plan when final construction drawings of the project are completed. Staff has addressed this requirement under the Condition of Certification section (**VIS–5**) of this analysis. The Elk Hills project is generally consistent with the land use designation for the area, and therefore is considered consistent with associated visual resource planning purposes and General Plan requirements.

PROJECT DESCRIPTION

The proposed EHPP will be a nominal 500-megawatt (MW), natural gas-fired combined cycle power plant located in the Elk Hills region of western Kern County. The site is about 25 miles west of Bakersfield, California, 9 miles south of the unincorporated community of Buttonwillow, California, and 9 miles north of Taft, California. The 12 acre site is a part of the 47,000 acre Elk Hills Oil and Gas Field operated by Occidental of Elk Hills Inc. (OEHI), formerly the Elk Hills Naval Petroleum Reserve. The site is currently occupied by out-of-service tanks and related equipment formerly used for the storage and loading of propane, butane, and natural gas liquid products.

WATER SUPPLY LINE

A 16-inch, 9.8-mile long cooling water supply pipeline will be installed from the plant site to the West Kern County Water District distribution facility adjacent to the California Aqueduct's intersection with state Highway 119. The water pipeline will be above ground from the power plant site to milepoint (MP) 5.7. The waterline will be placed on 6-inch high concrete sleepers spaced at intervals of approximately 25 feet. The water pipeline will be underground from MP 5.7 to its termination at the West Kern County Water District distribution facility (MP 9.8).

NATURAL GAS PIPELINE

A new gas pipeline will not be required, as locally produced natural gas is available on site. The facility intertie to the existing pipeline will be 250-300 feet in length. The project's gas supply line will also connect to a new 16-inch tie to a Pacific Gas and Electric Company pipeline to the east.

WASTEWATER PIPELINE

The 6-inch wastewater pipeline will be carried above ground and placed on 6-inch high concrete sleepers spaced at intervals of approximately 25 feet. The wastewater will be disposed of in injection wells to be drilled adjacent to Elk Hills Road at the edge of Buena Vista Valley. The wastewater pipeline will be located entirely within the Elk Hills Oil and Gas Field.

TRANSMISSION LINE

The preferred transmission line, Route 1A, would be 9 miles long and would terminate at a new substation located on the west side of the California Aqueduct near the community of Tupman. The substation would connect with the existing 230 kV Midway-Wheeler Ridge transmission line. Route 1B would parallel the existing 115 kV Midway-Taft transmission line and would interconnect at the Midway Substation at Buttonwillow.

With the recent variation by EHPP to relocate a portion Alternate Route 1B from the plant site to the California Aqueduct, staff has reviewed the proposed linear route (Route 1B) and determined that the linear facilities will not adversely effect views significantly. Staff has provided mitigation (Staff Mitigation 1) which insures painting of the transmission poles to a color consistent with the surrounding area.

SETTING

REGIONAL SETTING

The project site lies about 25 miles west of Bakersfield along the southwestern edge of the San Joaquin Valley. The landscape includes the Elk Hills and portions of the flat valley lands to the north. The Elk Hills are a 16-mile long, 6-mile wide southeast trending foothill spur of the Temblor range. The ridges of the Elk Hills rise 1,000 to 1,200 feet above the floor of the adjacent San Joaquin Valley. The climate is arid, and the hills are covered with a mantle of low growing annual grasses. Elk Hills has been subject to intensive oil and gas exploration since the early part of the 20th century, and the natural landscape has been modified extensively. A network of access roads, terraced drilling areas, oil pumps, above ground pipelines, and storage tanks crisscrosses the hills in the area of the project site. Oil and gas processing facilities are all prominently visible within the landscape pattern. Most of the Elk Hills Oil and Gas Field lands have been fenced off during the time it was a Naval Petroleum Reserve and public access restricted, and these public access restrictions have been continued by Occidental of Elk Hills, Inc. (OEHI). The only part of the area open to public use is Elk Hills Road, a county highway that passes north/south across the center of the range. This road provides the only close up views of the landscape of the Elk Hills.

As provided in the Application for Certification, the small number of residences scattered through this area tend to be farm homes rather than non-farm rural residences, and residential uses are secondary to this area's agricultural function.

The landscape consists of roads, canals, power lines, agricultural storage facilities are very prominent and little natural vegetation and landscaping is visible.

Communities in the project area include Dustin Acres, Valley Acres, Tupman, and Buttonwillow. Dustin Acres and Valley Acres are small unincorporated residential communities located along Highway 119 in the Buena Vista Valley, which lies along the southern edge of the Elk Hills range. Tupman is a small, unincorporated residential community located in the eastern end of the Elk Hills at the base of its northern slopes.

Buttonwillow is an unincorporated community located on the flat lands approximately four miles north of the northern edge of the Elk Hills range. Buttonwillow is the largest of the communities in the project area and consist of residential homes and commercial service centers for the surrounding agricultural operations in the area.

The Tule Elk State Reserve (Reserve) is located north of the Elk Hills range on the flat valley lands northeast of Tupman. The reserve is a 956-acre sanctuary for the Tule or dwarf elk. The facilities consist of a visitor's center, picnic grounds, and viewing area, located at the Reserve's north end along Station Road.

The proposed power plant will be visible from the Reserve. As indicated in the AFC Figure 5.10-1, portions of the transmission line along Route 1A would be visible from the visitor center and viewing platform at the Reserve. However, given the distance (2.5 miles) and the fact the transmission line would be viewed against the backdrop of the hills, the line would not be highly visible, and would be a minor element in the overall landscape scene. Also given the distance the transmission line would have little effect on the character and quality of the scenery experienced by visitors to the reserve. Therefore, staff has not addressed the Tule Elk State Reserve in the visual analysis section of this report.

PROJECT AREA SETTING

The project site will be located on a 12-acre parcel located on a large, generally flat plateau on the crest of the Elk Hills range. The site lies on the west side of Elk Hills Road (county) near the intersection of Skyline Road (private) within a complex of gas processing facilities operated by OEHI. In addition to the gas processing facilities, this complex also includes a cogeneration plant, a liquidfied petroleum gas storage and loading facility, a maintenance facility, and a single story administration building. Much of the land has been graded; some of the graded areas have been paved, but much of the graded areas have been left with either dirt or gravel surfaces. The only vegetation consists of low-growing annual grasses. The area on which the plant will be developed is an area that was occupied by a cluster of large out of service, spherical-shaped tanks and a row of fourteen, large out-of-service bullet tanks, which will be removed from the site by the end of 1999.

KEY OBSERVATION POINTS

As provided in the AFC (AFC pg.5.10-5, Section 5.10.1.6), the consultant structured the analysis of the project effects by identifying the view areas most sensitive to the

project's potential visual impacts, and in consultation with Energy Commission staff, five Observation Points (KOPs) were selected for the development of photo simulations that could be used as a basis for visualizing the plant's potential effects. This analysis focuses on viewers who are highly sensitive to changes in the visual setting and on existing visual features that affect the visual quality, visibility, and visual exposure to the proposed project for those viewers. **VISUAL RESOURCES Figure 1** shows the location of the KOPs used in this analysis and the direction of each view.

Because the water supply and wastewater lines will be either underground or on the ground and will be either not visible or not highly visible, and because they will, for the most part be located within the 74 square mile boundaries of the Elk Hills Oil and Gas Field to which public access is restricted, KOPs were not identified or defined for these features.

VISUAL RESOURCES Table 2 shows the value for visual quality, viewer sensitivity, visibility, and viewer exposure considered for each of the Key Observation Points analyzed in this section and the resultant values for visual impacts. Table 2 also serves an overall summary of staff's analysis for this section:

VISUAL RESOURCES Figure 1
Key Observation Points

This figure is not available in electronic format.

VISUAL RESOURCES Table 2
Summary of Visual Impact Susceptibility - Key Observation Points

	VISUAL QUALITY	VIEWER SENSITIVITY	VISIBILITY	VIEWER EXPOSURE
Key Observation Point 1	Low	Low	Moderate	Moderate
Key Observation Point 2	Low to Moderate	Low	Moderate	Moderate
Key Observation Point 3	Moderate	Moderate	Moderate to High	Moderate to High
Key Observation Point 4	Low to Moderate	Low	Low to Moderate	Moderate
Key Observation Point 5	Moderate	Moderate	Moderate to High	Moderate

KEY OBSERVATION POINT 1 – POWER PLANT

KOP 1(see **VISUAL RESOURCES Figure 1** for location) represents the view toward the site from Elk Hills Road in the plateau area. The KOP is located on the east side of the road, at a point approximately 1,100 feet south of the Elk Hills Road intersection with Skyline Road, a private road that provides restricted access to the Elk Hills Oil and Gas Field.

Visibility

Approximately 900 vehicles per day travel on Elk Hills Road. From a visibility standpoint, the plant will be seen in the foreground and middleground views from Elk Hills Road; at its closest point, the plant site will be within 600 feet of the road.

Visual Quality

The view of KOP 1 has the character of an arid, open landscape devoted to oil and gas production and gas processing facilities. Wooded power poles, oil pumps, surface pipelines, tanks, portable buildings, and heavy equipment are elements of the landscape scene. Because industry characterizes these views and no features of higher quality are present, visual quality in this view is low.

Viewer Exposure

Approximately 900 vehicles per day travel on Elk Hills Road. For travelers on Elk Hills Road, considering the foreground distance and the small number of viewers, the viewer exposure is moderate.

KEY OBSERVATION POINT 2- ELK HILLS ROAD

KOP 2(see **VISUAL RESOURCES Figure 2** for location) represents the view of the new transmission line from Elk Hills Road in the area north of the proposed plant.

Visibility

The traveling public can see the proposed transmission line on Elk Hills Road at a rate of approximately 900 vehicles per day. As provided in the AFC, the transmission line will be part of a view in which the line and poles will be in the center of road users' cone of vision. The KOP is located on Elk Hills Road, approximately 800 feet north of where the existing 115 kV line crosses the road and approximately 1,550 feet north of where the proposed line will cross.

Visual Quality

The view from KOP 2 includes the road, the road cut, and the existing PG&E 115 kV lines 105-foot steel lattice poles. The landscape visible in this view is disturbed by the patterns in the grass on the hillsides indicating the presence of access roads related to oil and gas production activities. Because the landscape visible from KOP 2 is disturbed, the visual quality is low to moderate.

Viewer Exposure

Considering the foreground distance, the small number of viewers (900 vehicles per day) and the moderate duration of view, viewer exposure is moderate for Key Observation Point 2.

KEY OBSERVATION POINT 3- TRANSMISSION LINE-COMMUNITY OF TUPMAN

KOP 3 (see **VISUAL RESOURCES Figure 3** for location) represents the eastern view of a portion of the transmission line alternative Route 1A that will be most visible from the community of Tupman, an unincorporated community with fewer than 100 residents.

Visibility

The transmission line will be visible from up to 18 homes at the periphery of the community that have unobstructed views towards the route's alignment. The transmission line will also be visible from the Elk Hills Elementary School grounds and the adjacent God's Oasis Church, which are located on the western edge of the community. Visibility is considered moderate to high.

Visual Quality

The view from KOP 3 is toward the southwest that takes in a part of the school gymnasium, a portion of the school grounds, and existing distribution line that will be partially paralleled by the proposed transmission line. The school gymnasium is

33 feet high and the height of the existing distribution line wood poles is 43 feet. Because the view includes existing structures such as the school, church building, and an existing transmission line, visual quality is moderate.

Visual Exposure

The two proposed transmission poles are in the middleground from this KOP. The number of viewers is moderate, and the view duration is long. Therefore, viewer exposure is moderate to high.

KEY OBSERVATION POINT 4- TRANSMISSION LINE- EAST OF TUPMAN

KOP 4 (see **VISUAL RESOURCES Figure 4** for location) represents the view east of Tupman as the alignment of the transmission line alternative Route 1A crosses Tupman Road and travels across the open grasslands to the east where it terminates at the proposed substation.

Visibility

The transmission line will be visible to a handful of homes at the most easterly edge of the community of Tupman. The transmission line will also be visible to approximately 360 vehicles per day on Tupman Road. Visibility is considered low to moderate.

Visual Quality

The view from KOP 4 is panoramic across the valley. The terrain in this area is flat to slightly rolling. The vegetation is low grasses and the view is unobstructed. Existing wooden electrical distribution lines (37 feet high) are in the foreground. Visual quality is considered low to moderate for KOP 4.

Visual Exposure

Considering the middle-ground distance from the KOP to the proposed transmission line, the small number of viewers, and the moderate duration of view, visual exposure for KOP 4 is moderate.

KEY OBSERVATION POINT 5- WASCO WAY TRANSMISSION LINE

KOP 5 (see **VISUAL RESOURCES Figure 5** for location) represents the alignment of the transmission line alternative Route 1B which follows along the east edge of Wasco Way, where it lies within the immediate foreground of the road.

Visibility

The corridor along Wasco Way includes scattered rural residences. On the west side of the road, there are two residences and a 10-unit agricultural labor housing complex. On the east side of the road, adjacent to the proposed alignment, there are five residences; in addition, there is also a residence on Beurkle Road just east of Wasco Way in close proximity to the alignment. Because of the presence of rural residence, visibility is considered moderate to high.

Visual Quality

The view from KOP 5 is northward that takes in the existing electrical distribution line carried on 32-foot high wood poles. In addition the view takes in the 71-foot high concrete poles carrying the PG& E 115 kV transmission line. Portions of the agricultural field that border the road and homes on both sides of the road are shown from this viewpoint. Because of the presence of rural residences, existing distribution lines and agricultural landscaping, visual quality is considered moderate.

Visual Exposure

Considering the foreground distance of the proposed electrical distribution line from the existing residences, the small number of viewers (approximately 900 vehicles per day and scattered rural residences), viewer exposure is moderate and view duration is long. Considering these factors, viewer exposure is moderate for Key Observation Point 5.

IMPACTS

CONSTRUCTION IMPACTS

PROJECT SITE

The period of construction for the main site and offsite utility installation is expected to take about 20 months and would entail heavy construction equipment, temporary office facilities, laydown and storage area, and truck traffic. The power plant site is sufficiently far from residences that visual impacts due to construction would not be significant.

ELECTRICAL TRANSMISSION LINES

Construction activities for the transmission lines would involve drilling holes for tower foundations, installation of the foundation reinforcement and structure anchoring equipment, the placement of concrete for foundations, the installation of the structures, and the two transition stations.

Construction of the transmission line and transition stations would take approximately three months to complete and would occur within the overall timeframe for the construction activities at the power plant site.

NATURAL GAS LINES, WATER SUPPLY AND WASTEWATER PIPELINES

A 10-inch diameter pipeline that will extend a short (2,500 feet) distance from an existing 20-inch pipeline will provide natural gas. Although the pipeline will lie on top of the ground, because it will be located behind the plant as viewed from Elk Hills Road, it will not be prominently visible from publicly accessible areas. Visual impacts during construction would not be significant.

A new 16-inch diameter steel water pipeline will lie within an established right of way and adjacent to an existing line. Like the existing line it parallels, the water line

will be above ground in the area between the power plant and MP 5.7, and underground between MP 5.7 and its point of origin at the West Kern Water District distribution facility adjacent to the California Aqueduct at Highway 119. The above ground portion of the water line will lie entirely within the Elk Hills Oil and Gas Field and will only be visible to the public from a small area along Elk Hills Road. From staff's perspective, the pipeline will be seen in the context of the existing oil and gas facilities and would not produce a significant change in visual conditions.

The wastewater line will be a 6-inch steel pipeline and will be located above ground. For most of its length, the pipeline will parallel an existing above ground pipeline. The proposed 6-inch pipeline will parallel Elk Hills Road and may be visible from it in various areas. Because of the pipeline size and its general consistency with other features in this landscape, it will not have a significant effect on the visual quality of the landscape through the area it passes.

OPERATIONS IMPACTS

KEY OBSERVATION POINT 1

Visual Resources Figure 1b shows the view from KOP 1 with the proposed project simulated in the view. As shown, the plant will be clearly visible from Elk Hills Road and will add a new element to the view. From the perspective of form, line, color, texture, scale dominance, and spatial dominance, because of its location, and general consistency with the existing oil and gas processing facility adjacent to the project site, the project will not appreciably change the character and quality of the landscape visible from the road. It can be concluded that the proposed plant will not have a significant impact based on the following summarization of visual factors for KOP 1:

- viewer sensitivity is low;
- visual quality is low for the traveling public with views of the project generally seen by the local oil workers in the area;
- visibility is moderate;
- viewer exposure is moderate;
- the highest levels of contrast would be moderate;
- scale dominance would be negligible;
- spatial dominance would be co-dominant with the existing gas processing and cogeneration facility adjacent to the proposed power plant facility; and
- view blockage would be negligible.

Considering all of these factors, the visual impact would be less than significant from the view area represented by KOP 1.

KEY OBSERVATION POINT 2

Visual Resources Figure 2B shows the view from KOP 2 as one of the proposed transmission line's poles will be visible within the cone of vision of travelers

(approximately 900 vehicles per day) on Elk Hills Road. From this KOP, the new transmission line will appear slightly smaller than the existing PG&E 115 kV line located in the foreground. The transmission line will increase the density of transmission poles visible from this KOP, but will not substantially change the quality of view. It can be concluded that the proposed transmission lines in this area will not have a significant impact based on the following summarization of visual factors for KOP 2:

- viewer sensitivity is low;
- visual quality in this area is low to moderate for the traveling public with views of the transmission line;
- visibility is moderate;
- viewer exposure is moderate as the view generally will be seen by local oil workers in the area;
- the highest levels of contrast would be low;
- scale dominance would be negligible;
- spatial dominance would be co-dominant with the existing transmission lines in the area; and
- view blockage would be negligible.

Considering all these factors, visual impact would be less than significant from the view area represented form KOP 2.

KEY OBSERVATION POINT 3

Visual Resources Figure 3B shows the view from KOP 3 as it represents the proposed Transmission Line Alternative 1A as viewed from the area across the street from the Elk Hills School and God's Oasis Church in the community of Tupman.

CONTRAST WITH STRUCTURES

From Key Observation Point 3, the most prominent existing structures are the 43-foot high wood electrical distribution poles in the foreground. From this view, the nearest proposed 120-foot high transmission line would be approximately 1,000 feet from the nearest structures (school and church building). The proposed transmission poles will be in the middleground and will appear slightly taller than the existing distribution poles. The form and line of the proposed poles would be similar to the existing poles. The poles also would be galvanized steel and will be colored to match the color and texture with the existing poles. In summary, the proposed poles would cause moderate contrast in form, line, color, texture, and scale.

Contrast with Vegetation

Vegetation visible in the view from Key Observation Point 3 consist of a variety of seasonal grasses and low shrubs. The vertical form of the poles would contrast highly to the low, irregular form of the natural arid vegetation. The straight lines of the poles would similarly contrast with the existing vegetation. The color tones of

the poles would contrast moderately with the texture of the vegetation. The towers would be substantially larger than any of the vegetation, so scale contrast would be high. However, the proposed transmission line would only add incrementally to the contrast with vegetation caused by the existing poles, which are closer to the school and church buildings, so contrast with vegetation would be low.

Contrast with Land/Water

No water is visible in this view. The landforms consists of flat natural land with the Elk Hills visible in the horizon. The proposed transmission poles would contrast highly with this land surface in regard to form and line. The earth tone colors of the transmission line would cause moderate contrast with the natural terrain of the landforms of this viewpoint. The flat texture of the poles would cause moderate contrast with the texture of the land. The existing school gymnasium in the foreground would compliment the transmission lines in the background, so scale contrast would be moderate.

Scale Dominance

The group of proposed transmission poles visible from this viewpoint would be moderate in size compared to the panoramic field of view and would occupy a moderate part of the setting. Therefore, scale dominance from Key Observation Point 3 would be co-dominant.

Spatial Dominance

Because the spatial composition of the view from Key Observation Point 3 is panoramic, the towers would be subordinate in regard to composition. Spatial dominance would be prominent in regard to position. Because the transmission poles would be almost backdropped by sky, spatial dominance in regard to backdrop would be prominent. The overall spatial dominance rating would be co-dominant, similar to the existing poles.

View Blockage

From Key Observation Point 3, the proposed poles would only block a small portion of the field of vision. Therefore, the amount of view blockage is minimal.

Visual Impact Severity

Because scale dominance would be co-dominant, the project's visual impact severity from Key Observation Point 3 would be high. (see **VISUAL RESOURCES APPENDIX B-Table B-1**).

KEY OBSERVATION POINT 4

Visual Resources Figure 4B shows the view from KOP 4 as it represents the view toward the transmission line Alternative 1A's crossing of Tupman Road and its termination at a new substation located adjacent to the California Aqueduct. As further shown in the view from KOP 4, there exist wooden utility poles in the foreground and existing lattice steel towers of the Midway-Wheeler Ridge 230Kv line are visible in the middleground. The proposed transmission line will be prominently visible in this view and will have a small degree of impact on the visual

character and quality of the view due to the existence of the existing linear facilities in the area. Residential viewers are ½ mile or more from the new transmission line and substation. The distance will significantly reduce the apparent size of the transmission line. It can be concluded that the proposed transmission lines in this area will not have a significant impact based on the following summarization of visual factors for KOP 4:

- visual sensitivity is low;
- visual quality is low to moderate for the traveling public with views of the transmission line as the view generally will be seen by local oil workers in the area;
- visibility is low to moderate;
- viewer exposure is moderate;
- the highest levels of contrast would be low;
- scale dominance would be negligible;
- spatial dominance would be co-dominant; and
- view blockage would be negligible.

Considering all these factors, visual impacts would be less than significant from the view area represented by KOP 4.

KEY OBSERVATION POINT 5

Visual Resources Figure 5B shows the view from KOP 5 as it represents the view from the corner of Wasco Way and Stockdale Highway, looking north along the alignment that the Alternative 1B would follow along the east side of Wasco Way.

Contrast with Structures

From Key Observation Point 5, the most prominent existing structures are the 32-foot high wood electrical distribution poles (eastern edge of Wasco Way) and 71-foot high concrete poles that support the PG&E 115 kV line that runs along the western edge of Wasco Way. From this view, the proposed 120-foot high transmission poles will replace the existing 32-foot high wood distribution poles and appear considerably taller than the existing 71-foot high distribution poles. The form and line of the proposed poles would be similar to the existing poles. The poles also would be galvanized steel and will be colored to match the color and texture of the existing poles. There are approximately six rural residential units along Wasco Way. With the removal of the existing 12kV wood pole line and its replacement with the new 120–foot high steel poles, the new transmission line will be more widely spaced and sited to avoid placement of the poles on or near the yards of the homes. In summary, because the power poles which now line both sides of the road, Wasco Way already appears as a well-defined transmission corridor, with the proposed poles causing a moderate contrast in form, line, color, texture, and scale.

Contrast with Vegetation

Vegetation visible in the view from Key Observation Point 5 consist of a variety of agricultural row crops. The vertical form of the poles would contrast highly to the low, irregular form of the agricultural fields. The straight lines of the poles would similarly contrast with the existing vegetation. The color tones of the poles would contrast moderately with the texture of the vegetation. The towers would be substantially larger than any of the vegetation, so scale contrast would be high. However, the proposed transmission line would only add incrementally to the contrast with vegetation caused by the existing poles, which are on the west side of Wasco Way, so contrast with vegetation would be low.

Contrast with Land/Water

No water is visible in this view. The landforms consists of flat natural land, planted in various agricultural row crops. The proposed transmission poles would contrast highly with this land surface in regard to form and line. The earth tone colors of the transmission line would cause moderate contrast with the natural terrain of the landforms of this viewpoint. The flat texture of the poles would cause moderate contrast with the texture of the land. The existing transmission line on the west side of Wasco Way would compliment proposed transmission line on the east side of the road, so scale contrast would be moderate.

Scale Dominance

The group of proposed transmission poles visible from this viewpoint would be moderate in size compared to the panoramic field of view and would occupy a moderate part of the setting. Therefore, scale dominance from Key Observation Point 5 would be co-dominant.

Spatial Dominance

Because the spatial composition of the view from Key Observation Point 5 is panoramic, the towers would be subordinate in regard to composition. Spatial dominance would be prominent in regard to position. Because the transmission poles would be almost backdropped by sky, spatial dominance in regard to backdrop would be prominent. The overall spatial dominance rating would be co-dominant, similar to the existing poles.

View Blockage

From Key Observation Point 5, the applicant has indicated their intent to avoid placement of the transmission poles on or near the yards of the homes on the east side of the street or directly across from homes on the west side. With this proposal, residents will see fewer poles in the area in front of their homes. The poles that residents will see in views looking up and down the road will be taller that exist now. Staff agrees with the AFC (AFC pg.5.10-17) that the perceived visual dominance of these taller poles will be reduced by their distance from the homes and by their relationship to the existing PG&E 115 kV line on the opposite side of the road. With the new line, the visible number of conductors crossing the front of properties on the east side of Wasco Way will be increased from 3 to 6, but they will be less noticeable in that they will be higher and more likely out of the normal view

plane of nearby viewers. The proposed linear facilities will not block the panoramic view of the agricultural setting, so the proposed poles would only block a small portion of the field of vision. Therefore, the severity of view blockage would be low.

Visual Impact Severity

Because scale dominance would be co-dominant, the project's visual impact severity from Key Observation Point 5 would be high. (See **VISUAL RESOURCES APPENDIX B, Table B-1**).

LIGHTING

Although the proposed power plant is in an industrial area, existing lighting levels are generally low in the immediate vicinity. Exterior lighting for the proposed power plant therefore has the potential to considerably increase lighting levels, creating glare, backscatter to the nighttime sky, and illumination of visible plumes. The applicant has proposed measures to reduce such impacts, and Energy Commission staff has expanded these measures in the proposed condition of certification.

VISIBLE PLUMES

COOLING TOWER PLUME CHARACTERISTICS

The potential exists for white vapor plumes (water vapor condensation from the exhaust) to be visible from the project stacks and cooling tower. The frequency, persistence, and size of visible condensate plumes depends primarily on the design and type of combustion turbine generator, heat recovery steam generator, auxiliary boiler, and cooling tower, as well as meteorological conditions of temperature and humidity.

The plume of steam rising from the cooling towers could project upward as much as 1,000 feet from the ground under worst case conditions of temperature and atmospheric conditions.

Although condensate plumes usually tend to dissipate fairly quickly, because of the meteorological conditions in late November, December, and January, such a plume tends to linger and not dissipate as rapidly. However, this is also the foggy season and such plumes will not be visible during much of the time. During the rest of the period when conditions are favorable for steam plume formation, the length of time under which plumes may occur is limited to short periods on any particular day.

Viewshed

The viewshed for the plume is substantially larger than that for the project structures because the plume's maximum height will be much greater than the height of the structures. The tallest proposed structures are the two stacks, proposed to be 120 feet tall. The maximum predicted height of the plume above the cooling towers is over 1,000 feet. The primary area of viewshed is along Elk Hills Road, which is not a heavily traveled public road.

Visual Quality

The cooling tower plume's viewshed includes the McKittrick Valley and the surrounding hills. Portions of the natural landscape have been altered by oil production facilities, so visual quality is low to moderate.

Viewer Sensitivity

Travelers on Elk Hills Road vary in visual sensitivity. Those travelers commuting to and from work in the oil fields are considered to have low visual sensitivity. Other travelers on this roadway are considered to have moderate visual sensitivity because the area is not known for its scenic value, so few recreational travelers use this roadway.

Visibility

Elk Hills Road runs perpendicular to the power plant site, so visibility is low to moderate for travelers.

Viewer Exposure

The factors determining viewer exposure are distance, the number of viewers and the duration of exposure. The number of travelers on Elk Hills Road in this area is approximately 900 vehicles per day (EHPP 1998a, PG.5.10-6). Therefore, the number of traveling viewers is low. The duration of view is moderate due to the variable presence and size of the plume and due to the differences in activities between viewers. Although condensate plumes usually tend to dissipate fairly quickly, because of the meteorological conditions in late November, December, and January, such a plume tends to linger and not dissipate as rapidly. However, this is also the foggy season and such plumes will not be visible during much of the time. During the rest of the period when conditions are favorable for steam plume formation, the length of time under which plumes may occur is limited to short periods on any particular day. Considering these limitations, duration of view is low for the traveling public. Maximum duration of view for travelers on Elk Hills Road is between one and two minutes because of hills, and actual duration for these travelers is further restricted by the weather conditions previously discussed. Therefore, expected duration of view for travelers is short. In summary, for the traveling public, the viewing distance is middleground, the number of viewers is low, and the duration of view is very short, so overall visual exposure for travelers is low to moderate.

Visual Impact Susceptibility

For travelers on Elk Hills Road, visual quality is low to moderate, visual sensitivity is low to moderate, visibility is low to moderate, and viewer exposure is low to moderate. Considering these factors, for travelers on Elk Hills Road visual impact susceptibility low to moderate.

Contrast

Existing Structures

The visible cooling tower plume from the proposed project would cause strong contrast to the surrounding existing structures (oil facilities). Color, line and texture contrast of the plume varies dependent on weather conditions in the area. Scale contrast would be high due to the visibility of the semi-rural setting mixed with oil production facilities in the area. An existing gas processing and cogeneration plant are adjacent to the proposed plant with various tanks and oil wells. The highest structures currently on site consist of a 100-foot high distillation column and a 60-foot high cooling tower associated with the Lean Oil Absorption Plant. To the extent of their contrast with the plume, the massive size of the plume contributes highly to the already diminished quality of the views the area. In summary, during the limited times over the year that the cooling tower plume will occur, it would cause high contrast in regard to form, scale, line, color, and texture.

Vegetation

The visible cooling tower plume from the proposed project considered in relation to vegetation would cause high contrast in regard to the low, rectilinear form of the Elk Hills and natural field grasses in the area. The plume would cause high contrast in regard to the line of the terrain. The white to light gray color of the plume would create high contrast with the seasonally green to tan colors of the vegetation. The plume's soft, irregular texture would contrast moderately to the more distinct but irregular texture of the vegetation. The plume would cause high contrast with the vegetation in regard to scale because it would appear taller than any vegetation when it is visible. In summary, in regard to vegetation, during the limited times over the year that the cooling tower plume would occur, the proposed project would cause high contrast in regard to form, line, color, and scale, and moderate contrast in regard to texture.

Land/Sky

The cooling tower plume would cause high contrast in regard to the form of the land, which consists of flat valley views, some of which have the Elk Hills on the horizon. The plume of steam rising from the cooling towers will occur intermittently.

The plume would cause high contrast in regard to the generally straight line of the horizon and the irregular line of the Elk Hills. The plume would cause high contrast regarding color when the sky is clear and low contrast when the sky is cloudy. The plume would cause moderate contrast with the moderately varied texture of the land. The plume would cause high contrast with the scale of the land, appearing taller than any land feature. In summary, in regard to land/sky, during the limited times over the year that the cooling tower plume would occur, the proposed project would cause high contrast in regard to form, line, color, and scale, and moderate contrast in regard to texture.

Scale Dominance

The cooling tower plume from the proposed project, although it would occur only during limited times of the year, because of its substantial height and width and middle ground distance, it would be a prominent element in the field of view, so the plume would create a co-dominant level of scale dominance.

Spatial Dominance

The cooling tower plume from the proposed project would vary in its location in the view depending on the viewpoint, so its spatial dominance would vary from subordinate to prominent in regard to composition. Because of its middleground location, spatial dominance would be between prominent and subordinate in regard to position. Because the plume would be partially backdropped by sky, spatial dominance in regard to backdrop would be between prominent and subordinate. Overall, spatial dominance would be co-dominant.

View Blockage

For the traveling public in the viewshed of the plume, during the limited times over the year it would occur, the plume would block a moderate portion of the view of the Elk Hills. Therefore, the severity of view blockage would be moderate.

Visual Impact Severity

Because a) contrast of the cooling tower plume with existing structures would be high in regard to form, b) contrast with vegetation would be high in regard to form, line, and color, c) contrast with land/sky would be moderate in regard to form, line, and color, d) scale dominance would be co-dominant, and e) spatial dominance would be co-dominant, the cooling tower plume's visual impact severity would be moderate (see **VISUAL RESOURCES Table B-1**).

Visual Impact

For travelers on Elk Hills Road, visual impact susceptibility is low to moderate and the visual impact severity of the cooling tower plume, during the limited times of the year that it would occur, would be strong, so visual impacts would be less than significant. This also takes into account the limited times per year that the plume would occur, the generally poor weather conditions expected when the plume would occur, and no affected residences in the area.

CUMULATIVE IMPACTS

The proposed power plant would add a noticeable but not considerable increment to the existing industrial character of this portion of Elk Hills. In regard to the potential for cumulative visual impacts from the proposed Sunrise Cogeneration Power Plant, the proposed La Paloma Power Plant, and the proposed Midway-Sunset Project, almost none of the residential viewers with a view of one of these plants would have a view of the other plants, so the three plants would not cause a cumulative visual impact for local residents. In addition the viewshed is visually separate by approximately 7 to 8 miles. The transmission line proposed as part of the La Paloma project terminates at the Midway Substation near Buttonwillow, as does Transmission Line 1B for the EHPP. Cumulative impacts at Midway Substation will

be insignificant because the two-transmission lines approach the substation from different directions. The Buttonwillow area already has a high density of transmission lines and the incremental impact of the EHPP will be difficult to distinguish from the other transmission lines. In conclusion, the proposed power plant would not contribute substantially to a significant cumulative visual impact.

FACILITY CLOSURE

INTRODUCTION

There are at least three circumstances in which a facility closure can take place, planned closure, unexpected temporary closure and unexpected permanent closure**.**

PLANNED CLOSURE

Planned closure occurs at the end of a project's life, 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. The closure plan that the project owner is required to prepare should address removal of the power plant structures and the transmission poles to reduce visual impacts.

UNEXPECTED TEMPORARY CLOSURE

Unexpected 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. No special conditions regarding visual resources are expected to be required to address temporary closure.

UNEXPECTED PERMANENT CLOSURE

Unexpected permanent closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unexpected closure where the owner remains accountable for implementing the on-site contingency plan. It can also include unexpected closure where the project owner is unable to implement the contingency plan, and the project is essentially abandoned. The contingency plan that the project owner is required to prepare should address removal of the power plant structures and the transmission poles to reduce visual impacts.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS AND STANDARDS

LOCAL

COUNTY OF KERN

The applicant has proposed to prepare a Landscape Plan when final construction drawings of the project are completed. The Landscape Plan is intended to conform to

the landscape requirements in Chapter 19.86 of the Kern County Zoning Code. Once available, the applicant will send a copy of the Landscape Plan to the Energy Commission for review. Staff recommends the adoption of a Condition of Certification to ensure that the Landscape Plan and its implementation satisfy the requirements of the Kern County General Plan and Zoning Code.

APPLICANT'S PROPOSED MITIGATION

SPECIFIC MITIGATION MEASURES

The Applicant has proposed eight mitigation measures "to make the project more aesthetically acceptable" (EHPP 1998, p.5.10-18):

- All structures, stacks, buildings, and tanks will be constructed of materials that restrict glare, and will be finished with flat, neutral gray tones that will blend with the surrounding environment.
- All fencing will be constructed of non-reflective materials that are non-glare, and will be painted using colors that are unobtrusive.
- Signs at the site will be constructed of non-reflective materials that non-glare, and will be painted using colors that are unobtrusive.
- Lighting at the power plant site will be limited to areas required for safety.

Transmission Line:

- In the corridor along the east side of Wasco Way, the transmission poles will be sited so as to avoid locations in or near the front yards of residences located on the east side of the road or directly opposite of residences located on the road's west side.
- At the points where the transmission line would cross major roads, the poles have been sited 100 feet or more from the road's edge to reduce impacts on views from the road.
- The transmission poles and the elements of the substation will be finished with flat neutral gray tones that will blend with the surrounding environment.
- Non-specular conductors and non-reflective and non-refractive insulators will be used to reduce conductor and insulator visibility.

EFFECTIVENESS OF THE APPLICANT'S PROPOSED MITIGATION MEASURES

The Applicant's proposed mitigation measures will act to reduce the potential significance of visual impacts associated with the generation project. Extensions of these measures and other measures, as proposed below by Energy Commission staff, will ensure that visual impacts will be minimized.

STAFF'S PROPOSED ADDITIONAL MITIGATION

STAFF MITIGATION 1 (CONDITION 1)

A specific painting plan is needed to assure that proposed colors will not unduly contrast with the surrounding landscape colors. Such a plan should be submitted at an early time so that any precolored buildings, structures and linear facilities can have colors approved and included in bid specifications for such buildings or structures.

STAFF MITIGATION 2 (CONDITION 3)

A specific lighting plan is needed to assure that project lighting will be adequately designed, shielded, and placed so as to minimize off-site light and glare. This plan should also minimize backscatter to the nighttime sky, and should include provisions to minimize lighting of plant areas, consistent with operational and safety needs. A procedure is also needed to resolve any lighting complaints.

STAFF MITIGATION 3 (CONDITION 4)

A specific landscaping plan should be prepared showing the location of such landscaping, the varieties and sizes of plants proposed to be used in such landscaping, and the proposed time to maturity for such landscaping.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

With application of the proposed mitigation, the visual impacts of the proposed power plant will be less than significant. The use of colors that blend with the existing setting will reduce the potential visual impact of the project structures to a less than significant level. Measures to minimize lighting effects will reduce such impacts to less than significant levels.

As discussed in staff's analysis of condensation plumes, meteorological conditions will determine the severity of the visibility during any given time. In addition, because of the project's rural setting, and lack of residences in the area, staff has determined that periodic and seasonal condensation plumes will have no significant impact.

With the recent variation by EHPP to relocate a portion Alternate Route 1B from the plant site to the California Aqueduct, staff has reviewed the proposed linear route (Route 1B) and determined that the linear facilities will not adversely effect views significantly. Staff has provided mitigation (Staff Mitigation 1) which insures painting of the transmission poles to a color consistent with the surrounding area.

RECOMMENDATION

The Energy Commission should adopt the following conditions of certification if it approves the project.

PROPOSED CONDITIONS OF CERTIFICATION

VIS-1 Prior to the start of commercial operation, the project owner shall treat the project structures, buildings, towers, substation and tanks visible to the public in a non-reflective color to blend with the surroundings. The project owner shall treat the cooling towers with a heat-resistant color that minimizes contrast and harmonizes with the surrounding environment.

Protocol: The project owner shall submit a treatment plan for the project to the California Energy Commission Compliance Project Manager (CPM) for review and approval. The treatment plan shall include:

1. specification, and 11" x 17" color simulations, of the treatment proposed for use on project structures, including structures treated during manufacture;
2. a detailed schedule for completion of the treatment; and,
3. a procedure to ensure proper treatment maintenance for the life of the project.

If the CPM notifies the project owner that revisions of the plan are needed before the CPM will approve the plan, the project owner shall submit to the CPM a revised plan.

After approval of the plan by the CPM, the project owner shall implement the plan according to the schedule and shall ensure that the treatment is properly maintained for the life of the project.

For any structures that are treated during manufacture, the project owner shall not specify the treatment of such structures to the vendors until the project owner receives notification of approval of the treatment plan by the CPM.

The project owner shall not perform the final treatment on any structures until the project owner receives notification of approval of the treatment plan from the CPM.

The project owner shall notify the CPM within one week after all precolored structures have been erected and all structures to be treated in the field have been treated and the structures are ready for inspection.

Verification: Not later than 30 days prior to ordering the first structures that are color treated during manufacture, the project owner shall submit its proposed plan to the CPM for review and approval. If the CPM notifies the project owner that any revisions of the plan are needed before the CPM will approve the plan, within 30 days of receiving that notification, the project owner shall submit to the CPM a revised plan.

Not less than thirty days prior to the start of commercial operation, the project owner shall notify the CPM that all structures treated during manufacture and all structures treated in the field are ready for inspection.

The project owner shall provide a status report regarding treatment maintenance in the Annual Compliance Report.

VIS-2 Any fencing for the project shall be non-reflective.

Protocol: Prior to ordering the fencing the project owner shall submit to the CPM for review and approval the specifications for the fencing documenting that such fencing will be non-reflective.

If the CPM notifies the project owner that revisions of the specifications are needed before the CPM will approve the submittal, the project owner shall submit to the CPM revised specifications.

The project owner shall not order the fencing until the project owner receives approval of the fencing submittal from the CPM.

The project owner shall notify the CPM within one week after the fencing has been installed and is ready for inspection.

Verification: At least 30 days prior to ordering the non-reflective fencing, the project owner shall submit the specifications to the CPM for review and approval.

If the CPM notifies the project owner that revisions of the submittal are needed before the CPM will approve the submittal, within 30 days of receiving that notification, the project owner shall prepare and submit to the CPM a revised submittal.

The project owner shall notify the CPM within seven days after completing installation of the fencing that the fencing is ready for inspection.

VIS-3 Prior to the start of commercial operation, the project owner shall design and install all lighting such that light bulbs and reflectors are not visible from public viewing areas and illumination of the vicinity and the nighttime sky is minimized. To meet these requirements:

Protocol: The project owner shall develop and submit a lighting plan for the project to the CPM for review and approval. The lighting plan shall require that:

1. Lighting is designed so that exterior light fixtures are hooded, with lights directed downward or toward the area to be illuminated and so that backscatter to the nighttime sky is minimized. The design of this outdoor lighting shall be such that the luminescence or light source is shielded to prevent light trespass outside the project boundary;

2. High illumination areas not occupied on a continuous basis such as maintenance platforms or the main entrance are provided with switches or motion detectors to light the area only when occupied; and

3. A lighting complaint resolution form (following the general format of that in attachment 1) will be used by plant operations, to record all lighting complaints

received and document the resolution of those complaints. All records of lighting complaints shall be kept in the on-site compliance file.

If the CPM notifies the project owner that revisions of the plan are needed before the CPM will approve the plan, the project owner shall prepare and submit to the CPM a revised plan.

Lighting shall not be installed before the plan is approved. The project owner shall notify the CPM when the lighting has been installed and is ready for inspection.

Verification: At least 90 days before ordering the exterior lighting, the project owner shall provide the lighting plan to the CPM for review and approval. The CPM will notify the project owner of approval or disapproval within 15 days of receipt of the lighting plan. If the CPM notifies the project owner that any revisions of the plan are needed before the CPM will approve the plan, within 30 days of receiving that notification the project owner shall submit to the CPM a revised plan.

The project owner shall notify the CPM within seven days of completing exterior lighting installation that the lighting is ready for inspection. If the CPM notifies the project owner that revisions of the submittal are needed before the CPM will approve the submittal, within 30 days of receiving that notification, the project owner shall prepare and submit to the CPM a revised submittal.

The project owner shall notify the CPM within seven days after completing installation of the landscaping that the landscaping is ready for inspection.

VIS-4 To minimize potential visual impacts, the project owner shall place all electrical transmission poles as to not be directly in front of any residences.

Protocol: Prior to construction of the transmission line, the project owner shall submit a plan to the CPM showing:

- All proposed pole locations;
- All residences within one-quarter mile of the proposed transmission route that have a view of the transmission line.

Installation of transmission line poles shall not begin before the plan is approved. The project owner shall notify the CPM when the poles have been installed and are ready for inspection.

Verification: At least 60 days prior to beginning transmission line construction, the project owner shall provide the electrical transmission pole plan to the CPM for review and approval.

If the CPM notifies the project owner that any revisions of the plan are needed before the CPM will approve the plan, within 30 days of receiving that notification, the project owner shall submit to the CPM a revised plan.

VIS-5 Prior to the start of commercial operation, the project owner shall implement a landscape plan that meets the requirements of the Kern County Zoning Code.

a. The project owner shall submit to the CPM for review and approval a specific plan describing its landscaping proposal, stating that it conforms to Kern County's Zoning Code. The plan shall include, but not be limited to:

- a detailed landscape plan, at a reasonable scale, which includes a list of proposed tree and shrub species and sizes and a discussion of the suitability of the plants for the site conditions and mitigation objectives.
- maintenance procedures, including any needed irrigation; and
- a procedure for replacing unsuccessful plantings.

b. If the CPM notifies the project owner that plan revisions are needed, the project owner shall prepare and submit to the CPM a revised plan for CPM approval.

c. The trees and shrubs shall not be planted before the plan is approved. The project owner shall notify the CPM when the trees and shrubs have been planted and are ready for inspection.

Verification: At least 90 days prior to the start of commercial operation, the project owner shall submit the proposed landscape plan to the CPM for review and approval. The CPM will respond to the project owner within 15 days of receipt of the landscaping plan.

The project owner shall submit any required revisions within 15 days of notification by the CPM. The CPM will respond to the project owner within 15 days of receipt of the revised documents. The project owner shall notify the CPM in the next Monthly Compliance Report following completion of the proposed planting that the planting is ready for inspection.

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ATTACHMENT 1
LIGHTING COMPLAINT RESOLUTION FORM

LIGHTING COMPLAINT RESOLUTION FORM

ELK HILLS POWER PROJECT **Kern County**
Complainant's name and address: Phone number:
Date complaint received: Time complaint received:
Nature of lighting complaint:
Definition of problem after investigation by plant personnel: Date complainant first contacted:
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.)

VISUAL RESOURCES APPENDIX A

Visual Resources Figures 2 through 6a

VISUAL RESOURCES Figure 2
KOP 1 (Existing View of Proposed Power Plant)

This figure is not available in electronic format.

VISUAL RESOURCES Figures 2a
KOP 1 (Simulation)

VISUAL RESOURCES Figure 3
KOP 2 (Existing View)

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VISUAL RESOURCES Figure 3a
KOP2 (Simulation)

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VISUAL RESOURCES Figure 4
KOP 3 (Existing View)

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VISUAL RESOURCES Figure 4a
KOP 3 (Simulation)

This figure is not available in electronic format.

VISUAL RESOURCES Figure 5
KOP 4 (Existing View)

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VISUAL RESOURCES Figure 5a
KOP 4 (Simulation)

This figure is not available in electronic format.

VISUAL RESOURCES Figure 6
KOP 5 (Existing View)

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VISUAL RESOURCES Figure 6a
KOP 5 (Simulation)

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VISUAL RESOURCES APPENDIX B
Commission Staff's Visual Assessment Methodologyvisual Resources Appendix B - Commission Staff's Visual Assessment Methodology

METHODOLOGY FOR ASSESSING VISUAL SETTING

Visual Factors

Commission staff evaluated a number of factors in assessing the visual setting of the proposed project. These factors include visual quality, viewer sensitivity, visibility, and viewer exposure.

Visual Quality

The visual quality of a setting is the value of visual resources in that setting, determined by the visible environment's intrinsic physical properties and by associated cultural or public values (Andrews 1979; Smardon et al. 1986). Where publicly adopted goals, policies, designations or guidelines exist, they are given great weight in assessing visual quality. Where they do not exist, the analyst relies on experience and judgment to assess visual quality. The relevant physical properties of the environment include landform, vegetation, water, color, scarcity, and cultural modifications.

A basic premise in the evaluation of visual quality is whether a project will be compatible with the character of the landscape. In the case of predominantly natural settings, projects should be compatible with this character. It is possible for new structures to be compatible with predominantly natural settings if such settings already contain some structures that are considered compatible and the new structures are similar to the existing structures and do not appreciably change the balance of natural and cultural elements. However, in areas that appear to be totally natural, any modification that appears to be human-made will change the character of the area.

Viewer Sensitivity

One of the principal factors evaluated in assessing the potential for visual impacts is the sensitivity level of potential viewers. Viewer sensitivity is a measurement of the level of interest or concern of viewers regarding the visual resources of an area. It is generally expressed as high, moderate, or low. Local values and goals affect a viewer's expectations regarding a visual setting (Blair 1980). Concern regarding a change to a visual setting is often due at least in part to the symbolic effect of the change. A basic document for visual impact assessment states that

> "more often it is symbolic meaning, not preference, which motivates our value judgments and reactions" (Schauman 1986, p.105).

A visual change can be perceived as a symbol of a threat to the cultural stability and identity of a group or community (Costonis 1982). Viewer sensitivity can be determined in two ways, directly through evaluation of viewer attitudes or indirectly using viewer activities.

Viewer Attitudes (direct)

The direct determination of viewer attitudes is normally done by surveying potential viewers. As mentioned above in the discussion on Visual Quality, the accurate determination of such information is very complex, involves well-designed, implemented and interpreted surveys, is usually labor intensive, and is usually expensive. Given these constraints and the mandated time schedule for power plant siting cases, it is generally not possible for Commission staff to conduct such a direct determination of viewer attitudes and be assured of accurate and valid results.

Viewer Activities (indirect)

In situations where direct information on viewer sensitivity cannot be obtained, indirect methods are typically used in the visual profession to gain an insight as to viewers' sensitivity regarding visual resources. Land use is considered a "useful indirect indicator of likely viewer response" (Blair 1986), and activities associated with some uses can result in an increased awareness of visual or scenic resources (Headley 1992). Use activities associated with 1) designated parks, monuments, and wilderness areas, 2) scenic highways and corridors, 3) recreational areas, and 4) residential areas are usually highly sensitive. Commercial uses are generally less sensitive as activities, and views are often focused on those commercial activities. Large scale industrial or agricultural processing facility uses are usually the least sensitive because workers are focused on their work, and often are working in surroundings with relatively low visual value.

Visibility

Another important factor in assessing the existing visual setting, and thus potential impact is the visibility of the project. Visibility can differ substantially between view locations, depending on screening and the effect of the location of the visual change in the view. The smaller the degree of screening, the higher the visibility usually is and the greater the potential impact is likely to be. One factor potentially affecting screening is the season. Deciduous trees that provide substantial screening in summer may provide little screening in winter. Angle of view is also important. The closer the feature is to the center of the view area, the greater the impact is likely to be. Meteorological conditions can also affect visibility. For example, fog can make a cooling tower plume or stack plume unnoticeable, given particular fog density and distance from the viewer to the plume. Another factor affecting visibility is time of day. Although projects are generally more noticeable during daylight hours, lighting can make project structures and plumes more noticeable at night than during the day.

Viewer Exposure

The degree to which viewers are exposed to a view by (a) their distance from the feature or view in question, (b) the number of viewers, and (c) the duration of view is called viewer exposure (Grinde and Kopf 1986). Viewer exposure is important in determining the potential for a change in the visual setting to be significant.

Distance

As the distance between the viewer and the feature viewed increases, the perceived size of the feature and the ability to see details decreases. Distance zones may be usefully categorized as follows: foreground, or close-range; middleground, or mid-range; and background, or long-range. Within close-range distances, details such as surface textures and the fullest range of surface colors are clearly perceptible. Mid-range distances are characterized by visualization of complete surface features such as tree stands, building clusters, and small landforms. Long-range distances are dominated by the horizon and major landforms (Felleman 1986).

Numbers of Viewers

Two measures of the number of viewers are important to consider in assessing the potential visual impact of a project. One is the absolute number of viewers. The other is the proportion of viewers in a viewshed who can see the project.

Duration of View

The length of time that a view is visible to a viewer is another important factor to be considered in determining the importance of a view and the potential impact of a project. For a given activity, the longer the view duration, the greater the potential importance or impact. View durations range from a few seconds, as in the case of some travelers in motor vehicles, to a number of hours per day, in regard to some residential situations.

Key Observation Points

The evaluation factors discussed above are considered in relation to Key Observation Point. Key Observation Points are chosen to provide the basis for evaluation of project impacts by comparing the appearance before and after project construction. Key Observation Points include locations which are chosen to be representative of the most critical locations from which the project will be seen. Additional Key Observation Points should be selected that represent typical views encountered in different classes of views within the viewshed, if they are not covered by critical viewpoints. Variables that should be considered in selecting Key Observation Points include relative project size, season, and light conditions.

METHODOLOGY FOR ASSESSING VISUAL IMPACTS

Use of Objective vs. Subjective Methods

The determination of visual resource impacts has traditionally been done using a completely subjective method relying exclusively on the knowledge and experience of the visual resources professional. The drawback to this approach is that it is difficult to relate the steps and process used in the analysis which lead to the conclusions which are drawn regarding visual impacts.

In the 1970s and 1980s, there was an attempt in the profession to develop more objective methods for determining potential impacts. While this led to a more understandable set of steps and processes, analyses often did not account for unusual situations not addressed by the standard procedure or gave the false impression that they were totally objective.

In recent years visual resource analysts have been developing a synthesis, in which an objective methodology has been used to develop the categories and the analysis process to be used in analyzing visual impacts, at the same time explicitly recognizing that subjective values are involved in selecting factors and assigning weights to factors. It is important that subjective judgements be identified and defined to the extent possible.

Key Observation Points

As previously discussed, Key Observation Points include locations which are chosen to be representative of the most critical locations from which the project will be seen. For linear projects such as power lines, additional Key Observation Points are selected that represent any special project or landscape features such as skyline crossings, river crossings, or substations.

Because each Key Observation Point represents a critical location, a typical view encountered in a class of view, and/or a special project or landscape feature, it also represents an important specific aspect of the viewshed that is susceptible to visual impacts. Therefore, the visual impact of a project is determined for each Key Observation Point, not from an “overall” perspective that masks the specific impacts.

Major Impact Evaluation Factors

For each Key Observation Point Commission staff considers the susceptibility to visual impact and the severity of impact are considered together to determine the significance of impact. The following sections explain how these two major factors are assessed and considered. Other potential causes of significant visual impacts, such as night lighting, visible emission plumes, and noncompliance with laws, ordinances, regulations, and standards, are addressed separately in this analysis.

Susceptibility to Impact

The first step in evaluating the visual impact of a project from a particular Key Observation Point is to consider the elements of the existing visual setting (discussed previously), including visual quality, viewer sensitivity, visibility, and viewer exposure. Each of these factors is assessed as either high, moderate to high, moderate, low to moderate, or low. Staff combines these factors into a measure of the susceptibility of the view from a particular Key Observation Point to visual impact. A low value for any of the four factors generally results in low susceptibility to impact.

Impact Severity

As previously discussed, the degree of visual impact that a project will cause depends on the degree of change resulting from the project upon visual character or visual quality, here called the impact severity. Commission staff considers both the relationship of the project to the other components visible in the landscape, and blockage from view or elimination by the project of any previously visible components.

Relationship of the Project to Other Visible Components

Landscape Components

The three basic landscape components are land and water, vegetation, and structures.

Visual Elements

The basic elements of each physical component of a view include color, form, line, texture, scale, and spatial character. The impact of a project is assessed in terms of contrast in color, form, line, texture, and scale, as well as scale dominance and spatial dominance. Scale is the proportionate size relationship between an object and its surroundings. Absolute scale is the size of an object obtained by relating its size to a definitely defined standard (i.e., measurement). Relative scale is the relative size of objects; the apparent size relationship between landscape components. Sub-elements of scale include *scale dominance* (the scale of an object relative to the visible expanse of the landscape and to the total field of view of the human eye or camera) and *scale contrast* (the scale of an object relative to other distinct objects or areas in the landscape). *Spatial dominance* is the measure of the dominance of an object due to its location in the landscape. Regarding these three factors, a change has the greatest potential to cause impacts in regard to scale dominance, and the least potential in regard to scale contrast.

Assessment of Contrast

Staff assesses contrast with existing structures, vegetation, and land/water in regard to color, form, line, texture, and scale. Regarding these factors, contrast in color, form, or line has greater potential to cause impacts than contrast in texture or scale.

The magnitude of the visual impact of a project is measured by the degree of change that it causes. In regard to contrast, the degree of change depends partly on the existing levels and types of contrast. For instance, if existing structures already contrast strongly with natural features, the addition of a similar structure tends to cause a smaller change than if no structures already existed. In addition, the degree of contrast depends on the proximity of the project to the landscape component to which it is compared. If a project is superimposed on a component (such as body of water), the potential for contrast is greater than if the project is near such a landscape component, and even greater than if the project is far from the landscape component.

Factors Affecting Contrast

Among the basic characteristics of the visual setting previously discussed, distance is a factor in determining the visual contrast that a project will create. Increasing distance can decrease perceived contrast both by reducing the apparent size of project structures and by reducing clarity of view due to atmospheric conditions.

Several additional factors can also influence the degree of contrast that a project may cause. These include atmospheric conditions, light conditions, motion, seasonal changes, and recovery time (BLM 1986).

Blockage or Elimination of Existing Elements

In regard to obstruction or elimination of previously visible components, the analysis evaluates any change between the visual quality of those components compared to the visual quality of the project. Blockage of higher quality visual elements by lower quality elements can cause impacts, potentially as great as those regarding scale dominance.

Assessment of Visual Impact Severity

VISUAL RESOURCES Table B-1 shows how staff calculates impact severity from each Key Observation Point.

<u>Determination of Significance</u>

Commission staff considers the following factors in determining whether a visual impact will be significant. These factors are not a complete listing of all the considerations that staff uses in its analyses, because many such considerations are site-specific.

State

The California Environmental Quality Act Guidelines make it clear that aesthetic impacts can be significant adverse impacts by defining 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. (Cal. Code Regs., tit.14, 15382.) Appendix G, subdivision (b), of the Guidelines state that a project will normally have a significant effect on the environment if will have a substantial, demonstrable negative aesthetic effect.

VISUAL RESOURCES Table B-1
Staff's Visual Impact Severity Assessment Process

	SEVERITY SCORE				
	Extreme	**Strong**	**Moderate**	**Weak**	**Negligible**
SEVERITY FACTOR					
CONTRAST					
Color Contrast		High	Medium		Low
		Or	Or		or
Form Contrast		High	Medium		Low
		Or	Or		or
Line Contrast		High	Medium		Low
		Or	Or		or
Texture Contrast			High	Medium	Low
			Or	or	or
Scale Contrast			High	Medium	Low
			or	or	or
DOMINANCE					
Scale	Dominant	Co-Dominant	Subordinate		Insignificant
		Or	Or		or
Spatial		Dominant	Co-Dominant	Subordinate	Insignificant
VIEW BLOCKAGE	Substantial blockage of high quality view	Moderate blockage of high quality view or substantial blockage of moderate to high quality view	Minor blockage of high quality view, moderate blockage of moderate to high quality view, or substantial blockage of moderate quality view	Minor blockage of moderate to high quality view, moderate blockage of moderate quality view, or substantial blockage of low to moderate qual. view	Minor blockage of moderate, low to moderate, or low quality view; moderate blockage of low or low to moderate quality view; or substantial blockage of low quality view
COMBINED FACTORS	Two or more of the above factors with a severity score of strong.				

Local

As discussed above, Commission staff considers any local goals, policies or designations regarding visual resources. Conflicts with such laws, ordinances, regulations, and standards can constitute significant visual impacts.

Professional Standards

Professionals in visual impact analysis have developed a number of questions as a means of evaluating the potential significance of visual impacts (see, e.g., Smardon 1986). The questions listed below address issues commonly raised in visual analyses for energy facilities:

Will the project substantially alter the existing viewshed, including any changes in natural terrain?

Will the project deviate substantially from the form, line, color, and texture of existing elements of the viewshed that contribute to visual quality?

Will the project substantially degrade the existing visual quality of the viewshed or eliminate or block views of valuable visual resources?

Will the project significantly increase light and glare in the project vicinity, particularly night-time glare?

Will the project result in significant amounts of backscatter light into the night-time sky?

Will the project be in conflict with directly-identified public preferences regarding visual resources?

Will the project comply with local goals, policies, designations or guidelines related to visual quality?

Will the project result in a significant reduction of sunlight, or the introduction of shadows, in areas used extensively by the community?

Will the project result in a substantial visible exhaust plume?

Commission staff considers these questions, where applicable, in its impact assessment.

Consideration of Impact Susceptibility and Impact Severity

For most operations impacts staff considers the assessment of the impact susceptibility in relation to the impact severity from each Key Observation Point to determine visual impact. Staff considers construction impacts, lighting impacts, and visible plume impacts separately.

Cumulative Visual Impacts

Staff reviews the proposed project and its related facilities as well as other past, present, and future projects in the vicinity to determine whether potential cumulative visual impacts will occur and whether those impacts will be significant. In addition, in the case of cogeneration facilities where the proposed power plant is to be part of an already existing industrial facility, this review examines whether the addition of the proposed project and its related facilities will result in cumulative visual impacts and whether they will be significant. If past activities have resulted in significant impacts, and the project will appreciably increase the total impact, the project will contribute substantially to a significant cumulative impact. When cumulative visual impacts are found to be significant, whether in relation to other proposed projects or to the host industry, feasible mitigation measures will be recommended to reduce those impacts.

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CULTURAL RESOURCES

Roberta S. Greenwood

INTRODUCTION

This analysis discusses cultural resources which are defined as the structural and cultural evidence of the history of human development and life on earth. Evidence of California's early occupation is becoming increasingly vulnerable due to the ongoing development and urbanization of the state.

Cultural resource materials may be found nearly anywhere in California: along the ocean coastline and on coastal islands; along rivers and streams; in coastal and inland valleys and lowlands; throughout the coastal and inland mountain ranges; throughout the interior deserts, and even under water. Cultural resources may be found on the ground or may be encountered at varying depths beneath the surface. In some areas of the state, a sequence of settlements on the same site may result in multiple layers of cultural resources representing diverse functions, different periods of time, or distinct groups of people. In other areas, the distribution of cultural materials may be much more dispersed.

Cultural resources are significant to the understanding of our culture, history and heritage. Critical to the analysis of cultural resources are the spatial relationships between the various features or elements of a given site and the relationship of the site to the surrounding environment, both culturally and geographically. These relationships provide information that can be used to piece together the sequence of human occupation and use of an area, and they begin to create a picture of the former inhabitants and their environment.

Staff's primary concerns in its cultural resource analysis are to ensure that all historic properties are recognized, potential impacts to significant sites are identified and that conditions are set forth which ensure no significant adverse impacts will occur to cultural resources. The determination of potential impacts to cultural resources from the proposed Elk Hills Power Project (EHPP) is required by the Siting Regulations of the California Energy Commission (Energy Commission) and by the California Environmental Quality Act (CEQA). Impacts to cultural resources may result either directly or indirectly during pre-construction, construction, maintenance, temporary shut-down, or ultimate abandonment of the project.

Three aspects of cultural resources are addressed in this analysis: prehistoric and historic archaeological resources, and ethnographic resources.

PREHISTORIC RESOURCES

Prehistoric archaeologic resources are those materials relating to prehistoric human occupation and use of an area. These resources may include sites and deposits, structures, artifacts, features, faunal remains, rock art, trails, other traces of prehistoric human behavior, or places of particular concern to Native American people. In California, the prehistoric period began more than 10,000 years ago and extended into the 18th century when the first Euro-Americans explored California.

HISTORICAL RESOURCES

Historical archaeologic resources are those materials usually associated with exploration, settlement, or use of an area by persons other than Native Americans, and correlates with the beginning of a written historical record. They may include archaeological deposits, sites, structures, districts, traveled ways, artifacts, landscape, documents, or other evidence of human activity. Both the National Register of Historic Places and the California Register of Historical Resources consider as historical resources important properties which are 50 or more years old unless there are overriding considerations.

ETHNOGRAPHIC RESOURCES

Ethnographic resources are those materials important to the heritage of a particular ethnic or cultural group, such as Native Americans, and African, European, Asian or other immigrants. They may include traditional resource collecting areas, ceremonial sites, topographic features, cemeteries, shrines, or ethnic neighborhoods and structures.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Cultural resources are indirectly protected under provisions of the federal Antiquities Act of 1906 (Title 16, United States Code, § 431 et seq.) and subsequent related legislation, policies and enacting responsibilities, e.g., federal agency regulations and guidelines for implementation of the Antiquities Act. The following laws, ordinances, regulations, standards and policies apply to the protection of cultural resources in California. Projects licensed by the Energy Commission are reviewed to ensure compliance with these laws.

FEDERAL

Portions of the routes proposed for the electric transmission lines cross land managed by the US Bureau of Land Management (BLM). Therefore, the project may become an “undertaking” according to federal definition and the BLM would be involved as the lead federal agency for cultural and paleontologic resources. If cultural resource sites are identified on non-federal lands, and they meet federal criteria for eligibility for listing in the National Register of Historic Places, then federal laws would also apply to these resources.

- National Environmental Policy Act (NEPA): Title 42, United States Code, section 4321 et seq., requires federal agencies to consider potential environmental impacts of projects with federal involvement and to consider appropriate mitigation measures.
- Federal Land Policy and Management Act (FLPMA): Title 43, United States Code, section 1701 et seq., requires the Secretary of the Interior to retain and maintain public lands in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric water resource, and archeological values [Section 1701(a)(8)]; the Secretary, with

respect to the public lands, shall promulgate rules and regulations to carry out the purposes of this Act and of other laws applicable to public lands [Section 1740].

- Federal Register 48 44739-44738, 190; September 30, 1983: Federal Guidelines for Historic Preservation Projects. The US Secretary of the Interior has published a set of Standards and Guidelines for Archaeology and Historic Preservation. These are considered to be the appropriate professional methods and techniques for the preservation of archaeological and historical properties. The Secretary's standards and guidelines are used by federal agencies, such as the Forest Service, the Bureau of Land Management, and the National Park Service. The State Historic Preservation Office refers to these standards in its requirements for selection of qualified personnel and in the mitigation of potential impacts to cultural resources on public lands in California.
- *National Historic Preservation Act 16 USC 470* requires federal agencies to take into account the effects of their undertakings on historic properties through consultations beginning at the early stages of project planning. Regulations revised in 1997 (36 CFR Part 800 et. Sec) set forth procedures to be followed for determining eligibility for nomination, the nomination, and the listing of cultural resources in the National Register of Historic Places (NRHP). The eligibility criteria and the process are used by federal, state and local agencies in the evaluation of the significance of cultural resources. Very similar criteria and procedures are used by the state in identifying cultural resources eligible for listing in the State Register of Historic Resources. Recent revisions to Section 106 in 1999 have emphasized the importance of Native American consultation.
- Executive Order 11593, "Protection of the Cultural Environment," May 13, 1971 (36 Federal Register 8921) orders the protection and enhancement of the cultural environment by providing leadership, establishing state offices of historic preservation, and developing criteria for assessing resource values.
- American Indian Religious Freedom Act: Title 42, United States Code, section 1996 protects Native American religious practices, ethnic heritage sites, and land uses.
- Native American Graves Protection and Repatriation Act (1990): Title 25, United States Code, Section 3001, et seq. defines "cultural items," "sacred objects," and "objects of cultural patrimony"; establishes an ownership hierarchy; provides for review; allows excavation of human remains, but stipulates return of the remains according to ownership; sets penalties; calls for inventories; and provides for return of specified cultural items.

STATE

- Public Resources Code, section 5020.1 defines several terms, including the following:

(j) “Historical resource” includes, but is not limited to, any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California.

(q) “Substantial adverse change” means demolition, destruction, relocation, or alteration such that the significance of an historical resource would be impaired.

- Public Resources Code, section 5024.1 establishes the California Register of Historical Resources; sets forth criteria to determine significance; defines eligible properties; and lists nomination procedures. The criteria are essentially the same as for eligibility to the NRHP, but stipulate that some properties which may not retain sufficient integrity to meet NRHP standards, may still be eligible for the California Register.
- Title 14, California Code of Regulations, section 4852(c) explains that a resource that has lost its historic character or appearance may still have sufficient integrity for the California Register.
- Public Resources Code, section 5097.5 states that any unauthorized removal or destruction of archaeologic or paleontologic resources on sites located on public land is a misdemeanor. As used in this section, “public lands” means lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority or public corporation, or any agency thereof.
- Public Resources Code, section 5097.98 defines procedures for notification of discovery of Native American artifacts or remains and for the disposition of such materials.
- Public Resources Code, section 5097.99 prohibits obtaining or possessing Native American artifacts or human remains taken from a grave or cairn and sets penalties for these actions.
- Public Resources Code, section 5097.991 states that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated.
- Public Resources Code, section 21000, et seq, California Environmental Quality Act (CEQA). This act requires the analysis of potential environmental impacts of proposed projects and requires application of feasible mitigation measures.
- Title 14, California Code of Regulations, section 15064.5 states that the lead agency determines whether a project may have a significant effect on important archaeological resources; if so, an EIR shall address these resources. If a potential for damage to significant archaeological resources can be demonstrated, such resources must be avoided, if they can not be avoided, mitigation measures shall be required. If a resource is found to be a historical resource, Public Resources Code 21083.2 does not apply and the criterion as “unique” is now replaced by the standards for eligibility to the California Register.

- Public Resources Code, Section 21084.1 indicates that a project may have a significant effect on the environment if it causes a substantial adverse change in the significance of a historic resource; the section further defines a “historic resource” and describes what constitutes a “significant” historic resource.
- CEQA Guidelines, Title 14, California Code of Regulations, section 15126.4, Consideration and Discussion of Mitigation Measures Proposed to Minimize Significant Effects,” Subsection (b) “Mitigation Measures Related to Impacts on Historical Resources.” Subsection (b) discusses impacts of maintenance, repair, stabilization, restoration, conservation, or reconstruction of a historical resource. Subsection (b) discusses mitigation through avoidance of damaging effects on any historical resource of an archaeological nature, preferably by preservation in place; alternatives include documentation or data recovery by scientific excavation if avoidance or preservation in place is not feasible. Data recovery must be conducted in accordance with an adopted data recovery plan.
- CEQA Guidelines, Title 14, California Code of Regulations, section 15064.5, “Determining the Significance of Impacts to Archaeological and Historical Resources.” Subsection (a) defines the term “historical resources.” Subsection (b) explains when a project may be deemed to have a significant effect on historic resources and defines terms used in describing those situations. Subsection (c) describes CEQA’s applicability to archaeological sites and provides a bridge between the application of the terms “historic resources” and “archaeological resources.”
- CEQA Guidelines, Title 14, California Code of Regulations, section 15064.7, “Thresholds of Significance.” This section encourages agencies to develop thresholds of significance to be used in determining potential impacts and defines the term “cumulatively significant.”
- CEQA Guidelines, Appendix G: “Issue V: Cultural Resources.” Lists four questions to be answered in determining the potential for a project to impact archaeological, historical, and paleontological resources.
- California Penal Code, section 622.5: Anyone who willfully damages an object or thing of archaeological or historic interest can be found guilty of a misdemeanor.
- California Health and Safety Code, Section 7050.5. If human remains are discovered during earth disturbing activities or construction, the project owner is required to contact the county coroner.
- Public Resources Code, section 5097.98. If the county coroner determines that the remains are Native American, the coroner is required to contact the Native American Heritage Commission, which is then required to determine the “Most Likely Descendant” to inspect the burial and to make recommendations for treatment or disposition of the remains and any associated burial items.

LOCAL

Although the Energy Commission has pre-emptive authority over local laws, it typically ensures compliance with local laws, ordinances, regulations, standards,

plans, and policies. The project site and associated linear facilities are all located within unincorporated portions of western Kern County.

KERN COUNTY

General provisions of the Kern County General Plan of 1994 require maintenance of a County inventory of areas with potential cultural and archaeological significance (EHPP 1999a, page 6-35).

ENVIRONMENTAL SETTING

REGIONAL DESCRIPTION

The project area is within the Great Valley Physiographic Province, which is bounded on the south by the Transverse Range; on the east by the Sierra Nevada Range; on the north by the deltas of the San Joaquin and Sacramento rivers; and on the west by the Temblor Range (an interior portion of the Coast Ranges). The Kern River flows west across the valley floor from the western Sierra foothills, and southward into Lake Buena Vista.

The San Joaquin Valley comprises the southern part of the Great Valley Province. At one time this entire valley was covered by an ancient salt-water sea, which began to shrink during the late Pleistocene, leaving vast areas of wetland and tules in the shallows around the shores of ancient lakes Buena Vista and Tulare. These lakes were in the low spots of the flood plain and were renewed by the frequent flooding of the Kern River. The shorelines of Buena Vista are in close proximity to the southeast end of the Elk Hills Oil and Gas Field, and as late as the 1840's, prior to the control of water resources for irrigation, would have constituted a favorable environment for prehistoric settlement. Today the project area is generally arid, existing vegetation is dominated by desert saltbush, and there are no longer any perennial streams (EHPP 1999a).

Ancient geologic activity in the Temblors, which caused folding and deformation of the underlying rock layers, transformed some of these rocks into new types. Among these resulting new rock types is the chert which archaeological investigations have demonstrated was quarried and utilized by prehistoric people to make stone tools. Other geologic conditions caused underlying petroleum deposits to rise to the surface along fault lines, forming the tar seeps used by both Native Americans and modern settlers (EHPP 1999a).

PROJECT VICINITY DESCRIPTION

The proposed Elk Hills project is located in the Elk Hills Oil and Gas Field near the southwestern edge of the San Joaquin Valley in Kern County, California. The project area is about 25 miles southwest of Bakersfield. The project vicinity includes Buena Vista Valley and the Buena Vista Hills and Oil Field on the west, and lies south of State Highway 58. A topographic feature of relevance to prehistoric settlement is the Buena Vista Lake Bed, across the California Aqueduct toward the southeast.

Physiographically, the San Joaquin Valley is a large, northwest-trending alluvial plain between the Sierra Nevada Mountains to the east, the Diablo and Temblor Ranges on the west, the Tehachapi Mountains on the south, and the San Joaquin River on the north. The valley is filled with alluvial sediments eroded from the mountains on both sides (DOE 1997). The Elk Hills represent a foothill spur of the Temblor Range which is about 16 miles long and 6 miles wide, reaching an elevation of 1,551 feet (about 1,000 to 1,200 feet above the Valley floor. The Elk Hills Oil and Gas Field is an anticline composed of recently uplifted stratified alluvial soils.

The Elk Hills Oil and Gas Field comprises the oil and gas production and processing area formerly known as the Naval Petroleum Reserve Number 1 (NPR-1), now operated by the Occidental of Elk Hills, Incorporated (OEHI). The field is approximately 47,000 acres, of which approximately 706 acres were surveyed for cultural remains.

As presently proposed, the Elk Hills Power Plant consists of several elements:

- The power plant site would be located on the 12 acres adjacent to Elk Hills Road, northeast of its intersection with Skyline Road. Included with the plant site are Route 4, the gas supply line, and a 0.25-mile buffer.
- The APE Area of Potential Effect(APE) for transmission line Route 1A, the west-east transmission line to Tupman, was defined as 200 feet wide and 9 miles long. Minor adjustments have been made to the original alignment.
- The APE for transmission line Route 1B (south-north transmission line to Buttonwillow) is 200 feet wide and approximately 8.6 miles long. Minor adjustments have been made to this corridor.
- Transmission line variation Route 1B parallels, approximately the west side of Route 1B from the plant site to the California Aqueduct.
- Alternative Route 1C was a transmission line along Elk Hills Road, generally parallel to 1B, subsequently abandoned. The APE was 200 feet wide and approximately 5.5 miles long.
- Route 2 is the raw water supply line running approximately east-west with an APE 100 feet wide and is approximately 9.8 miles long.
- Route 3 is the wastewater disposal line originating at the power plant with a south-north APE approximately 4.4 miles long and 100 feet wide, terminating in new disposal wells.
- Route 4 is a new, west-east 10-inch natural gas supply pipeline elevated above ground for 2,500 feet west that originates from the OEHI processing facilities.

- Other possible areas of potential effect include new facilities at the Midway substation; facilities which may need relocation; new spur roads needed for access during construction; potential interconnections of the La Paloma and

Sunrise projects with Elk Hills; the residence on PG&E property between the substation fenced areas and Highway 58.

PREHISTORIC SETTING

Archaeological literature indicates that early residents of California typically lived near water sources that could provide them with access to a wide variety of plant and animal resources. Evidence from archaeological sites found along the shorelines of ancient lakes Buena Vista and Tulare indicates that native peoples may have occupied the project area as early as 8,000 years ago. These prehistoric lakes were surrounded by great marshy sloughs and wetlands that were well populated by animals and waterfowl, offering a wide variety of food and material resources for prehistoric peoples. According to the Cultural Resources Inventory of the Elk Hills Power Project, hereafter cited as CRI, the potential cultural resource sensitivity of the region is greatest near the water resources (EHPP 1999a; CRI 1999). The presence of a local source of chert would have been another incentive for at least temporary exploitation of this resource.

Archaeologists have proposed several different developmental chronologies for the project region. Evidence from archaeological sites excavated in the 1930s led archaeologists to their opinion that there were similarities between the type of archaeological assemblages found in the project area and those found outside the region. Some of the dart points discovered at archaeological sites along the shorelines of ancient Lake Tulare suggest that these sites could possibly have been populated by hunters of big game as early as 11,000 years ago (EHPP 199 a; CRI 1999).

Later excavations in 1964 revealed artifacts in close proximity to fresh-water shell, which could be dated at about 10,000 “years before the present” (ybp). However, archaeological experience has shown that dates obtained from freshwater shell may be misleading and artifacts found in close proximity to such shells might not necessarily share the same dates . The physical remains do demonstrate a technological evolution of tool types, increasing use of more diverse ecological zones, and greater sedentism through time.

As described in the Application for Certification (AFC), known Native American prehistoric cultural resources in the project vicinity include archaeological sites representing residential bases, field camps, and structures. Known resources recorded in the project area include large, complex sites indicating residential use and include burials, sites with a great abundance and diversity of cultural materials, areas of shell and/or lithic scatters, and widely separated and isolated artifacts (CRI 1999). One synthesis has proposed four distinct phases of discontinuous occupation beginning more than 8,000 years ago, with the different episodes of utilization and abandonment perhaps influenced by climatic conditions which altered the lake levels and regional ecology (CRI 1999). Areas presumably disturbed by agricultural or extractive activities in the lowlands may still contain deeply buried deposits with good integrity, under the thick layers of valley alluvium.

The Cultural Resource Management Plan (CRMP) of 1998 prepared for the Department of Energy (DOE) analyzed site distribution within NPR-1, and observed that site density was highest along the Elk Hills-Buena Vista Slough ecotone where there was a diversity of subsistence resources and suitable terrain. Surveys have concluded that the most likely location for multiconstituent or complex sites is on the north side of NPR-1 at elevations below 750 feet. It was emphasized that because sites may survive on deflated landforms, or be buried by alluvial and colluvial processes, it is very difficult to recognize the presence, size, or importance of archaeological remains from surface observations.

The research context for analysis and evaluation of the prehistoric sites is organized on three hierarchical levels: archaeological context, past lifeways, and culture process (CRMP 1998). The first of these includes topics such as the site formation processes, paleoenvironment, and cultural chronology. Past lifeways addresses issues such as settlement pattern, subsistence practices, and technology. The highest level of inquiry, culture process, seeks to explain such questions as hunter-gatherer adaptations, resource exploitation strategies, social and economic aspects, trade and exchange, and influence of the environment. Not every site will contain the data to approach all of the issues, but all information is incremental and contributes to the understanding of the broad region.

ETHNOGRAPHIC BACKGROUND

The prehistoric marshland environment along the lakeshores was rich in fish, waterfowl and other animals, and would have supported a variety of useful plants. It was an abundant source of many necessities of life and it is likely that, with such resources, many tribal groups were able to maintain occupation at the same location throughout most of the year. The project area is located within the ethnographic boundaries of the Southern Valley Yokuts, and the town of Buttonwillow was originally a Yokuts meeting place and dance ground. A number of individual tribal groups were known to exist at the time of contact with historical explorers (Wallace 1978). Yokuts tribal groups living in the project area included the Tulamni who occupied the now dry Buena Vista lakebed, watershed, and areas west of the lake; the Chuxoxi who inhabited the channels and sloughs north of Elk Hills; the Yawelmani east of Buena Vista Lake; and the Wogiti west of Elk Hills near McKittrick. Three named villages are known in the general project area but outside the Elk Hills Oil and Gas Field. The lake and marshlands provided shelter to a great variety and abundance of wildlife and the rich food sources allowed the Yokuts peoples to live there most of the year. Archaeological artifacts associated with the Yokuts people include triangular projectile points, preserved textiles, pottery, glass beads, and steatite artifacts (CRI 1999).

The literature also indicates that the project area may have been influenced culturally by contact with Chumash people. The Chumash traditionally occupied coastal and inland areas from Topanga Canyon in Los Angeles County to northern San Luis Obispo County. With reference to the project area, the Cuyama band would have been contemporaries occupying the Temblor Mountains and Cuyama Valley west of the project area. The Emigdiano and Castac tribes lived farther to the south and southeast, respectively (CRI 1999). The southern portion of the

central valley would have constituted a route of travel or trade. The archaeological evidence does indicate there was such trade; artifacts associated with the Chumash include shell beads, fine baskets, projectile points, sandstone, oak and steatite bowls. The Chumash are also well known for extraordinary rock art and numerous sites have been recorded within their traditional lands in the coastal range (Grant 1978, EHPP 1999a).

Thus, portions of the project area may have been influenced archaeologically by both the Yokuts and the Chumash people. There is evidence of trade and artifacts from either group could be present in areas affected by the project. As surviving Native Americans were dispersed among the missions and to reservations, and many were employed as laborers and vaqueros on land grant ranches after secularization of the missions in the 1830s, there may have been a gradual melding of the languages and cultures over time (CRI 1999).

HISTORIC SETTING

The major themes related to the historical period include Spanish explorations, the Mission period, pioneer development and ranching, water projects in the San Joaquin valley, transportation, and development of the Elk Hills Oil and Gas field.

Spanish explorations in the project region began with the travels of Pedro Fages in 1773 and Fr. Francisco Garces in 1776, followed by the two expeditions in 1806 by Fra. Antonio Zalvidea and Lt. Moraga in search of mission locations. Fages visited at least one Yokuts village on the shore of Buena Vista Lake. No missions were established, and some of the subsequent expeditions between 1808 and the 1820s were conducted to capture Indians who had fled from missions. These efforts would have left little effect on the region.

Visits by European explorers increased in the early 1800s, but the southern San Joaquin Valley remained relatively sparsely settled for some time. Beginning in the 1830s, toward the end of the Spanish period and into the Mexican period, large tracts of land were granted to Mexican and other European settlers and used primarily for cattle grazing in support of the trade for hides and tallow. Although such Kern County ranchos as El Tejon and San Emigdio employed some of the mission Indians, they were still beset by cattle and horse raids from the nearby native communities. The most profound effect on the environment was the replacement of native vegetation by exotic grasses and forbes introduced by the new animals. Culturally, there ensued severe disruption of the Native American populations and cultures (CRI 1999).

The first waves of pioneer settlement and population growth, which took place elsewhere in California after the mid-nineteenth century, largely bypassed this part of the San Joaquin Valley because of the unfavorable climate and lack of timber and potable water. Hispanic Californios carried on small-scale cattle and sheep ranching and horse trading on the west side of the valley, joined by some Basque and Portuguese herders. The first private landowner in the Elk Hills was Alice J. Miller (or Muller) in 1905, and by 1910, nearly all of the Elk Hills, not owned by the government, had been claimed (CRI 1999).

As the old Mexican land grants and small holdings were gradually aggregated into major ranches, such as the Miller and Lux Land Company of the 1850s which ultimately acquired 700,000 acres, irrigation canal projects proliferated and conflicting claims to Kern River water were only settled by the California Supreme Court in 1886. Miller and Lux acquired the Kern Valley Water Company, leader in irrigation projects in the southern San Joaquin Valley through the 1920s. After that time, the large-scale development of more efficient hydroelectric power made it economically feasible to pump groundwater for irrigation, contributing to greater expansion of farm production.

Since prehistoric times, the Valley has served as a route of travel and trade, for Native Americans, fur traders, ox cart and wagon roads (El Camino Viejo, the Old Los Angeles Trace or Old West Side Road), and parallel paths for the Stockton-Visalia and Butterfield overland stages. Construction of the Southern Pacific Railroad along the east side of the Valley in 1877 led to expansions in wheat farming and ranching, and in 1893, the Southern Pacific opened a branch line through the Elk Hills from Bakersfield to Asphalto (now McKittrick) to serve the growing asphalt industry there (CRI 1999). These transportation improvements facilitated industrial growth and prosperity, expanded markets for the local products, brought about a population increase of 45 percent between 1900 and 1930, and stimulated interest in the exploration for oil.

Petroleum extraction in the region had begun with the Buena Vista Petroleum Company's refinery north of McKittrick in the 1860s, but the cost of transportation at the time made this a minor effort. The railroad, coupled with major discoveries in the McKittrick, Sunset, Kern River, and Elk Hills oil fields in the early 1900s, led to a rush to develop oil fields on the west side of the valley. Three companies acquired control of the resource and refineries: Standard Oil, Southern Pacific, and the cooperative called Associated Oil.

Early in this century the U. S. Navy expressed to Congress their concern for the strategic security of the nation's oil supply, and requested creation of defined petroleum reserves. In September, 1912, an executive order signed by President Taft created Naval Petroleum Reserve No. 1 (NPR-1) covering about 38,000 acres in the Elk Hills. Leases were acquired from the Navy by Standard Oil and speculators, and as the industry expanded in this remote area, families of many workers relocated to privately owned camps in the Elk Hills. Standard Oil's facility at Tupman not only supported field activities, but provided many residential amenities.

Concerned that such growth would deplete the government's reserve, the Navy undertook to drain the leased fields from offset wells, and to reclaim the leased resources. All claims had reverted to the government by 1938. Production was greatly increased during World War II, both to generate revenue and to supply naval needs. The Navy's Construction Battalions (SeaBees) moved onto NPR-1 to operate the wells, make improvements, and conduct wartime readiness drills, digging foxholes and building bunkers. These features survive on the northeast and northwest flanks of the oil and gas field (CRI 1999). Additional episodes of oil

development followed in 1945, 1951, and 1976. The DOE operated NPR-1 (now the Elk Hills Oil and Gas Reserve) until February 1, 1998.

The draft Cultural Resources Management Plan (CRMP), prepared as a DOE document, devotes a single page to the historical resources and does not offer a research design. The maps provided as Appendix 2 to this document depict the prehistoric sites exclusively. As described in the AFC, known historic era cultural resources of potential interest or concern would include transportation corridors and facilities; oil and gas production locations and installations; homesteads; commercial and residential communities, as represented by buildings, other structural elements and discards; work camps; sites; districts; landscapes; and objects (EHPP 1999a, CRI 1999). Many of the same research issues posed for the prehistoric sites would apply: archaeological context, settlement pattern, past lifeways, technology, adaptation to the environment, and all the subsets such as subsistence, chronology, social organization, economy, and the like. As with potential prehistoric resources, buried historical archaeological sites may be concealed from surface observations by superficial grading or land clearing, pavement, subsequent re-use of the landform, agricultural activity, sedimentation, or other process.

PRE-AFC LITERATURE AND RECORDS SEARCH

Prior to preparation of the AFC, consultants to the applicant conducted a literature search and reviewed site records and maps at the Southern San Joaquin Valley Information Center of the California Historical Resources Information System (CHRIS) in December 1998. Records indicated numerous previous surveys had been done in the project area, but not all of the area potentially affected by the project had been surveyed. Much of the archival and survey work had been conducted in 1997 and 1998 by DOE as part of the divestiture process for NPR-1, but some of the surveys and records of sites within the APE were as old as 1979. The applicant's consultant also reviewed lists of historic properties included within the National Register of Historic Places, California Register of Historical Resources, California Points of Historic Interest, California Landmark files, and historical maps (CRI 1999).

For project construction and operation, the literature and record search focused on the Areas of Potential Effect (APE) defined as an area 0.25 mile around the power plant site, 100 feet to either side of the transmission lines, 50 feet on either side of the water supply and water disposal lines and 50 feet on either side of the natural gas line (CRI 1999).

Within 0.25 mile of the EHPP facilities as then proposed, there were a total of 71 recorded archaeological sites (26 prehistoric, 43 historical, and 2 containing both components) and 5 prehistoric isolated occurrences. At that time, one site within the APE for transmission Route 1A (CA-KER-3079/H, a multi-component site) had already been nominated to the National Register of Historic Places (NRHP) by the DOE, and three others within the buffer zones listed in the OEHI-DOE License Agreement were found eligible. These are CA-KER--5404 and -3080 within 0.25

mile of Route 1A, and CA-KER-3168 within the same buffer zone of transmission Route 1B.

Results of the literature review and a brief description of the known resources are summarized in the AFC, Appendix L-2, titled *Cultural Resources Inventory of the Elk Hills Power Project.* (CRI). Site-specific information was filed with the Energy Commission under separate cover to maintain confidentiality of sensitive resource locations. For a summary of the results of the literature review and a brief description of the types of resources found at the recorded sites, refer to Tables 2 and 3, Revised in response to Data Requests 83 and 84 (EHPP 1999h).

PRE-AFC FIELD SURVEYS

The record search indicated that roughly 36 percent of the project APE had been previously surveyed, but that some of those surveys had been completed more than 25 years ago, some site records did not meet currently prevailing professional standards, and the criteria for evaluation were not always specified, comparable, or consistent with current standards. State and federal guidelines recommend that survey records and maps more than five years old should be updated to determine whether any changes have occurred. The consultants to the applicant conducted a cultural resource survey of portions of the project APE to determine the current status and condition of selected previously recorded resources, examine areas which had not previously been surveyed, and to identify any additional resources that might be present in areas not surveyed before.

Some of the sites had previously been identified and their potential eligibility evaluated as part of the License Agreement made in 1998 between the (DOE) and Occidental of Elk Hills, Inc., pursuant to Occidental's acquisition of Naval Petroleum Reserve No. 1 (NPR-1). The Programmatic Agreement (PA) signed in 1998 set forth the stipulations to be followed regarding historic preservation standards, treatment of cultural items and human remains, consultation with Native Americans, and other procedural matters. A Draft CRMP was prepared as a DOE document. As the response to Data Request 86 makes clear, Occidental Energy Ventures Corp. and Sempra Energy Resources (OEHI) are not parties to the PA or CRMP (EHPP 1999g).

The consultant's record search indicated that about one-third of the APE had been previously surveyed for cultural resources over the prior 25 years and according to various survey methods and recording standards. During the new survey in November and December of 1998, a two-person field team walked in a series of parallel transects each covering a width of about 50 feet (15.24 meters). Visibility was reported as good along Route 1A and the north end of wastewater supply pipeline, Route 3, where grass cover was sparse or dormant, along the plowed fields of Route 1B north of the aqueduct, and along the high production areas of Route 2, the raw water supply pipeline. Grasses were thick, up to chest-high, and visibility was poor along Route 1B south of the aqueduct and at the eastern ends of Routes 1A and 2. Steep slopes were not surveyed (CRI 1999).

As described in the Elk Hills AFC, the project vicinity and general area have been the scene of petroleum extraction for many years. Numerous traces of oil field development and remnants of oil production equipment were found during all surveys, and some of it may be more than 45 years old. Historic types of sites and structural remains were encountered during Elk Hills research. In 1997, 53 historical oil wells and the 3G Gas Plant were recorded; all were believed ineligible for lack of integrity because some or all of the superstructural elements or features had been dismantled. The CRI listed eight historical sites and two multicomponent sites within the APE, representing one drilling location, five historical oil wells, two domestic sites, one artifact deposit, and one not described (EHHP 1999a,). All were considered as not eligible, and no action was recommended for any of them although five of the historical sites occur in the path of proposed project facilities. The following areas were examined in 1998-1999:

- The entire power plant site plus 0.25-mile buffer zone, for a total of 145 acres, including the natural gas supply pipeline, Route 4.
- Route 1A, approximately 109 acres.
- Route 1B, approximately 202 acres.
- Route 1B Variation power plant site to California Aqueduct, acreage not provided.
- Route 1C (subsequently abandoned), 143 acres.
- Route 2, approximately 80 acres.
- Route 3, approximately 26 acres.

In all, approximately 706 acres were surveyed. The fieldwork identified 18 previously recorded sites (8 prehistoric, 8 historical, and 2 dual-component) and added two prehistoric sites (temporary designations EHPP-1 and -2), and two additional prehistoric isolates. Several other site localities were grouped as single sites, and some site boundaries were modified (EHPP 1999a). Subsequent refinements, additions, and combinations culminated in the present total of 19 sites and five isolates within the APE (EHPP1999h).

The survey report cautioned that shell scatters are common along the transmission line routes and that such discrete scatters may represent very large site areas with a discontinuous distribution of cultural material on the surface. Further, the observed presence of shell has extended the presumed boundaries of at least two sites, and due to the quality and scale of site maps, the precise distance and relation of sites to the project's linear features is sometimes difficult to determine (EHPP 1999a).

POST-AFC FIELD SURVEY

In data requests subsequent to the AFC, staff had requested that the applicant provide record and survey information for a portion of the Route 1B variation under consideration. This alignment begins at the power plant site and continues north-northeastward along the existing transmission line. It was surveyed as far as the

California Aqueduct. That portion of the variant north of the Aqueduct had previously been inspected as part of Route 1B. The survey of the southern sector was conducted by two surveyors on August 23 and 24, 1999. Visibility was reported as very good (EHPP 1999f).

POWER PLANT SITE AND IMMEDIATE LINEAR FACILITY ROUTES

POWER PLANT SITE AND ROUTE 4

The plant location encompasses approximately 12 acres at the southwest corner of the project area. There are no recorded archaeological sites, only one isolate, within the plant footprint or the 0.25-mile buffer surrounding the project and its facilities. The surveyors noted one depression toward the center of the area obscured by dense vegetation, and another along an ephemeral drainage east of the former where there were petroleum product odors.

Route 4 is the 2500-foot long, 6-inch natural gas supply line which will be built above ground on the power plant site. There are no known sites and a single isolate within the APE or 0.25-mile vicinity.

ROUTE 1A

The alignment of the alternative Route 1A transmission line extends northeasterly from the plant site for about 9,000 feet, coterminous with the alignment of Route 1B, then turns generally east-west for a distance of approximately 9.0 miles from the plant to its termination at the California Aqueduct. Approximately 4.2 linear miles within the APE were newly surveyed, to fill in gaps in previous coverage. After two sites have been combined under a single designation, there are now eight sites and two isolated occurrences on record. The isolates, both prehistoric shell fragments, were newly added during the 1998 survey for the proposed EHPP. Four sites are prehistoric, two are historical, and two have both components. Five sites are directly on the transmission line, while the others are less than 100 feet distant. Fourteen additional sites and one prehistoric isolate are within 0.25 mile of the APE (EHPP 1999h). Site CA-KER-3079/H, a resource with both prehistoric and historical components, has been determined eligible for the NRHP and any impact will require mitigation. CA-KER-3080 was also determined eligible, and is approximately 500 feet from the APE, and significant site -5404 is 300 feet north of the APE (EHPP 1999h).

Many of the same research issues posed for the prehistoric sites would apply to the historical sites: archaeological context, settlement pattern, past lifeways, technology, adaptation to the environment, and all the subsets.

ROUTE 1B

Alternative transmission line Route 1B exits the plant site in a north-northeasterly direction for about 4.3 miles and then heads north for 4.3 miles (mile post 4.3 to 8.6) to termination at bench mark (BM) 276. Approximately 7.75 miles of the APE were surveyed in 1998 since most of the alignment had not been previously examined. Two previously recorded prehistoric sites are directly on the line within the APE, and

one isolate, not described, is within 100 feet. After the combination of two sites into a single designation, seven additional sites, one prehistoric isolate, and one unidentified isolate lie within the 0.25-mile buffer. CA-KER-3168H, containing both prehistoric and historical remains, is eligible, some 800 feet east of the APE (EHHP 1999h).

ROUTE 1B VARIATION

Added to the AFC Figure 3 map (CRI 1999), this variation was surveyed in August 1999 after submission of the AFC. The APE surveyed extends north-northeast from the power plant along the existing transmission line as far as the California Aqueduct. The alignment north of the aqueduct had been surveyed . Shell fragments and chert flakes were observed, extending the size of one previously recorded site, which will be in the APE of either Route 1B or this variation. Other shell was noted about 75 feet west of this variant, in the vicinity of a previously recorded site apparently outside of the APE. A third prehistoric site was observed where the Route 1B survey had reported an isolate (EHPP 1999f); the location is not depicted on the Figure 3 map, so it is not clear at this time whether the known site is within the APE of this variant. One eligible with both prehistoric and historical components, CA-KER-3168/H, is 800 feet east of the APE (EHPP 1999h).

ROUTE 2

The water supply pipeline is generally parallel to Route 1A and about two miles to the south. It extends for approximately 8.6 miles from the plant site to termination at the California Aqueduct. About 6.1 miles of the 100-foot wide APE were surveyed in 1998 to complete the coverage. Nine sites are now known within the APE, one of them newly recorded during the most recent survey. Of these, three are prehistoric; one is an historical livestock/corral site with foundations and domestic artifact scatters, possibly a portion of Standard Oil's Hay-Carmen work camp dating from circa 1918; four are historical oil wells; and the ninth is another historical habitation site with domestic artifact scatters (no site record or other data provided). Six of the sites are directly on the pipeline corridor and the others are within 100 feet. One prehistoric "find" is not identified. Within 0.25 mile, there are an additional 32 sites and one prehistoric isolate, evidence of the high site density along this corridor. All but one of the sites are historical and none of these was regarded as significant (EHPP 1999h). The pipeline crosses a half-section of BLM property, and conditions of the National Historic Preservation Act apply to this part of the project.

One newly recorded site in the APE, EHPP-1, has not been tested or evaluated. The site record (CRI 1999) mentions features, described as two shell deposits on opposite sides of a dirt road, and "other" which is not explained. Without further evaluation or detail, staff considers such resources as potentially eligible.

ROUTE 3

The new wastewater discharge will be a 6-inch steel pipeline 4.4 miles long, extending from the plant site south to new disposal wells 4 miles south of the plant. Access will be provided by new dirt roads. Approximately 2 miles at the north end of the route were surveyed in 1998. No sites were recorded either in the APE or the buffer zone (EHPP 1999h).

ARCHITECTURAL RECONNAISSANCE

The AFC does not contain any architectural or engineering analysis of evidence remaining of the long history of oil production or the work camps which supported industrial activities. Although much of the oil and gas production equipment in the project vicinity was older than 45 years, and at least one historical site within the APE contains materials dating back at least to the 1920s and probably older, based on the presence of sun-colored amethyst glass, the structural elements, artifact deposits and research potential of historical remains were not assessed. The work camp site, for example, also contains a complex of foundations, roads and trails, privies, at least three trash deposits, railroad grades, walls and fences. This site, which includes comparable examples with both industrial and residential remains, and numerous wells spudded in during the 1920s were regarded as disturbed because superstructures were fragmentary or missing. Seemingly for this reason alone, these sites were evaluated as failing to meet the criteria for significance. The archaeological and engineering/technology aspects of such sites were not addressed, and historical landscape was not considered.

NATIVE AMERICAN CONTACTS

In November 1998, prior to beginning the fieldwork and surveys, the consultant to the applicant contacted the state's Native American Heritage Commission (NAHC) to request information on sacred lands within the project area (CRI, 1999). The NAHC maintains a list and maps of traditional sacred sites located on public and private lands throughout the state. The Heritage Commission also can refer staff, applicants, consultants and members of the public to registered Native American representatives for each part of the state who can assess the potential for a specific project to impact Native American sites or values.

In response to the project consultant's request, no sacred properties were identified within the project area. The fact that no sacred property locations were divulged, however, does not mean that they may not exist since this information is often protected until a project actually appears to be approaching such a resource area. In its response, the NAHC provided a list of Native American contacts. Attachment E contains three letters sent by Occidental to tribal representatives, and the list of those attending an informational meeting in January 1999 between OEHI and the Kern County Native American Preservation Council (EHPP 1999a, CRI). The AFC does not contain any written responses to the applicant's letters, expressions of concern, or record of Native American participation in the surveys or site assessments.

SUMMARY OF KNOWN RESOURCES WITHIN THE AREA OF PROJECT EFFECT

The record search and field surveys now document the presence of 19 recorded archaeological sites and 5 isolates within the APE for the plant site and associated transmission lines and pipelines (EHPP 1999h Tables 2 and 3). For this purpose, the APE was defined as 0.25 mile around the power plant, 100 feet on either side of the transmission lines, and 50 feet on either side of the water supply and water disposal pipelines. Nine of the sites and all isolates are prehistoric, eight sites are

historical, and at least two represent both periods. Isolates, by definition, are typically not eligible for listing on the National Register of Historic Places and do not require further management. No sites were located within the half-section of BLM land.

Many of the known resource sites have been disturbed or damaged to some extent and most have not been tested prior to forming the preliminary opinions about whether or not they may be eligible for listing on the Register. However, as indicated in the applicants proposed mitigation measures, regardless of the potential for a known site or resource to be eligible for the Register, these resources should be avoided during earth disturbing activities, project construction and operation (CRI 1999).

Apparently only one site within the APE has been formally determined eligible for the Register, with Office of Historic Preservation (OHP)concurrence. Others may meet the criteria for eligibility for the Register if in situ cultural deposits are present and contain data needed to address important research questions. Condition 17 addresses specific mitigation efforts. In some areas additional testing was recommended to ascertain the presence, extent, and complexity of subsurface deposits to assist in the determination of eligibility. This can be accomplished by manual excavation, carefully controlled mechanical excavation, or some combination of both. Such testing of some resources or deposits outside the limits of the APE, but in the immediate vicinity of construction areas, may be necessary because the presence and boundaries of subsurface deposits have not been established; therefore, it is possible that portions of some sites in immediate proximity to the APEs could be encountered during construction.

No subsurface testing was done as part of the survey effort or site evaluations. Testing was specifically recommended for newly recorded site EHPP-1. The CRI further pointed out that,

> "There is a potential for the discovery of subsurface prehistoric archaeological deposits at lower elevations along the northern, eastern, and southern flanks of the Elk Hills...This is due to the apparent concentration of prehistoric and ethnographic settlement in these areas. Portions of the proposed transmission lines and water supply pipeline routes pass through these areas" (EHPP 1999a).

Monitoring and avoidance were recommended, but if impacts are unavoidable, testing would be justified to complete or revise the formal determination of eligibility and thus, the requirement to implement a mitigation program as addressed in Condition 3 and Condition 17

BLM has jurisdictional interest in cultural resources on lands crossed by portions of the routes for the water disposal line.

CATEGORIZATION OF IDENTIFIED RESOURCES

Various laws apply to the treatment of cultural resources. These laws require the Energy Commission to categorize resources by determining whether they meet

several sets of specified criteria. These categories then, in turn, influence the analysis of impacts to the resources and the mitigation that may be required to ameliorate any such impacts.

Under federal law, only historic or prehistoric sites, objects or features, landscapes, or architectural resources that are assessed by a qualified researcher as "significant" in accordance with federal guidelines typically need to be considered during the planning process. The significance of an "historic property" - which includes both prehistoric and historical sites - is judged in accordance with the criteria for eligibility for nomination to the National Register of Historic Places as defined in 36 CFR 60.4. If such resources are determined to be significant, and therefore eligible for listing in the National Register (and automatically for the California Register), they are afforded certain protection under the National Historic Preservation Act and/or CEQA.

Pursuant to 36 CFR. Part 800, to be eligible for the National Register, districts, sites, buildings, structures, and objects are those that possess the quality of significance in American history, architecture (interpreted in the broadest sense to include landscape architecture and planning), archaeology, engineering and culture, and that:

1. are associated with events that have made a significant contribution to the broad patterns of our history; or
2. that are associated with the lives of persons significant in our past; or
3. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
4. that have yielded, or may be likely to yield, information important in prehistory or history.

Title 14, California Code of Regulations, section 4852 indicates that the integrity of a resource is measured by such criteria as the degree to which it retains its location, design, setting, materials, workmanship, feeling, and association.

Under federal law, resources determined not to be significant, that is, not eligible for National Register listing, are subject to recording and documentation only, and are afforded no further protection. However, certain resources, although they may not be assessed as significant, may nonetheless, be of local or regional importance such that mitigation may be warranted regardless of their assessed significance under the federal criteria. Staff reviews the survey reports and site records for any known resources located within or adjacent to the project APE to determine whether they meet the eligibility criteria. Determinations of eligibility are made by the Keeper of the National Register with the concurrence of OHP.

Properties formally determined eligible for the National Register are automatically listed in the California Register of Historical Resources. The state has a similar set of criteria adopted in 1997. However, the NRHP standards have been modified for

state use in order to include a range of historical resources which better reflect the history of California. For example, “site” is defined as the location of a significant event, a prehistoric or historic activity, or a building or structure, *whether standing, ruined, or vanished* (Italics added*)* where the location itself possesses historical, cultural, or archaeological value regardless of the value of any existing building, structure, or object [Title 14, Public Resources Code , section 4800.3 4852 (A.a) (2)]. Also, with regard to integrity, the State has broadened the definitions and judges condition with reference to the specific criteria under which a property is being considered. It accepts that alterations over time, or changes in a property’s use, may themselves have historical, cultural, or architectural significance. California explicitly recognizes that “properties may not retain sufficient integrity to meet the criteria for listing on the National Register, but they may still be eligible for listing in the California Register. A property that has lost its historic character or appearance may still have sufficient integrity for the California Register if it maintains the potential to yield important scientific or historical information, or specific data” (section 4800.34852).

The OHP has established status codes, and subcategories to many of them, to be used in the evaluations of sites or structures recorded on Form DPR 523. The basic codes are:

Category 1 - Listed in the National Register of Historic Places;
Category 2 - Formally determined eligible for listing in the National Register;
Category 3 - Appears eligible for listing in the National Register;
Category 4 - Could become eligible for listing in the National Register; or
Category 5 - Locally significant.

If the underlying survey meets the State’s standards, the OHP will recommend to the State Historical Resources Commission (SHRC) that all properties with a rating of Category 1 through 4 be listed in the California Register. All Category 5 ratings will be reviewed for consistency with the criteria of significance. The SHRC may list properties which are 45 years of age or older.

The record and literature search and the field surveys of the proposed project APE were conducted to identify the presence of any cultural resource sites or materials. Where resources were identified, additional evaluation was conducted to form an opinion about whether the resources appear potentially eligible for listing on the National Register of Historic Places (36 CFR 800). Criteria for the California Register of Historical Resources were not discussed, and the status code boxes on the site record forms (DPR 523) were not filled in. It is not known whether OHP has concurred with all of the evaluations of significance expressed in the AFC (EHPP 1999i).

The CEQA guidelines, Title 14, sections 15126.4 and 15064.5, explicitly require the lead agency (in this case, the Energy Commission), to make a finding of whether a proposed project will affect “historic resources.” As used in CEQA, the term “historic resources” includes any property, regardless of age (usually a minimum of 45 years), which satisfies the criteria stated above. If the criteria are met, the Energy Commission must evaluate whether the project will cause a “substantial

adverse change in the significance of that historic resource," which the regulations define as a significant effect on the environment. The CEQA guidelines indicate that if an archaeological site is determined to be an historical resource, the limits contained in PRC section 21083.2 do not apply.

Using the above criteria, staff has determined that the cultural resource sites described in the AFC, and in subsequent filings for the Elk Hills project, meet one or more of the criteria for being an historical resource. Isolated finds, by definition do not meet these criteria. Since staff has concluded that the sites for which it is recommending mitigation meet the definition of historical resources, PRC section 21083.2 does not apply to the mitigation discussed in this analysis.

IMPACTS

Since project development and construction usually entail surface and subsurface disturbance of the ground, the proposed Elk Hills project has the potential to cause an adverse effect on both known and previously unknown cultural resources. Project-related impacts may be categorized in several, inter-related ways. Impacts to cultural resources may either be temporary or permanent effects that could be associated with site preparation, project construction, project operation, and/or project closure. Project-related impacts may also result either directly or indirectly during the pre-construction, construction, operation, and/or closure of the project.

TEMPORARY EFFECTS

Temporary effects occur primarily during those phases of the project associated with disturbance or use of the ground surface during pre-construction vegetation removal and site preparation, and during activities associated with the construction and use of parking or storage areas, conductor pulling sites, or tower laydown sites. Potential adverse changes to a cultural resource may occur if sensitive resource areas are subject to personal or vehicular traffic, parking, or storage because any resources present at the surface could be dislocated or damaged. Typically, once the activity is completed, the potential for impacts is alleviated.

PERMANENT EFFECTS

The potential for permanent effects to occur to cultural resources would be related to such project activities as grading, cutting and filling, excavation, trenching, augering, pile driving, or other pre-construction or construction process which disturbs, removes, or destroys an historic property. Permanent effects may also be caused by damage or disturbance of previously unknown resources that are unexpectedly encountered during earth disturbing activities or construction. Permanent effects on sites within or away from the APE may result from the construction and use of new access roads to an area previously inaccessible, ongoing maintenance to pipelines and other linear facilities, or response to emergency situations.

DIRECT IMPACTS

According to CEQA Guidelines, direct impacts are defined as those impacts that are directly attributable to the project and which occur at the same time and place. Direct impacts are those which may result from the immediate disturbance of resources, whether from vegetation removal, vehicle travel over the surface, earth-moving activities, or excavation.

INDIRECT IMPACTS

Indirect impacts are those which may result from increased erosion as a result of site clearance and preparation, management of the biological habitat, or from inadvertent damage or outright vandalism to exposed cultural materials within or outside of the APE due to increased accessibility to sensitive resource areas.

POTENTIAL FOR PROJECT EFFECTS

The potential for project construction or earth disturbing activities to impact previously unknown cultural resources cannot be fully evaluated until the subsurface soils are exposed by excavation, trenching, and/or augering. A prediction of the potential for discovery of cultural resources can be made, based on the results of literature review and field investigations. The numerous sites already known on or near portions of the project site or the linear facility routes, the recorded occurrence of numerous isolates, and the evidence of human habitation over a period of thousands of years - all on or in proximity to the proposed project – indicate that construction of the EHPP has the potential to encounter previously unrecorded cultural resources. Some will have been buried by the natural sedimentation on the flood plain, while surface evidence of others has been obscured or removed during subsequent or sequential historical uses of the property.

Thus, the potential for EHPP to impact previously unknown cultural resources is directly related to the likelihood that such resources are present, whether they are actually encountered during project development, and the measures set in place to avoid or reduce such impacts to an insignificant level.

THE POTENTIAL FOR “ADVERSE CHANGES” TO HISTORIC RESOURCES

Based upon the Warren-Alquist Act and the Energy Commission siting regulations, the Commission staff must evaluate the potential for significant impacts to cultural resources. Based upon CEQA, staff must evaluate the potential for adverse changes in the significance of historic resources. Not all cultural resources are the same, nor do they offer the same degree of information or insight into past human activities and adaptations to their environment.

Professional experience, the literature, the records of previously discovered cultural resources, and reference to a regional research design all contribute to the assessment of the importance of a newly discovered site or an unanticipated subsurface resource. Significant cultural resources are those that meet established and generally accepted scientific criteria, or that possess special values to a community or national/ethnic group, contain human remains, or that contribute to an

historical landscape. The significance of any cultural resource sites, or materials recovered during project construction, is evaluated by a qualified cultural resource specialist and often can only be assessed after the sites have been mapped and recorded, collected, usually tested, analyzed, and reports prepared by professional archaeologists, historians, architectural historians, industrial specialists, and/or other consultants as the nature of the site may warrant. The actual formal determination of significance is made by the OHP which reviews the findings and forwards potentially eligible resource nominations to the NRHP and/or the California Register.

For the purposes of this analysis, potentially significant impacts to an archaeological, historical, or cultural resource are defined as project impacts which would:

- Demolish or materially alter in an adverse manner those physical characteristics of a resource that convey its historical significance and that justify its inclusion in, or eligibility for the California Register of Historical Resources (CEQA, PRC Section 15064.5);
- Demolish or materially alter in an adverse manner those physical characteristics that account for its inclusion in a local register or historical resources pursuant to local ordinance or resolution (PRC, Section 5020.1(k)), or its identification in a historical resources survey meeting the requirements of PRC, Section 5024.1(g), unless the preponderance of the evidence demonstrates that the resource is not historically or culturally significant.

The lead agency must address two questions: 1) Is there a significant resource that may be impacted by the proposed project? 2) Will the project cause a substantial adverse change to the extent that the values of the resource which contributed to its importance are impaired or lost? CEQA specifically states that a resource need not be listed on any register to be found significant (Section 21084.1).

The AFC and supplementary filings indicate that a total of 81 cultural resources (72 sites and 9 isolates) have been recorded within the project area, and that 19 sites and 5 isolates within this inventory are within the defined APE. There is a potential for construction of transmission Route 1A to impact 8 known sites unless final design avoids construction in the vicinity of these resources. Route 1B could impact 2 recorded sites, and the water supply pipeline, Route 2, could affect 9 sites (EHPP 1999h). Some of the known resources appear to lack the integrity to meet the eligibility criteria for listing in the Register, but several potentially eligible sites are known to exist and one site has been determined eligible. Additional testing and analysis must be conducted in the vicinity of these sites if adverse changes are unavoidable and their significance has not been formally evaluated.

For this project, the majority of potential impacts to cultural resources would be associated with the pre-construction earth disturbance and construction phase. Since project development and construction usually entail surface and subsurface disturbance of the ground, the proposed EHPP project has the potential to impact known, as well as previously unknown, cultural resources. However, the normal

day to day operation of the EHPP is not expected to have any significant impacts on the region's cultural resources. Staff has proposed mitigation measures that address the potential for impacts to both known and unknown resources. Given the sensitivity of much of the area for the presence of cultural resources, it is likely that additional cultural resources may be discovered during construction. At this time the number of sites that cannot be avoided is unclear. Where the Cultural Resources Specialist has found evidence of cultural resources in sensitive areas, the plan is to avoid them, if possible. Archaeological methods will be used to confirm the presence; define the boundaries, contents, integrity, and research potential; and evaluate the significance of sites, in conjunction with Energy Commission staff.

POWER PLANT AND WATER DISPOSAL FACILITIES

The power plant site consists of 12 acres near the southwest portion of the total project area. As described in the AFC, the elevation of the proposed plant site slopes gently from an elevation of 1315 to 1340 feet above mean sea level (msl). In preparing for project construction, the site will be leveled to an average elevation of 1330 feet above sea level (EHPP 1999a). Soil in this area has been previously disturbed by oil and gas production, and the site is presently occupied by out-of-service tanks and equipment which will be removed. Excavation for grading, foundations, and underground systems will require the movement and recompaction of approximately 60,000 cubic yards of fill, most of the cutting to take place on the southern area of the plant site, with fill deposited on the north and northeast sides. Grading will entail a maximum cut of 10 feet at the south end, and as much as 4 feet of soil removal for fill areas. After the grade is established, maximum excavation depth for the new power plant foundation is estimated to be 15 feet (EHPP 1999a).

Existing aboveground pipelines will be relocated, and there will be a new paved 600-foot long access road from a new controlled gate at Elk Hills Road (EHPP 1999a). The disposal of wastewater will be managed by a north-south, 6-inch pipeline trending south from the power plant (Route 3), for a distance of 4.4 miles. The flow will be discharged into new disposal wells 4 miles south of the power plant. The sanitary system will be served by a septic tank draining into a leach field whose location is not specified.

NATURAL GAS LINE

Only one isolate is presently known within 0.25 mile of the power plant footprint or within 50 feet to either side of the short course of Route 4 which extends to the west from the plant site. No impacts are anticipated unless unknown subsurface deposits are encountered.

WATER SUPPLY PIPELINE

The water supply will be provided by the West Kern Water District (WKWD), conveyed through a new 9.8-mile, 16-inch pipeline (Route 2) extending from the power plant location easterly to the existing facilities of the WKWD. Three dedicated pumps plus one spare pump will be located near the existing WKWD

facilities. The pipeline will be carried above ground from the power plant to approximately MP 5.7, and will continue below grade to the eastern terminus.

Underground pipelines will be approximately 30 inches wide and 5 feet deep. Thirty-two archaeological sites have been recorded within 0.25 mile of the alignment (EHPP1999h Table 3), and nine additional sites are reported to be within 50 feet to either side of the APE (EHPP 1999h, Table 2). Most of those are within or adjacent to the APE are between MP 5.7 to MP 9.8 where the pipeline will be installed underground and are the most likely to be subject to impact.

ELECTRIC TRANSMISSION LINE ROUTES

Two alternative transmission lines have been plotted, with one variation. Access to transmission line structures will be provided by new spurs from existing oil roads. The transmission lines will be strung on single-shaft steel poles rising from 100 feet to 1225 feet above grade. The spans between poles are typically 950 feet and may be up to 130 feet, depending on the terrain and need to accommodate constraints such as road crossings. Transmission pole foundation excavations will be augered to approximately 12 feet with a diameter of approximately 6 feet. For poles placed at angle points or where extra strength is needed, the diameter of the holes needed for the poles may be as much as 12 feet (EHPP 1999b). The poles are typically 950 feet apart, but may be as far as 1225 feet apart.

Construction of concrete pier foundations for the transmission structures will require drilling into the soil to variable depths for each power pole. The depth of soil disturbance will depend on the height and diameter of the individual transmission poles designed for each portion of the route. Typically, the diameter of holes for the power poles would be about 6 feet. The width and extent of surface soil disturbance would depend upon the size of equipment needed to set and erect the poles and the amount of construction work that can be accomplished from existing, disturbed areas or roads.

ROUTE 1A

Route 1A originates at the plant switchyard and extends for 9.0 miles in a generally eastern direction to the terminus to a new ring bus station. Approximately one-third of the APE was newly surveyed in 1998, the balance being evaluated from prior investigations. There are eight sites and two newly recorded isolates within the Route 1A APE and an additional 14 sites and one isolate within 0.25 mile of the project facilities (EHPP 1999h Tables 2, 3).

ROUTE 1B

Alternative Route 1B extends from the switchyard in a generally northern direction for a distance of 8.6 miles to Buttonwillow. All of this alignment has been surveyed in 1998. Access will be provided from spur roads from existing oil field roads, and the existing 12 kV distribution circuit will be undergrounded will provide space for the new transmission line. Two sites and one isolate are within the APE, and seven sites and two isolates are between the APE and a distance of 0.25-mile (EHPP 1999h Tables 2and 3).

ROUTE 1B VARIATION

The Route 1B variation was added for consideration after completion of the AFC. It exits the power plant on the same path as Route 1B, but diverges at approximately MP 0.2 to run parallel to the west side of 1B at a distance which averages about 500 feet, to the California Aqueduct. This APE was surveyed in August 1999. Cultural remains were encountered which expand the boundaries of one previously recorded site, which will be in the APE of either Route 1B or this variant. Other remains were observed which may be part of a site previously believed to be outside of the APE. Other evidence was found to suggest that one isolate observed during the Route 1B survey is better identified as a site possibly within this variant (EHPP 1999f).

To the degree that pole placement can be modified, impacts to significant resources may be avoided. When it is desired to change a proposed pole location in order to protect a site, the alternative location will be subject to the same level of survey and further investigation as the primary location, and if the secondary choice would also result in an impact to a significant resource, either another placement should be considered, or mitigating measures implemented.

WASTEWATER DISPOSAL PIPELINE

The wastewater discharge is conveyed by a six-inch steel pipeline depicted as Route 3. It extends from the power plant in a south-southeast direction for 4.4 miles. The pipeline will be carried aboveground on pipe supports, except where it crosses under Elk Hills Road and Skyline Road in a pipe chase, to new disposal wells 4 miles south of the power plant. There are no recorded sites along this route. No impacts are anticipated unless presently unknown cultural resources are encountered.

CUMULATIVE IMPACTS

Cumulative impacts to cultural resources may occur if increasing amounts of land are cleared and disturbed for the development of multiple projects in the same vicinity as the proposed project.

The Energy Commission has certified one power generation project (La Paloma, Oct. 1999), and is currently reviewing, or anticipates receiving for review, at least four large power generation projects, all proposed for construction in this part of southwestern Kern County. Discussions are underway to consider joint use of rights-of-way for linear facilities. The consolidation and/or the reduction in the number of rights-of-way and facilities would reduce the cumulative impact potential associated with the development of multiple projects in the same general area.

Proposed developments, such as these large power generation projects and associated linear facilities, and ongoing oil field and agricultural production, are extending farther out into the southern San Joaquin Valley. The combined effects of this development can accelerate the potential for continued disturbance of cultural resource sites and the loss of significant information. The level of cumulative impact will grow as increasing development opens more undisturbed

areas and eventually exposes highly sensitive cultural resource sites. There is increasing potential that important resources will be inadvertently lost or destroyed. Implementation of appropriate mitigation measures is essential to the protection of valuable cultural resources and for the recovery of information about such important regional issues. Staff encourages cooperation among project owners to facilitate the protection of such resources, and if this is not technically or economically feasible, to mitigate unavoidable impacts on significant sites.

The incremental effect of this project is likely to contribute to a significant cumulative impact on Routes 1A and 2, which contain the greatest number of sites within the APE. At this time, the process of defining site boundaries and determining site significance is still underway, and the full inventory of significant cultural resources may only be completed during the construction phase of this project. The applicant can mitigate impacts to both undetermined and identified sites to less than significant by staff's proposed mitigation and the conditions of certification.

IMPACTS OF FACILITY CLOSURE

PLANNED CLOSURE

The anticipated lifetime of the Elk Hills project is expected to be at least 35 years. It is anticipated that upgrades or modifications made prior to the facility's closure might extend the life of the plant. Closure would be caused by either (1) a natural or manmade disaster or economic difficulty, or (2) planned, orderly closure that will occur when the plant becomes economically non-competitive.

At the time of closure, all then-applicable LORS will be identified and the Energy Commission-required closure plan will address compliance with these LORS. Generally, if no additional ground disturbance occurs during closure activities and all conditions of certification have been met, no impacts to cultural resources would be expected. However, actual potential impacts are more likely to depend upon the final location of project structures in relation to existing resources than upon the procedures used for the removal of project structures. Since the spatial relationship between the closure and removal of project structures and sensitive resources cannot be forecast at this time, no conclusion can be drawn at present about the possible impact of facility closure on cultural resources.

UNEXPECTED TEMPORARY CLOSURE

According to the AFC, an emergency unplanned closure would probably be temporary. The applicant's plan, if this type of closure occurs, would be to keep everything ready to resume operations as soon as the emergency is over. In this sort of situation, there is unlikely to be any impact to cultural resources unless emergency response might require traffic over unsurveyed areas or disturbance to sites which had not been considered subject to impact.

UNEXPECTED PERMANENT CLOSURE

If a site were simply abandoned, impact to cultural resources would be unlikely because there would be no immediate soil disturbances. Alternatively, the removal or demolition of structures, or different use of the land, might affect cultural resources. Over time, depending on the need to disturb the ground to accomplish project closure and facility removal, some disturbance of known and/or previously unknown cultural resources might result.

MITIGATION

The AFC indicates that numerous historic and prehistoric sites and numerous isolates have previously been found on the surface within the study corridor of the project area. Since project development and construction usually entail disturbance of the ground surface, as well as disturbance below the surface, the proposed project has the potential for subsurface excavation to encounter buried or obscured cultural resources. The presence of cultural resource materials beneath the surface of the project area is difficult to determine until the ground is opened by excavation, trenching, or augering, so the extent of potential impacts often cannot easily be evaluated prior to construction. The applicant intends to use archaeological methods to determine the presence of sites and avoid them, if possible.

The preferred mitigation for impacts to cultural resources is avoidance of the resource. If previously unknown cultural resources are encountered during site clearance and preparation, or during project construction, and they cannot be avoided, then contingency measures must be in place to react promptly to protect these resources and ameliorate the impacts to a level of not significant. Staff's objective is to ensure that there will be no adverse impacts to significant cultural resources during project development and construction. Critical to the success of any mitigation effort is the selection of a qualified professional cultural resources specialist. The designated specialist must have the authority to halt or redirect work in the vicinity of a site or structure until the resource is identified, evaluated, and treated, if warranted. Energy Commission staff must review the qualifications and approve of the professional archaeologist(s) designated by the project owner to lead and participate in project monitoring, testing, and mitigation efforts. Given the nature of known resources, provision should be made for expertise in both prehistoric and historical archaeology.

Mitigation measures are recommended to reduce the potential for adverse impacts on the region's cultural resources to a less than significant level. While certain types of impacts, such as the demolition of an historical structure or disturbance of human remains, cannot be mitigated to a less than significant level, staff has developed a series of conditions of certification that would help ensure the mitigation of project impacts to the extent possible. The conditions are presented below in the approximate sequence in which they would be implemented and include specific time requirements to reflect a phased or staged sequence of actions prior to, during, and following project construction.

The proposed mitigation measures are developed to reduce the impacts on important cultural resources to a less than significant level in all areas affected by the project. Sites which are not eligible for the National Register do not require management, but should be avoided if possible. Where no formal determination of eligibility has been made, sites are regarded as provisionally eligible. Mitigation measures are derived from good professional practice, based on the U. S. Secretary of the Interior guidelines and Commission staff recommendations. All of these mitigation measures have been previously proven successful in protecting sensitive cultural resources from construction-related impacts, while allowing the timely completion of many projects throughout California.

APPLICANT'S PROPOSED MITIGATION

As indicated in the AFC and in the confidential filings, any known cultural resource sites will be avoided wherever possible. The AFC recommends that sites for which significance has not been formally assessed, will be presumed to be important or significant until a determination of significance has been made and reviewed by OHP. The applicant has assumed that all the recorded sites that have not yet been formally evaluated for significance/importance, and that may still retain integrity, are at minimum an "important" resource under CEQA, or are potentially eligible for listing on the National Register under 36 CFR 60.4(d), or are eligible for the California Register.

MITIGATION MEASURES IN THE AFC

In the AFC, the applicant recommended a program of mitigation measures that would apply to any known or newly discovered cultural resources within the project APE. These proposed mitigation measures were set forth in the AFC (EHPP 1999a), and are to be incorporated into the (CRMP) to be prepared, as described in the proposed conditions of certification.

The mitigation measures provided in the AFC are summarized as follows:

1. The primary mitigation will be attempting to avoid impacts on recorded sites to the extent feasible. Transmission towers and associated facilities will be located to avoid impacts to recorded sites.
2. If eligible sites on OEHI lands cannot be avoided, OEHI will contact DOE under the License Agreement, so that DOE can implement their PA and CRMP. Prior to construction, sites will be delineated using flagging tape, rope, or other means, to include a 100-foot buffer around the resource. This is intended to be a cultural exclusion zone off limits to construction personnel.
3. Prior to construction, the Project Archaeologist will conduct a worker education session for the construction crew and supervisory personnel to explain the importance of and legal basis for the protection of significant resources. On OEHI lands, construction crews will be trained in the identification, reporting, and preservation of new and old sites.

4. An archaeological monitor will be present at sites along the transmission and water supply corridors when subsurface disturbance is taking place.
5. If a new archaeological resource is discovered during earth disturbing activities or construction and determined to be significant, the Project Archaeologist will notify the Energy Commission staff and implement a mitigation plan in accordance with the state regulations on private lands and federal regulations on federal lands, as applicable.
6. The Project Archaeologist will arrange for the curation of archaeological materials at a qualified curation facility.

If an archaeological site cannot be avoided by construction or maintenance activities, the project owner will, prior to initiating construction, develop a specific mitigation plan to address the impacts on the resource(s) and submit the plan to the Energy Commission for review. In consultation with Energy Commission staff, the plan will be completed and implemented so as to render any adverse impacts to the significant/eligible resource(s) to less than significant in accordance with CEQA, Energy Commission standards, and other legal requirements.

It is further understood that if human remains should be encountered, either during earth disturbing activities, construction or mitigation activities, work will stop immediately within 50 feet of the discovery and the provisions of the California Health and Safety Code Section 70500.5, Public Resources Code Section 5097.98, and other applicable provisions of Archaeological Resources Protection Act 1979, Native American Graves Protection and Repatriation Act (1990), and other law shall apply.

The AFC concludes that implementation of the foregoing mitigation measures would be effective by either ensuring the avoidance of cultural resources, or by mitigating unavoidable impacts to less than significant (EHPP 1999a).

POST-AFC MITIGATION MEASURES

After the AFC was filed, the applicant continued to study and evaluate alternative routes for the electrical transmission facilities. A variation to Route 1B was surveyed in August 1999, providing additional information about the archaeological and paleontological environment (EHPP 1999f).

Additional information necessary to determine whether a site is a historical resource includes final trinomial designations for some sites, (sites are at times assigned temporary numbers and it is possible for one site to be indicated by several different numbers) correspondence with OHP regarding determinations of eligibility, and results of any subsurface testing, other surveys, or analytical testing (e.g., obsidian hydration measurement, radiocarbon assay, etc.) which may have been conducted subsequent to the AFC.

The only formal determinations of eligibility for APE resources by OHP are for site CA-KER-3079/H on Route 1A - determined eligible for the National Register, and site CA-KER-3084 on Route 1B, declared not eligible. OHP consultations regarding the eligibility of CA-KER-3077 (in APE), -3077, -3168, and -5404 are not completed.

The newly recorded site listed as EHPP-1 has not been tested or evaluated. From site record alone, it may be potentially eligible. Some of the multi-component sites appear to have been evaluated only for their prehistoric values, and not for their historical significance. The presence, integrity, and research potential of subsurface deposits remain largely unknown.

The project will be designed with the intent to avoid cultural resources. If avoidance of any potentially significant cultural resource through project design will not be possible, the significance of that resource must be formally evaluated with respect to the NRHP criteria and eligibility to the California Register. This usually implies subsurface testing, confirmation of boundaries, analysis of the constituents and integrity, and assessment of scientific research potential in support of the conclusion. Appropriate mitigation measures and Section 106 consultation procedures, if necessary, in the event of disagreements, will be followed to consider project effects on potentially affected cultural resources.

The area between MP 7.5 and MP 9.0 of Route 1A contains several areas of particular sensitivity. The sector contains a complex of three sites, including the very large CA-KER-3079 which has been determined eligible. The area between MP 5.4 and MP 6.0 is also sensitive for the presence of two large sites whose boundaries are not tested, one which spans the entire survey corridor and the other apparently closely adjacent to the APE.

Procedures for addressing unanticipated archaeological discoveries were defined in the AFC. Consultation with Energy Commission staff will be carried out to ensure that all appropriate and necessary measures are taken to minimize impacts to cultural resources encountered during construction.

BLM'S PROPOSED MITIGATION MEASURES

Portions of the route proposed for the water supply pipeline route for the EHPP cross lands managed by the US Bureau of Land Management. The staff archaeologist for the BLM at the Caliente Resource Area office in Bakersfield has received a copy of the AFC and the related confidential cultural resource reports prepared by the applicant's consultants. The BLM is expected to review this staff analysis document and provide any comments and recommendations regarding cultural resource mitigation and data recovery.

STAFF'S PROPOSED MITIGATION MEASURES

Commission staff concurs with the mitigation measures proposed by the applicant in the AFC. In addition to the applicant's proposed mitigation, staff's recommendations have been incorporated into a series of conditions of certification that are expected to reduce the potential for adverse project impacts on the region's cultural resources to a less than significant level.

The proposed mitigation measures would apply to any potential for impacts to sensitive cultural resources in all areas affected by the project. Mitigation measures are derived from good professional practice and they are based on the US Secretary of the Interior's guidelines, and staff's recommendations. The mitigation

measures set forth in the conditions have been applied to previous projects before the Energy Commission and they have been proven successful in protecting sensitive cultural resources from construction-related impacts, while allowing the timely completion of many projects throughout California.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The AFC reported an inventory of 72 recorded archaeological sites (26 prehistoric, 43 historical, and 3 multicomponent) plus nine prehistoric isolates within 0.25 mile of the proposed Elk Hills facilities (EHPP 1999hdata response 83 and 84, Tables 3 and 3).

Within the APE as defined above, there are 19 sites and five isolates. Given the number of recorded sites and isolates within the 0.25-mile study area, there is a strong possibility that project construction could encounter additional, potentially significant cultural resources. The presence of isolates on a surface which has been subject to use and modification can sometimes indicate the presence of additional resources below the surface or in proximity to the surface finds.

The analysis of “land disturbance” prepared by Walsh Environmental Scientists and Engineers (EHPP 1999e) dealt explicitly with *surface* disturbance, and does not mean that the cultural potential of areas regarded as “disturbed” should be automatically ruled out. The archaeological consultant assessed the degree of prior impacts at 56 prehistoric sites, and while available data were variable, the CRMP reported as follows (pages 23-33):

Sites with 0 to 20% disturbance	18
Sites with 20-40% disturbance	5
Sites with 40-60% disturbance	5
Sites with 60-80% disturbance	10
Sites with 80 to 100% disturbance, or not relocated	18
Total	56

A consideration in weighing disturbance from past extraction or production activities is that 41 of the above sites are in low production areas, compared to 12 in high production areas, while three are in agricultural lands (CRMP 1998, Table 2). It is questionable whether two of the prehistoric sites (CA-KER-3200/H and -3210/H) were completely destroyed by the overlying historical component, or whether CA-KER-3255 in agricultural land was “completely destroyed” by livestock grazing. The CRMP further suggested that the so-called prospect pits on six of the sites are “probably World War II military emplacements constructed for the defense of NPR-1” (CRMP 1998, page 33), an association which may be significant.

Of the 19 known recorded sites within the Elk Hills project APE, only one (CA-KER-3079/H) has been determined eligible so far for listing on the National Register of Historic Places. Others are awaiting testing, consultant evaluation, and review of the recommendations by the OHP. While many of these previously recorded resources may not be eligible for the register, an eligibility determination has not been completed for all known, recorded resources within the APE.

Under CEQA, the Energy Commission is required to make findings as to the presence of historic resources in the area potentially affected by a project and to draw conclusions as to the potential significance of the resources and/or the impacts. Staff has determined that the known resource sites described in the AFC and in the confidential technical reports meet one or more of the criteria needed to identify them as "historic resources." There may be others in the APE which have not been fully evaluated for their significance. Staff has reviewed the discussions of the materials recorded at the various known sites found within 0.25 mile of the project APE. Staff has reviewed the recommendations of the applicant's archaeological specialist and will consider the comments of the BLM archaeologist in the Final Staff Assessment.

Mindful that some information is still to be supplied, and that there may be changes in the locations of routes or facilities, staff has incorporated the various cultural resource mitigation measures into a proposed set of conditions of certification for the Elk Hills project. These conditions are set forth as a series of steps or activities that are intended to be completed in a phased sequence, during project-related pre-construction, construction, post-construction, and operation activities. For instance, the preparation of a monitoring and mitigation plan by the designated cultural resource specialist cannot take place until final project design and site maps have been completed, the designated specialist has been approved by the Energy Commission staff's Compliance Project Manager (CPM), and any necessary final surveys have been completed.

The cultural resource conditions of certification are presented as a means of anticipating potential impacts and they are expected to reduce any potential for adverse impacts to historic resources to a less than significant level. An applicant or a project owner frequently anticipates starting project construction as soon as they receive the Energy Commission's decision on certification. It is crucial to recognize that such construction cannot begin until the adopted Conditions of Certification have been complied with. If the start of project construction begins immediately after certification, conditions with extended lead times must be initiated prior to certification.

Staff concludes that construction of the Elk Hills project can be accomplished in a manner that can avoid potential adverse changes to the significance of the known prehistoric resources which were the focus of the CRMP. The potential for adverse changes to subsurface deposits and as yet undiscovered additional sites will remain unknown until, and unless, such resources are encountered. Not a single historical site in the APE or buffer zone has been evaluated as having research potential, although descriptions mention residential and industrial sites, domestic trash deposits, structural remains, and possible military emplacements dating to World

War II. Staff believes that if the recommendations and proposed conditions of certification are implemented by qualified professionals in a timely and proper manner, the project will be in compliance with the applicable LORS.

RECOMMENDATIONS

Portions of Route 1A between MP 7.5 and MP 9.0 were identified as being particularly sensitive, and further evaluation and testing may be needed to clarify the potential for the project to affect known resources. As a result of the surveys, the archaeological consultant has also recommended that several of the previously recorded isolates and sites should be combined with boundaries revised or expanded to reflect the new findings. While many of the recorded resources present along Routes 1A and Route 2 may not be eligible for the Register(s), formal determination of eligibility with concurrence from OHP has apparently been completed for only those sites considered in the PA/CRMP and/or the OEHI/DOE Agreement.

Staff recommends the designation of a qualified professional cultural resource specialist to implement all cultural resource conditions of certification. Staff also recommends monitoring by the designated specialist throughout the pre-construction and construction periods, as needed, and the implementation of appropriate mitigation measures wherever cultural resources are encountered. Monitoring and mitigation by a qualified cultural resource specialist are essential to reduce the potential for project impacts to cultural resources to a less than significant level. Historical and dual component resources should be examined and evaluated by an historical archaeologist and/or architectural historian who is versed in the method and theory of addressing the significance of historical deposits, structural remains, industrial evidence, and the potential for subsurface resources, and who can identify and date artifacts on the surface or which may be encountered during construction.

Staff recommends that the qualified resource specialist be informed before and during the construction process of mitigating measures implemented by other consultants, for example, the biologist, which have the potential to affect cultural resources which are outside of the surveyed corridors.

Staff recommends that the Energy Commission adopt the following proposed conditions of certification, to ensure mitigation of potential impacts to sensitive cultural resources during the land-disturbing activities associated with construction of the Elk Hills Power Project.

CONDITIONS OF CERTIFICATION

CUL-1 Prior to the start of project-related earth disturbing activities including vegetation clearance, ground disturbance and preparation; and site excavation activities, or the movement or parking of heavy equipment onto or over the project surface, the project owner shall provide the California Energy Commission (Energy Commission) Compliance Project Manager (CPM) with the name and statement of qualifications for its designated cultural resource

specialist who will be responsible for implementation of all cultural resources conditions of certification,

Protocol: The statement of qualifications for the designated cultural resource specialist shall include all information needed to demonstrate that the specialist meets at least the minimum qualifications specified by the Department of the Interior, as published by the National Park Service, Heritage Preservation Services. Alternatively, the archaeologist shall be qualified by the Register of Professional Archaeologists (ROPA). The minimum qualifications include the following:

1. a graduate degree in, archaeology,cultural resource management,
2. at least three years of archaeological resource evaluation, management, impact mitigation and field experience in California; and
3. at least one year's experience in each of the following areas:

a) leading archaeological resource field surveys;
b) leading site and artifact mapping, recording, and recovery operations;
c) marshaling and use of equipment necessary for cultural resource recovery and testing;
d) preparing recovered materials for analysis and identification;
e) determining the need for appropriate sampling and/or testing in the field and in the laboratory;
f) directing the analyses of mapped and recovered artifacts;
g) completing the identification and inventory of recovered cultural resource materials; and
h) preparing appropriate reports to be filed with the receiving curation repository, the SHPO, all appropriate regional archaeological information center(s).

The statement of qualifications for the designated cultural resource specialist shall include:

1. a list of specific projects the specialist has previously worked on;
2. the role and responsibilities of the specialist for each project listed; and
3. the names and phone numbers of contacts familiar with the specialist's work on these referenced projects.

Verification: At least ninety (90) days prior to the start of project earth disturbing activities, the project owner shall submit the name and statement of qualifications of its designated cultural resource specialist (including items 1, 2, & 3 above) to the CPM for review and written approval.

At least ten (10) days but no more than thirty (30) days prior to the start of any ground-disturbing action, the project owner shall confirm in writing to the CPM that the approved designated cultural resource specialist will be available at the start of

earth disturbing activities and is prepared to implement the cultural resources conditions of certification.

At least ten (10) days prior to the termination or release of a designated cultural resource specialist, the project owner shall obtain CPM approval of the replacement specialist by submitting to the CPM the name and resume of the proposed new designated cultural resource specialist.

CUL-2 Prior to the start of any earth disturbing or earth moving activities, the project owner shall provide the designated cultural resource specialist and the CPM with maps and drawings showing the final project design and site layout, the final alignment of all linear facilities and the location of all auxiliary work areas. The routes for the linear facilities shall be provided on 7.5 minute US Geological Survey (USGS) quadrangle maps. In addition, maps at a scale of 1 inch to 2000 feet should indicate:

a) post mile markers (including "tic marks" for tenths of a mile);

b) final center lines and right-of-way boundaries; and

c) the location of all the various areas where surface disturbance may be associated with trenching or excavation, project-related access roads, storage yards, laydown sites, pull sites, pump or pressure stations, switchyards, electrical tower or pole footings, and any other project components.

Protocol: The designated cultural resource specialist may request, and the project owner shall provide, enlargements of portions of the maps presented as a sequence of strip maps for the linear facility routes. The strip maps would include post mile and tenth of a mile markers and would show the detailed locations of proposed access roads, storage or laydown sites, tower or pole footings, and any other areas of disturbance associated with the construction and maintenance of project-related linear facilities. The project owner shall also provide copies of any such enlargements to the CPM at the same time as they are provided to the specialist.

Verification: At least seventy-five (75) days prior to the start of earth disturbing or earth-moving activities on the project, the project owner shall provide the designated cultural resource specialist and the CPM with final drawings and site layouts for all project facilities and maps at appropriate scale(s) for all areas potentially affected by earth disturbing activities or project construction. If the designated cultural resource specialist requests enlargements or strip maps for linear facility routes, the project owner shall also provide a set of these maps to the CPM at the same time that they are provided to the specialist. Any and all changes thereafter should be mapped and provided to the specialists in the weekly meeting referenced in Cul-7 and to the CPM in the Monthly Compliance Report.

CUL-3 Prior to the start of project related earth disturbing activities, the designated cultural resources specialist shall prepare, and the project owner

shall submit to the CPM for review and written approval, a Cultural Resources Monitoring and Mitigation Plan (CRMMP), identifying general and specific measures to minimize potential impacts to sensitive cultural resources.

The Cultural Resources Monitoring and Mitigation Plan shall include, but not be limited to, the following elements and measures:

1. A proposed research design for both prehistoric and historical archaeology that includes a discussion of questions that may be answered by the mapping, data and artifact recovery conducted during monitoring and mitigation activities, and by the analysis of recovered data and materials. It shall provide details of the data needed to address the research issues and the methods proposed to obtain such data.
2. A discussion of the implementation sequence and the estimated time frames needed to accomplish all project-related tasks during the pre-construction, construction, and post-construction analysis phases of the project.
3. Identification of the person(s) expected to perform each of the tasks and description of the mitigation team organizational structure and the inter-relationship of team roles and responsibilities. Specification of the qualifications of any professional team members. The cultural resources team shall include one member with a background in the history and development of petroleum resources in California.
4. A discussion of the need for Native American observers or monitors, the procedures to be used to select them, the areas or post-mile sections where they will be needed, and their role and responsibilities.
5. A discussion of measures such as flagging or fencing, to prohibit or otherwise restrict access to sensitive resource areas that are to be avoided during pre-construction, construction and/or operation, and identification of areas where these measures are to be implemented. The discussion shall address how these measures will be implemented prior to the start of earth disturbing activities and how long they will be needed to protect the resources from project-related effects.
6. A discussion of where monitoring of project activities is deemed necessary by the designated cultural resource specialist. The specialist will determine the size or extent of the areas where monitoring is to occur and will establish the percentage of the time that the monitor(s) will be present. Identification of the monitoring requirement(s) will include areas where other specialists, e.g., biologists, may be conducting their own mitigating programs.
7. A discussion of the requirement that all cultural resources encountered will be recorded and mapped (may include photos) and all significant or diagnostic resources will be collected for analysis and eventual curation into a retrievable storage collection in a public repository or museum that meets the standards and requirements for the curation of cultural resources as set forth at Title 36 of the Federal Code of Regulations, Part 79. .

8. A discussion of the availability and the designated specialist's access to equipment and supplies necessary for site mapping, photographing, and recovering any cultural resource materials encountered during earth disturbing activities or construction.
9. Identification of the public institution that has agreed to receive any data and cultural resources recovered during project-related monitoring and mitigation work. Discussion of the requirements, specifications, or funding needed for the materials to be delivered for curation and how they will be met. Also include the name and phone number of the contact person at the institution.
10. Identification of specific sites within the APE deemed potentially significant, or potentially subject to impact, which may need additional information and recommendations for subsurface testing, boundary definition, assessment by an archaeologist (qualified in prehistory or historical archaeology as appropriate), or concurrence of the existing evaluation by OHP in the light of new information.

Verification: At least sixty (60) days prior to the start of earth- disturbing activities on the project, the project owner shall provide the Cultural Resources Monitoring and Mitigation Plan, prepared by the designated cultural resource specialist, to the CPM for review and written approval.

CUL-4 Prior to the start of earth disturbing or earth moving activities, the designated cultural resources specialist shall prepare an employee training program. The project owner shall submit the cultural resources training program to the CPM for review and written approval.

Protocol: The training program shall discuss the potential to encounter cultural resources in the field, the sensitivity and importance of these resources, and the legal obligations to preserve and protect such resources.

The training program shall also include the set of resource reporting procedures and work curtailment procedures that workers are to follow if previously unknown cultural resources are encountered during project activities. The training program shall be presented by the designated cultural resource specialist or qualified individual(s) approved by the CPM and may be combined with other training programs prepared for biological resources, paleontologic resources, hazardous materials, or any other areas of interest or concern.

Verification: At least sixty (60) days prior to the start of earth disturbing or earth moving activities on the project, the project owner shall submit to the CPM for review and written approval, the proposed employee training program, the set of reporting procedures, and the work curtailment procedures that the workers are to follow if previously unknown cultural resources are encountered during earth disturbing activities or construction. The project owner shall provide the name and resume of the individual(s) performing the training.

CUL-5 Prior to the start of earth disturbing or earth moving activities and throughout the project construction period as needed for all new employees, the project owner shall ensure that the designated cultural resource trainer(s)

provide(s) the CPM-approved cultural resources training to all project managers, construction supervisors, and workers. The project owner shall ensure that the designated trainer provides the workers with the CPM-approved set of procedures for reporting any sensitive resources that may be discovered during project-related ground disturbance and the work curtailment procedures that the workers are to follow if previously unknown cultural resources are encountered during earth disturbing activities or construction.

Verification: Within seven (7) days, after the start of earth disturbing or earth moving activities, the project owner shall provide the CPM with documentation that the designated cultural resources trainer(s) has/have provided to all project managers, construction supervisors, and workers hired before the start of earth disturbing activities the CPM-approved cultural resources training and the set of reporting and work curtailment procedures.

In each Monthly Compliance Report after the start of earth disturbing or earth moving activities the project owner shall provide the CPM with documentation that the designated cultural resource trainer(s) has/have provided to all project managers hired in the month to which the report applies the CPM-approved cultural resources training and the set of reporting and work curtailment procedures.

CUL-6 The designated cultural resource specialist or the specialist's delegated monitor(s) shall have the authority to halt or redirect earth disturbing activities or construction if previously unknown cultural resource sites or materials are encountered during project-related grading, augering, excavation and/or trenching. Cultural resources monitors shall be members of the approved cultural resources team with a background and experience appropriate to the project area being monitored.

If such resources are found and the specialist determines that they are not significant, and construction is allowed to resume, the project owner shall notify the CPM of the find as set forth in the Verification.

If such resources are found and, the specialist determines that they are or may be significant, the halting or redirection of earth disturbing activities or construction shall remain in effect until:

1. the designated cultural resources specialist has notified the CPM of the find and the work stoppage;

2. the specialist, the project owner, and the CPM have conferred and determined what, if any, data recovery or other mitigation is needed; and

3. any necessary data recovery and mitigation has been completed within the immediate area of the discovery.

The designated cultural resources specialist, the project owner, and the CPM shall confer within five working days of the notification of the CPM to determine what, if any, data recovery or other mitigation is needed.

If data recovery or other mitigation measures are required, the designated cultural resource specialist and team members shall monitor earth disturbing and construction activities and implement data recovery and mitigation measures, as needed.

All required data recovery and mitigation shall be completed expeditiously unless all parties agree to additional time.

Verification: Thirty (30) days prior to the start of earth disturbing or earth moving activities, the project owner shall provide the CPM with a letter confirming that the designated cultural resources specialist and delegated monitor(s) have the authority to halt earth disturbing or construction activities in the vicinity of a cultural resource find.

For any cultural resource encountered that the specialist determines is or may be significant, the project owner shall notify the CPM within 24 hours unless there is an intervening weekend. If there is an intervening weekend, the project owner shall notify the CPM on the Monday following the weekend.

For any cultural resource encountered that the specialist determines is not significant, the project owner shall notify the CPM within 72 hours after the find and provide written documentation.

CUL-7 Prior to the start of any earth disturbing or earth moving activity including landscaping, and each week throughout the project construction period, the project owner shall provide the designated cultural resource specialist and the CPM with a current schedule of anticipated monthly project activity. The schedule shall include a map indicating the area(s) where ground disturbing or construction activities will occur two months in advance. The designated cultural resources specialist shall consult daily with the project superintendent or construction field manager to confirm the area(s) to be worked on the next day(s), either by other specialists conducting mitigation measures or the actual processes of project development.

Verification: The project owner shall provide the designated cultural resource specialist and the CPM with a week-by-week schedule of the upcoming earth disturbing activities, construction, and mitigation activities, including those to be implemented by other specialists, on or off the project APE, one month in advance, as well as maps showing where each activity is scheduled to take place. These advance schedules are to be provided to the CPM with the Monthly Compliance Report. The project owner shall notify the CPM when all ground disturbing activities, including landscaping are completed.

CUL-8 Throughout the pre-construction reconnaissance surveys and the monitoring and mitigation phases of the project, the designated cultural resources specialist or delegated monitor(s) shall keep a daily log describing the area and nature of work, any resource finds and the progress or status of the resource monitoring, mitigation, preparation, identification, and analytical work being conducted for the project. The daily logs shall indicate by tenths of a post mile, where and when monitoring has taken place, where monitoring has been deemed unnecessary, and where cultural resources were found.

The designated specialist shall prepare a weekly summary report on the progress or status of cultural resource-related activities.

The designated resource specialist and delegated monitor(s)may informally discuss the cultural resource monitoring and mitigation activities with Commission technical staff.

Verification: Throughout any earth disturbing activity and the project construction period, the project owner shall ensure that the daily log(s) and the weekly summary reports prepared by the designated cultural resource specialist and delegated monitor(s) are available for periodic audit by the CPM. Upon request by the CPM, the project owner shall provide specified weekly summary reports to the CPM.

CUL-9 The designated cultural resource specialist or designated monitor(s), shall be present at all times the specialist deems appropriate to monitor construction-related grading, excavation, trenching, augering, or other disturbance of existing surface in the vicinity of previously recorded archaeological sites and in areas where cultural resources have been identified.

Protocol: If the designated cultural resource specialist determines that full-time monitoring is not necessary in certain portions of the project area or along portions of the linear facility routes, the designated specialist shall notify the project owner of the changes. The designated cultural resource specialist shall use post-mile markers and boundary stakes placed by the project owner to identify areas where monitoring is being reduced or is no longer deemed necessary.

Verification: During any earth disturbing activities and throughout the project construction period the project owner shall include in the Monthly Compliance Reports to the CPM copies of the weekly summary reports prepared by the designated cultural resource specialist regarding project-related cultural resource monitoring.

CUL-10 The project owner shall ensure that the designated cultural resource specialist obtains and maintains a current US Bureau of Land Management

(BLM) Archaeological Resource Use Permit to gain access to lands managed by the BLM or other federal agencies, to conduct any surveys, monitoring, data and/or artifact recovery activities on these lands. This use permit is to be obtained from the area office of the BLM in Bakersfield, California, no less than (10) days prior to the start of cultural resource activities governed by the permit.

Verification: The project owner shall provide the CPM and the designated BLM representative(s) with a copy of the BLM archaeological resource use permit received by the designated cultural resource specialist, in the next Monthly Compliance Report following its receipt or renewal.

CUL-11 The project owner shall ensure that the designated cultural resource specialist meets the professional qualifications specified by the BLM; that the Cultural Resources Monitoring and Mitigation Plan prepared per Energy Commission Condition CUL-5, also reflects BLM requirements for an Archaeological Resource Treatment Plan; and that all surveys, monitoring, and data and/or artifact recovery activities implemented during the construction and operation of the Elk Hills project.

Verification: In each Monthly Compliance Report, the project owner shall provide the CPM with a summary outlining the measures it has taken to ensure that it has met both BLM and Energy Commission requirements.

CUL-12 The project owner shall ensure that the designated cultural resource specialist performs the recovery, preparation for analysis, analysis, preparation for curation, and delivery for curation of all cultural resource materials encountered and collected during pre-construction surveys and during the monitoring, data recovery, mapping, and mitigation activities related to the project.

Verification: The project owner shall maintain in its compliance files, copies of signed contracts or agreements with the individuals, companies, or institutions which will ensure the necessary recovery, preparation for analysis, and analysis of cultural resource materials collected during data recovery and mitigation for the project. The project owner shall maintain these files for the life of the project and the files shall be kept available for periodic audit by the CPM. Information as to the specific location of sensitive cultural resource site shall be kept confidential and accessible only to qualified cultural resource specialists.

CUL-13 Following completion of data recovery and site mitigation work, the project owner shall ensure that the designated cultural resources specialist prepares a proposed scope of work for the final Cultural Resources Report. The project owner shall submit the proposed scope of work to the CPM for review and written approval.

Protocol: The proposed scope of work shall include (but not be limited to):

1. a discussion of any analysis to be conducted on recovered cultural resource materials;
2. a discussion of possible results and findings,
3. proposed research questions which may be answered or raised by analysis of the data recovered from the project; and
4. an estimate of the time needed to complete the analysis of recovered cultural resource materials and prepare the Cultural Resources Report.

Verification: The project owner shall ensure that the designated cultural resources specialist prepares the proposed scope of work within ninety (90) days following completion of the data recovery and site mitigation work. Within seven (7) days after completion of the proposed scope of work, the project owner shall submit it to the CPM for review and written approval.

CUL-14 The project owner shall ensure that the designated cultural resources specialist prepares a Cultural Resources Report. The project owner shall submit the report to the CPM for review and written approval.

Protocol: The Cultural Resources Report shall include (but not be limited to) the following:

1. For all projects:

   a) a description of pre-project literature search, surveys, and any testing activities;

   b) maps of showing areas surveyed or tested;

   c) a description of any monitoring activities;

   d) maps of any areas monitored; and

   e) conclusions and recommendations.

2. For projects in which cultural resources were encountered, include the items specified under “1” and also provide:

   a) site and isolate records and maps;
   b) a description of testing for, and determinations of, significance and potential eligibility; and
   c) a discussion of the research questions answered or raised by the data from the project.

3. For projects regarding which cultural resources were recovered, include the items specified under “1” and “2” and also provide:

   a) a description of the methods employed in the field and laboratory;

b) description (including drawings and/or photos) of recovered cultural materials;
c) results and findings of any special analyses conducted on recovered cultural resource materials;
d) an inventory list of recovered cultural resource materials; and
e) Interpretation of the site(s) with regard to the research design; and
f) the name and location of the public repository receiving the recovered cultural resources for curation.

Verification: The project owner shall ensure that the designated cultural resources specialists completes the Cultural Resources Report within ninety (90) days following completion of the analysis of the recovered cultural materials. Within seven (7) days after completion of the report, the project owner shall submit the Cultural Resources Report to the CPM for review and written approval.

CUL-15 The project owner shall submit an original, an original-quality copy, and a computer disc copy of the CPM-approved Cultural Resource Report to the public repository to receive the recovered data and materials for curation (or other format to meet the repository's requirements), with copies to the State Historic Preservation Officer (SHPO) and to the appropriate regional archaeological information center(s). The disc files must meet SHPO requirements for format and content.

Protocol: The copies of the Cultural Resource Report to be sent to the curating repository, the SHPO, and the regional information center(s) shall include the following (based on the applicable scenario (1, 2, or 3) set forth in Cul-14):

1. originals or original-quality copies of all text;
2. originals of any topographic maps showing site and resource locations;
3. originals or original-quality copies of drawings of significant or diagnostic cultural resource materials found during pre-construction surveys or during project-related monitoring, data recovery, or mitigation; and
4. photographs of the site(s) and the various cultural resource materials recovered during project monitoring and mitigation and subjected to post-recovery analysis and evaluation. The project owner shall provide the curating repository with a set of negatives for all of the photographs.

Verification: Within thirty (30) days after receiving approval of the Cultural Resources Report, the project owner shall provide to the CPM documentation that the report has been sent to the public repository receiving the recovered data and materials for curation, the SHPO, and the appropriate archaeological information center(s).

For the life of the project the project owner shall maintain in its compliance files copies of all documentation related to the filing of the CPM-approved Cultural Resources Report with the public repository receiving the recovered data and

materials for curation, the SHPO, and the appropriate archaeological information center(s).

CUL-16 Following the filing of the CPM-approved Cultural Resource Report with the appropriate entities, the project owner shall ensure that all cultural resource materials, maps and data collected during data recovery and mitigation for the project are delivered to a public repository that meets the US Secretary of the Interior standards for the curation of cultural resources. The project owner shall pay any fees for curation required by the repository.

Verification: The project owner shall ensure that all recovered cultural resource materials are delivered for curation within thirty (30) days after providing the CPM-approved Cultural Resource Report to the public repository receiving the recovered data and materials, to the SHPO, and to the appropriate archaeological information center(s).

For the life of the project, the project owner shall maintain in its project history or compliance files, copies of signed contracts or agreements with the public repository to which the project owner has delivered for curation all cultural resource materials collected during data recovery and mitigation for the project.

CUL-17 Prior to transmission line earth disturbing activities and construction, the project owner shall:

1. Design the transmission line in the areas cited to span the sensitive cultural resource site areas.
2. In the area between MP 5.0 to MP 6.0 and MP 7.5 to MP 9.0 of Route 1A, if it is not possible to span potential cultural resources, at each area of ground disturbance, the cultural resource specialist will survey the area. The survey will determine with appropriate methods whether the site represents a potentially significant cultural resource or has been formally determined not to be eligible.
3. To determine the presence or absence of subsurface deposits, the cultural resources specialist will conduct a detailed surface examination of an area 100 feet in diameter around the pole site. If cultural materials are found to be present, the designated cultural resource specialist will conduct an excavation at the center of the pole site. The preferred means of excavation will include a hand excavation unit 1-meter by 1- meter using archaeological methods and techniques. However, if deemed appropriate by the cultural resource specialist, the excavation may be conducted using auger or backhoe.
4. If sensitive cultural resources are located in situ, the pole site shall be moved to a new location, and that alternate location will be surveyed and tested, if necessary, to insure that there are no sensitive cultural resources present. If it is not possible to move the pole site, the designated cultural

resources specialist will design and implement mitigation measures, i.e., data recovery according to the research design.

5. At the discretion of the designated cultural resource specialist, in areas where human remains may be unearthed, a representative of the Native American Community shall be requested to be on site during excavations and earth disturbing activities.

Verification: The project owner shall include information about the activities related to this condition in the weekly summary of the designated cultural resource specialist's daily log submitted to the CPM in the Monthly Compliance Report.

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SOCIOECONOMICS

Joseph Diamond[1]

INTRODUCTION

Generally, a California Energy Commission (Energy Commission) staff socioeconomic impact analysis evaluates the project induced changes on community services and/or infrastructure and related community issues such as environmental justice and facility closure. Direct, indirect, and cumulative impacts are also included. This analysis discusses the potential impacts of the proposed Elk Hills project on local communities, community resources, and public services, pursuant to Title 14, California Code of Regulations, Section 15131.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

The following LORS are applicable to the Elk Hills power project:

FEDERAL

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

STATE

CALIFORNIA GOVERNMENT CODE, SECTION 65996-65997

As amended by SB 50 (Stats. 1998, ch. 407, Sec. 23), states that public agencies may not impose fees, charges or other financial requirements to offset the cost for school facilities.

LOCAL

Kern County General Plan - Public facilities component pertinent to socioeconomics.

(Policy No. 8) In evaluating a development application, Kern County will consider impacts on the local school districts.

[1] The cumulative impacts section is a joint product of Dale Edwards and Joseph Diamond.

(Implementation E) Determine the local cost of facility and infrastructure improvements and expansion which are necessitated by new development of any type and prepare a schedule of charges to be levied on the developer at the time of approval of the Final Map.

SETTING

Elk Hills is located in the rural oil fields of western Kern County. For a full description of the socioeconomic setting, please refer to the **Project Description** section of this document and the project description and location (5.1-Introduction and 5.8.1.1-Project Area) in the Elk Hills AFC, Vol. I., February 1999 (EHPP 1999a). The study area (affected area), defined by Elk Hills Power., LLC (EHP) in the socioeconomics section of the AFC, includes: western Kern County, Bakersfield, Buttonwillow, Maricopa, McFarland, McKittrick, Taft, Shafter, and Wasco. These communities are within a one-way commute distance of the power plant site where construction and operations workers may live.

IMPACTS

Staff reviewed the Elk Hills AFC, Vol. I, February 1999, socioeconomic section (EHPP 1999a) regarding potential impacts to community services and infrastructure (i.e., employment, housing, schools, utilities, emergency and other services), and environmental justice. Based on its analysis and the socioeconomic data provided and referenced from governmental agencies and trade associations, staff finds the AFC's socioeconomic analysis acceptable and agrees with its conclusions with the exception of the cumulative impacts on schools and the fire department which are described herein.

Fixed limits are used in housing (a 5 percent or less of permanent available housing) and EJ, which has a threshold of 50 percent for minority/low-income population. Criteria for subject areas such as fire protection, water supply and waste water disposal are handled in other sections. Educational impacts are subjectively determined but are moot, as described later in the testimony. And finally, impacts such as medical services, law enforcement, or community cohesion are based on subjective judgements or input from local and state agencies.

Greater non-local employment has the potential for resulting in significant impacts.

EMPLOYMENT

The results of population dispersion, as presented by Elk Hills in the AFC, are that 70 percent of the non-local construction workers (approximately 49 workers at peak construction) are expected to live in Bakersfield. These are results that staff would expect because more amenities are available in Bakersfield when compared to the communities closer to the project site. Furthermore, the results indicate that approximately 20 percent or 13 workers will likely live in Taft or Maricopa, 10 percent or about 7 workers will likely live in Shafter or Wasco; and about one worker will live in another area of Kern County or Southern California.

The Impact Analysis For Planning (IMPLAN) model (an input-output model), used in the AFC by Elk Hills to estimate employment impacts from the Elk Hills project on the affected area, is widely used and acceptable to staff. The University of California at Berkeley uses the IMPLAN model for regional economic assessment, and it has been used to assess other generating projects in the area. It is a common regional economic tool. In general, most multipliers are estimated by showing the total change divided by the initial change. Employment multipliers refer to the total additional employment stimulated by the new economic activity. IMPLAN is a disaggregated type of model which divides the (regional) economy into sectors and provides a multiplier for each sector (Lewis et al. 1979). The employment multipliers used by La Paloma were also applied to Elk Hills (3.23 for construction e.g., each new construction job supports approximately 2.2 indirect and induced jobs in the regional economy and 2.88 for operations with approximately 1.88 indirect and induced jobs in the regional economy (La Paloma 1998)) and are within an acceptable range of 2 often cited by many economists. The 2.88 multiplier for operations is based on a large electrical facility, the Midway-Sunset power plant, in Kern County (Smith 1999).

Project construction (power generation, electric power transmission, and pipelines for fuel gas, water supply and waste water) is expected to occur over a 15 month period. The peak construction, when the highest number of workers will be needed, is expected to occur in the 8th month of construction. The greatest number of construction workers, estimated to be 352 workers, will be needed in the 8th month of construction. Approximately 282 of these workers are expected to come from the communities in the affected area, and approximately 70 are expected to relocate from communities outside of the two-hour commute radius.

The number of construction workers needed outside of the peak construction period will range from fewer than 11 in the first month of construction to approximately 124 workers in the 15th month of construction. The average number of non-local workers needed for power plant construction is estimated to be 48. During operation of the project, about 20 workers will be needed to maintain and operate the project. Approximately 8 (40 percent) of these operations workers may be non-local in a worst-case scenario estimate according to Elk Hills.

The total employment, estimated by Elk Hills, using an IMPLAN multiplier of 3.23 for construction, is the equivalent of 785 jobs (which includes 540 secondary jobs), based on an average of 243 project-related construction jobs. For project operations, an average of 20 jobs with an IMPLAN multiplier of 2.88 for operations results in an equivalent of 58 total jobs (which includes 38 secondary jobs).

HOUSING

Permanent housing is considered to be in short supply if the vacancy rate is less than five percent (Cleary 1989). As of January 1998 (See Table 5.8-2 of the Elk Hills AFC) , approximately 81,932 housing units existed in Bakersfield, 413 in Buttonwillow, 20 in McKittrick, 3,364 in Shafter, 4,114 in Wasco, 2,405 in Taft, 2,076 in McFarland, and 455 in Maricopa. There are approximately 94,779 total housing units in these communities which are within a two-hour commute. The

vacancy rate for this housing averages approximately five percent. Therefore, approximately 4,739 single-family, multi-family and mobile homes are available. In addition, there are approximately 5,789 total motel/hotel rooms in four of the six communities, with the availability being about 30 percent on average or 1,737 rooms (EHPP 1999a). The combination of housing and motel/hotel rooms probably available to non-local construction and operations workers for this project is more than sufficient for worker needs.

SCHOOLS

Based on an average of 48 non-local construction workers and 8 non-local plant operating personnel, 43 (not 41 as estimated in the AFC) school-aged children for plant construction and 12 school-aged children for plant operation are estimated to be added to the affected area schools with 70 percent going to Bakersfield. According to Table 8.8-14 in the AFC, six of thirteen affected area high schools are over capacity. In most cases, schools in western Kern County, west of Bakersfield, appear to be well below capacity. The addition of project-related children to schools that are at- or over-capacity may increase costs in terms of supplies, equipment and/or teachers but the impact will be small. However, according to Senate Bill 50,enacted in 1998, which amended section 17620 of the Education Code, school funding is restricted to property taxes and statutory facility fees collected at the time the building permit is acquired (i.e., not more than $.31 per square foot of commercial and industrial chargeable and covered or enclosed space). (Govt. Code, Sec. 65995 (b)(2)) The limit of $.31 shall be increased in year 2000 and every two years thereafter. (Sunrise 1999a1) Public agencies may not impose fees, charges or other financial requirements to offset the cost for “school facilities.” School facilities are defined as “any school-related consideration relating to a school district’s ability to accommodate enrollment.” Local and state agencies are precluded from imposing (additional) fees or other required payments on development projects for the purpose of mitigating possible enrollment impacts to schools according to SB 50 in 1998.

The life of the Elk Hills power plant is estimated by Elk Hills in the AFC to be a minimum of 30 years. Property taxes on the plant have been estimated to be $20 million in the first ten years for use on infrastructure and services such as schools, government, and social programs and services with about $8,576,260 allocated to education.

UTILITIES, EMERGENCY AND OTHER SERVICES

The West Kern Water District (WKWD) can meet the project’s water supply needs. There are abundant electric supply options available for construction. During construction or operation, the project is not expected to place significant demands on the Kern County Fire Department, Sheriff, or the Mercy Westside District Hospital.

FINANCIAL

Elk Hills estimates (EPPS 1999a, AFC pp. 5.8-17&18) that the construction payroll will be $43 million (1999 dollars) for 15 months, and the operation payroll will be $2 million (1999) dollars with $3 million for local supplies annually during operations,

thereby generating additional sales tax revenue of about $217,000 annually. Elk Hills estimates that $25 million worth of materials and equipment will be purchased locally for construction. This spending will generate sales tax revenues for the local jurisdiction, about one percent for the county, and about 6.25 percent for the State, for a total of 7.25 percent. This translates to approximately $1.8 million in sales tax revenue. However, Kern County has granted Elk Hills a $4.0 million tax incentive from County tax revenues in May 1999 to reimburse the cost of building "public infrastructure" such as roads and street lighting. (Bedell 1999)

ENVIRONMENTAL JUSTICE

The EJ screening analysis contained in the AFC (EHPP 1999a, AFC pages 5.8-22 to 5.8-23) is consistent with the federal EJ guidelines, and the analysis is acceptable to staff. According to the federal EJ guidelines, a minority or low-income population exists if the minority or low income population percentage of the affected area is fifty percent or greater of the affected area's general population.

The EJ analysis in the AFC indicates that the affected area's minority population is less than 50 percent. Only McFarland and Wasco have Hispanic populations of 70 and 54 percent, but are located 50 and 35 miles from the project. (Elk Hills 1999, AFC pages 5.8-19&20) According to the data presented in Table 5.10-2 in the La Paloma AFC, 31 percent of the affected area population are non-white, based on 1990 US Census Data. The data is the same for Elk Hills since the total affected area is the same. More recent minority population data for the total affected area was not available. However, using estimated 1998 minority and total population data for Bakersfield (La Paloma 1998, AFC Table 5.10-2, 5.10-6), the growth area of Kern County, staff concludes that the affected area, estimated at 34 percent, would still fall below the 50 percent threshold required to establish EJ as an issue. In addition, the highest low-income population percentages are for McFarland and Wasco, at 27 percent respectively. Therefore, further EJ analysis is not necessary.

CUMULATIVE IMPACTS

Cumulative impacts might occur when more than one project has an overlapping construction schedule that creates a demand for workers that can not be met by local labor, resulting in an influx of non-local workers and their dependents. At the time of filing of the Elk Hills AFC in February 1998, four other power plant projects were identified in the vicinity of the Elk Hills project. The Elk Hills AFC included a discussion of cumulative impacts and concluded that there were none of significance.

Several power plant projects in western Kern County have either filed AFCs or are expected to soon. La Paloma filed their AFC on July 15, 1998 and the project was approved on October 6, 1999. The Sunrise Cogeneration and Power Company (SCPC) filed an AFC on December 21, 1998 for a 320 MW cogeneration project which will be located near the community of Fellows. Elk Hills Power Plant Project filed an AFC on February 24, 1999 for a 500 MW combined cycle power plant to be located at Elk Hills. AFCs are expected to be filed for the Pastoria and Midway-Sunset West projects in November 1999.

SOCIOECONOMICS Table 1 shows the estimated number of workers by month for the estimated construction schedules for each of the power plant projects identified above. There are approximately five months that the five projects will have overlapping construction schedules. During this period, the total number of workers needed for all five projects ranges from approximately 1,263 to over 1,438[2]. As of April 1999, the number of unemployed workers in the Kern County labor force was 37,400 out of a total civilian labor force of 282,600 or 13.2 per cent (State of California – Employment Development Department, preliminary data, 1999).

Staff agrees that Elk Hills will primarily draw on the local labor force for construction and operation. No significant influx of permanent employee or secondary employment households is expected due to Elk Hills because Kern County has a large available labor pool. With the addition of each subsequent project into the construction phase, the ability of the available local labor force to meet project construction needs decreases. The cumulative need for workers in particular crafts or specialties will exceed the availability of workers in those crafts in the local area at different times based on the numbers of specialists available and the total number of specialists needed. Each of the currently filed projects has identified their forecast for local vs. non-local workers based on the available work force by craft and their estimate of worker availability based on other project needs.

La Paloma, likely the first of the five projects to start construction, estimates that 86 and 14 percent of their average worker needs will be supplied by local and non-local workers, respectively. For peak construction, the percentages remain relatively unchanged. Sunrise's estimates are basically the same as La Paloma's. The Elk Hills AFC estimates 80 percent local and 20 percent non-local construction workers for average and peak periods. These estimates for local verses non-local workers are consistent with the availability of general construction laborers and the availability of workers in specific crafts in Kern County. There is sufficient housing available in Bakersfield and other communities closer to the project sites to meet all non-local worker needs.

[2] The number of workers for the Sunrise project's related facilities, such as the gas supply line and water line, were not available for their AFC analysis.

SOCIOECONOMICS Table 1
Cumulative Construction Workers
(Estimated)

	La Paloma	Sunrise*	Elk Hills	Midway-Sunset West**	Pastoria**	Total
Year 1999						
Dec	53					53
Year 2000						
Jan	76					76
Feb	146					146
Mar	222	64				286
Apr	304	75				379
May	403	96				499
Jun	467	142				609
Jul	555	157	111			823
Aug	597	197	128			922
Sep	637	233	142			1012
Oct	665	241	195			1101
Nov	714	255	241			1210
Dec	729	237	306			1272
Year 2001						
Jan	699	213	333	111	72	1398
Feb	625	193	352	128	140	1438
Mar	521	124	347	142	210	1344
Apr	399	104	329	195	289	1316
May	195	78	317	241	382	1263
Jun	141		310	306	444	1201
Jul			231	333	527	1091
Aug			158	352	567	1077
Sep			124	347	605	1076
Oct				329	631	960
Nov				317	678	995
Dec				310	692	1002
Year 2002						
Jan				231	664	895
Feb				158	593	751
Mar				124	495	619
Apr					379	379
May					185	185
June					134	134

* Does not include the gas line and water line workers.
** AFCs not yet filed. The number of workers are estimated, based on generating capacity of the project, compared to the three projects that have filed AFCs.

Based on an average of approximately 1,342 workers during the five months of overlapping construction for all five projects, and using an IMPLAN construction multiplier of 3.23, approximately 2,993 secondary jobs are expected to result during that period. Staff does not expect a significant number of these jobs to be filled by non-local workers because these jobs are expected to be temporary, coincident with the construction schedule, and salaries associated with indirect and induced jobs

generally do not attract new workers to an area. Over a period of approximately 25 months, secondary jobs, related to the construction of two or more of these projects at the same time, are expected to range from approximately 638 to 3,207.

Using an IMPLAN operation multiplier of 2.88, secondary jobs expected from the operation of the projects range from 111 for two projects to 246 for all five projects (based on estimates of 59 employees for La Paloma and Sunrise projects, and 131 employees for all five projects). These secondary jobs are estimated to be filled from the local work force.

Based on an estimated average of 258 non-local workers for all five projects during construction, and assuming the average family size to be 2.91 persons (State of California, Department of Finance 1998), approximately 235 children are estimated to be added to Kern County schools. These children will not enter and leave the schools at the same time. During operation of the five projects, approximately 48 children are estimated to be added to western Kern County schools as a result of non-local workers relocating their families. The increase in school enrollments due to the five projects during construction will cause a potential significant socioeconomic impact on those schools in the Bakersfield area that are currently at or over-capacity. However, the increase in school enrollments due to the five projects during operation is not expected to cause an impact because students will attend many schools that are under-capacity and the number is relatively small. Indeed, many non-local workers may not bring their children so the estimates could be high. Schools that are expected to handle more students are expanding their overall capability to meet needs and school impacts fees and property taxes will help fund education.

The Kern County Fire Department (KCFD) provides emergency medical response for the proposed power plants. The KCFD believes that it has adequate resources to provide emergency medical response for the five power plants that have been identified in this cumulative analysis.

The KCFD fire fighting resources are sufficient to cover all five of the proposed power plant projects. However, the fire department has identified a need for one new ladder truck to maintain its current level of service and to effectively respond to the types of emergency incidents that occur at facilities such as the proposed power plants. Specifically, the fire department sees an increase in the number of emergency responses that will require High Angle and Confined Space Specialist Technicians and equipment. The fire department requires one new, properly equipped, ladder truck that will be assigned to Station 21 at Taft, nine new personnel to cover three work shifts per day, and a replacement ladder truck approximately 15 years in the future.

Currently, the County has three ladder trucks, two in service and one as a backup. All three trucks are located in the metropolitan Bakersfield area. The closest ladder truck is about 40 miles away from the four power plants proposed for western Kern County. This distance makes dispatching to the area where the power plants are planned unacceptable due to the excessive response time.

The KCFD estimates the cost of a new, properly equipped, ladder truck to be $700,000, the cost of the first year's funding for the nine new personnel to cover three shifts per day for the ladder truck to be $750,000, and the cost for the first year of a ladder truck replacement fund to be $75,000. Staff believes these costs should be paid by La Paloma which was approved on October 6,1999 and the three power plant projects currently proposed for western Kern County (Sunrise, Elk Hills and Midway-Sunset West) that will benefit directly from the new ladder truck. Because full property tax payments for these new power plants will not begin until approximately 18 months after start of construction, the fire department will require up-front payments from each of the power plant owners to cover the costs for the new ladder truck, staff for the truck, and the replacement truck fund.

The KCFD estimates that the new ladder truck will take nine months to be delivered once ordered. The need for the new ladder truck begins with the start of construction of the second power plant in western Kern County. Current estimates are that construction of the second power plant will begin approximately March 2000.

Staff is aware that La Paloma, LLC is in negotiations with the fire KCFD to reach an agreement on funding for the three items the fire department has identified as resource needs. This agreement is expected to involve up-front payments by La Paloma for the new truck, staffing and replacement truck fund. La Paloma will then be reimbursed by the County and/or the other power plant owners as appropriate.

According to the KCFD (Chaffin 1999), the fire department estimates that the Fire Fund share of the property taxes paid by the four projects expected in the Taft area will be approximately $1,371,500 per year. This amount is based on the estimated property tax payments described in the AFCs for the La Paloma, Sunrise and Elk Hills projects. Taxes for the Midway-Sunset West project were estimated based on the Elk Hills project (both are 500 MW projects).

The State Board of Equalization, at an April 21, 1999 Property Tax Committee meeting, formally decided to assess only power generating facilities with a Certificate of Public Convenience and Necessity (CPCN) using unitary valuation and allocation of revenues on a countywide basis. Thus, local collection and distribution of property taxes will apply to the Elk Hills project and other power plant projects proposed for Kern County.

The Kern County Sheriff will provide police service for the five new projects, and existing resources are expected to be adequate to meet law enforcement needs during construction and operation of the five projects. Westside District Hospital serves the area for four of the five new projects, and their facility is expected to adequately meet medical service needs during construction and operation of the five new projects along with emergency services from the Kern Fire Department.

FACILITY CLOSURE

PLANNED CLOSURE

The Elk Hills AFC (see Facility Closure 3.10, pp. 3-71 to 3-73) provides for the inclusion of socioeconomic LORS which will be incorporated into the facility closure plan when it becomes necessary at the end of the project's economic life. The socioeconomic impacts of facility closure will be evaluated at that time.

UNEXPECTED TEMPORARY CLOSURE

Any unexpected, temporary closure would not likely cause any significant environmental impacts on the affected area, because the likely result of a temporary closure would be reactivation of the power plant by the same or a new owner within a relative short period of time. Personnel changes may occur if there is an ownership change, but socioeconomic impacts would not change significantly because the number of operating personnel would remain relatively the same.

UNEXPECTED PERMANENT CLOSURE

Any unexpected, permanent closure of the Elk Hills project would not likely cause any significant socioeconomic impacts on the affected area, because facility closure impacts i.e., dismantling would be similar to construction impacts, and staff has found no significant socioeconomic impacts due to the construction of the project.

MITIGATION

Elk Hills contends that impacts to schools will be mitigated by the property taxes paid in connection with operation of the proposed project. Staff has determined that, even though a potential significant socioeconomic cumulative impact has been identified for Kern County schools during the construction period for five power plant projects in western Kern County, including the Elk Hills project, with the changes to the Education Code resulting from the passage of SB 50 in 1998, school funding is now restricted to a combination of property tax revenues and a statutory development fee based on a project's covered or enclosed space.

A potential significant socioeconomic cumulative impact on the KCFD has been identified. This impact results from the construction and operation of the Elk Hills and one-to-three other power plant projects in western Kern County (La Paloma, Sunrise, and Midway-Sunset West). The introduction of the new power plants in this area reduces the fire department's emergency rescue capabilities below acceptable levels. The owners of the Elk Hills project should reach an agreement with the KCFD for a share of the cost to bring the fire department's emergency rescue capabilities up to acceptable levels. The La Paloma, Sunrise, and Midway-Sunset West projects will also be required to pay a share of the fire department's costs for the new ladder truck, truck staffing and replacement truck. Should one or more of the projects not be certified as expected, Elk Hills' share of the cost for the new ladder truck, truck staffing and replacement truck will change.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The estimated gross benefits from the project include increases in the affected area's property and sales taxes, employment, and sales of services, manufactured goods and equipment. For example, during average construction, 785 (243 x 3.23) total jobs (including power plant, transmission, water and gas lines) will be created with 542 indirect jobs. For average operations, 58 total jobs will be created with 38 indirect jobs. The annual property tax collected by the County over the first ten years of operation was estimated by the Kern Economic Development Corporation to be $20 million over the first ten years of operation (Elk Hills, 1999, page 5.8-18). However, Kern County has granted Elk Hills a $4.0 million tax incentive in May 1999 to reimburse the costs of building "public infrastructure" such as roads and street lighting (Bedell 1999).

Staff agrees with conclusions in the Elk Hills' AFC that the project will not cause a significant adverse impact on the affected area's housing, schools, police, fire, emergency services, hospitals, utilities and employment, if mitigation for the fire department is provided, consistent with the proposed conditions of certification. Elk Hills will be partially reimbursed or credited for its up-front payment for the proposed agreement described in condition of certification **SOCIO-2** by the County and/or the other power plant owners as appropriate.

Although staff identified a potentially significant socioeconomic cumulative impact on schools as a result of the Elk Hills and other new power plant projects in western Kern County, mitigation for the impact on schools is not possible under current state law.

The project, as proposed, is consistent with all applicable socioeconomic LORS. The proposed conditions of certification ensure compliance with LORS, and mitigation of the identified cumulative impact on the KCFD.

RECOMMENDATIONS

For the area of socioeconomics, staff recommends that, with the adoption of the following conditions of certification, the Elk Hills project be approved.

PROPOSED CONDITIONS OF CERTIFICATION

SOCIO-1 The project owner shall pay the statutory school impact development fee as required at the time of filing for the "in-lieu" building permit with the Kern County Department of Engineering and Survey Services and Building Inspection.

Verification: The project owner shall provide proof of payment of the statutory development fee to the Compliance Program Manager (CPM) in the next Monthly Compliance Report following the payment.

SOCIO-2 In a timely manner after certification, the project owner shall reach agreement with the KCFD, La Paloma Generating Company, and Sunrise Cogeneration and Power Company (if the Sunrise project has been certified) on Elk Hills' share of the total funding for the following:

1. Purchase of a new 105-foot Pierce Quint Aerial ladder truck equipped for high angle and confided space rescues;
2. First year funding for nine new positions for personnel to cover three shifts for the new truck; and
3. First year funding for a replacement ladder truck.

Verification: Not later than 45 days after certification, the project owner shall provide the CPM with a copy of an agreement with the KCFD and the owners of the power plant projects identified in this condition for funding of items 1. through 3. above.

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BIOLOGICAL RESOURCES

Linda Spiegel

INTRODUCTION

This section provides the Energy Commission staff's analysis of potential impacts to biological resources from the construction and operation of the Elk Hills Power Project (EHPP) proposed by Elk Hills Power LLC's (Elk Hills). This analysis addresses potential impacts to state and federally listed species, species of special concern, and areas of critical biological concern; describes the biological resources of the project site and at the locations of appurtenant facilities; determines the need for mitigation and the adequacy of mitigation proposed by the applicant, and; where necessary, specifies additional mitigation measures to reduce identified impacts to less than significant levels. It also determines compliance with applicable laws, ordinances, regulations and standards (LORS), and recommends conditions of certification.

This analysis is based, in part, upon information provided in Elk Hill's Application for Certification (AFC) (EHPP 1999a), Supplemental Filings (EHPP 1999b), site visits, workshops, staff data requests and applicant responses (EHPP 1999c - i), and discussions with various agency representatives.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

FEDERAL

ENDANGERED SPECIES ACT OF 1973

Title 16, United States Code, section 1531 et seq., and Title 50, Code of Federal Regulations, part 17.1 et seq., designate and provide 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 - 712, prohibits the take of migratory birds.

STATE

CALIFORNIA ENDANGERED SPECIES ACT OF 1984

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

NEST OR EGGS – TAKE, POSSESS, OR DESTROY

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

Birds of Prey or Eggs – Take, Possess, or Destroy

Fish and Game Code section 3503.5 protects California's birds of prey and their eggs by making it unlawful to take, possess, or destroy any birds of prey or to take, possess, or destroy the nest or eggs of any such bird.

Migratory Birds – Take or Possession

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 bird.

Fully Protected Species

Fish and Game Code sections 3511, 4700, 5050, and 5515 prohibits take of animals that are classified as Fully Protected in California.

Significant Natural Areas

Fish and Game Code section 1930 et seq. designates certain areas such as refuges, natural sloughs, riparian areas and vernal pools as significant wildlife habitat.

Streambed Alteration Agreement

Fish and Game Code section 1600 et seq. requires California Department of Fish and Game (CDFG) to review project impacts to waterways, including impacts to vegetation and wildlife from sediment, diversions and other disturbances.

Native Plant Protection Act of 1977

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

California Code of Regulations

Title 14, sections 670.2 and 670.5 list animals of California designated as threatened or endangered.

LOCAL

Kern County General Plan Land Use, Open Space, and Conservation Elements of 1994

Section 8, Resources

Policy 14: Habitats of threatened and endangered species should be protected to the greatest extent possible.

Policy 12: The County should work closely with local, state, and federal agencies to assure that all projects, both discretionary and ministerial, avoid or minimize direct impacts to fish, wildlife and botanical resources, whenever practical.

Policy 13: The County should develop and implement measures which result in long-term compensation for wildlife habitat which is unavoidably damaged by energy exploration and development activities.

SETTING

REGIONAL DESCRIPTION

The proposed project site is located in the southern San Joaquin Valley, about 25 miles west of Bakersfield, California in southwestern Kern County. The plant site will be located within the Elk Hills Oil and Gas Field (Elk Hills; formerly Naval Petroleum Reserves 1), owned by Occidental of Elk Hills, Inc. (OEHI).

Biotic communities at Elk Hills are composed primarily of species highly adapted for arid environments. However, past disturbances have resulted in conditions that also favor annual exotic grasses. The predominant vegetation type (98% of Elk Hills) is valley saltbush scrub (Holland 1986, Allscale Series, Sawyer and Keeler-Wolf 1995), dominated by valley saltbush (*Atriplex polycarpa*) and non-native annual grasses (*Bromus madritensis, Vulpia* spp., *Hordeum* spp.). Low elevation areas with alkali soils support a mixture of valley saltbush scrub and an alkali sacation assocation (Bush Seepweed Series, Sawyer and Keeler-Wolf 1995; valley sink scrub, Holland 1986) characterized by bush sweepweed (*Suaeda moquini*) and iodine bush (*Allenrolfea occidentalis*). Much of Elk Hills is developed for oil and gas production, particularly in the lower elevations. However, unlike the nearby intensively developed Midway Sunset oil field, the density of surface disturbance at Elk Hills is moderate in the flat areas to low in the hilly terrain.

Elk Hills supports several special status species. Lists of plant and animal species observed on Elk Hills are provided in Appendix J-6 of the AFC. Tables 5.3-1 and 5.3-2 list special status plant and animal species, respectively, known to occur or to potentially occur on Elk Hills (AFC, pages 5.3-5 – 7).

BIOLOGICAL RESOURCES Table 1 shows special status species identified by surveys to occur within the project site and linear facilities.

The southern San Joaquin Valley has experienced severe declines in natural habitat since the early 1900's (Spiegel and Anderson 1992). Several species endemic to this area have concomitantly experienced serious population declines, and many are now threatened or endangered (USFWS 1998). In 1986, it was

BIOLOGICAL RESOURCES Table 1
Special Status Species Found Within the Proposed Project Area

Common Name	Scientific Name	Status[1] Federal/State/CNPS	Observed During Surveys
Plants			
Heartscale	Atriplex cordulata	SC/--/1B	Yes
Crownscale	Atriplex coronata	--/--/4	Yes
Lost Hills crownscale	Atriplex vallicola	SC/--/1B	Yes
Gypsum-loving larkspur	Delphinium gypsophilum spp. Gypsophilum	--/--/4	Yes
Recurved delphinium	Delphinium recurvatum	SC/--/1B	Yes
Hoover's eriastrum	Eriastrum hooveri	T/--/4	Yes
Cottony buckwheat	Erigonum gossypinum	--/--/4	
Temblor buckwheat	Erigonum temblorense	SC/--/1B	
Tejon poppy	Eschscholzia lemmonii ssp. Kernensis	--/--/1B	Yes
Oil nest straw	Stylocline citroleum	SC/--/1B	Yes
San Joaquin bluecurls	Trichostema ovatum	--/--/4	
Wildlife			
Mammals			
San Joaquin antelope squirrel	Ammospermophilus nelsoni	SC/T	Yes
Giant kangaroo rat	Dipodomys ingens	E/E	Yes
Short-nosed kangaroo rat	Diponomys nitratoides brevinasus	SC/CSC	Yes
Southern grasshopper mouse	Onychomys torridus ramona	SC/CSC	
San Joaquin pocket mouse	Perognathus inornatus	SC/CSC	Yes
Badger	Taxidea taxus	--/CSC	Yes
San Joaquin kit fox	Vulpes macrotis mutica	E/T	Yes
Birds			
Sharp-shinned hawk	Accipiter striatus	--/CSC	Yes
Tricolored blackbird	Agelaius tricolor	SC/CSC	
Golden eagle	Aquila chrysaetos	--/CSC	
Short-eared owl	Asio flammeus	--/CSC	Yes
Western burrowing owl	Athene cunicularia hypugea	SC/CSC	Yes
Red-tailed hawk	Buteo jamaicensis	--/--	Yes
Swainson's hawk	Buteo swainsoni	T/CSC	
Northern harrier	Circus cyaneus	--/CSC	Yes
Horned lark	Eremophila alpestris actia	--/CSC	Yes
Merlin	Falco columbarius	--/CSC	
Prairie falcon	Falco mexicanus	--/CSC	Yes
Loggerhead shrike	Lanius ludovicianus	SC/CSC	Yes
LeConte's thrasher	Plegadis chihi	SC/CSC	Yes
Amphibians\Reptiles			
Southwestern pond turtle	Clemmys marmorata pallida	SC/CSC	
Blunt-nosed leopard lizard	Gambelia sila	E/E	Yes
San Joaquin coachwhip	Masticophis flagellum ruddocki	SC/CSC	Yes
California horned lizard	Phrynosoma coronatum frontale	T/T	

[1]Federal Status
E – Endangered
T – Threatened
SC – Species of Special Concern

State Status
E – Endangered
T – Threatened
CSC – California Species of Special Concern

CNPS
1B – rare, threatened, or endangered in California and elsewhere
4 – limited distribution – A watch list.

determined that less than 4 percent of the southern San Joaquin Valley still supported natural land and the number of listed species was greater there than anywhere in the continental United States (Anderson et al. 1992). Most extant habitat occurs as small, highly fragmented parcels. Elk Hills along with adjacent lands known as the Buena Vista Valley and the Lokern Natural Area represent the largest contiguous area of extant habitat remaining in the southern San Joaquin Valley. This block of habitat has been identified by U.S. Fish and Wildlife Service (USFWS) as crucial to the recovery or conservation of eleven species (USFWS 1998). These are: Hoover's eriastrum, oil nest straw, Tejon poppy, blunt-nosed leopard lizard, giant kangaroo rat, short-nosed kangaroo rat, San Joaquin kit fox, San Joaquin woolly threats, San Joaquin antelope squirrel, Tulare grasshopper mouse, and San Joaquin LeConte's thrasher (scientific names provided in **BIOLOGICAL RESOURCES Table 1**). Elk Hills is the only known location for the occurrence of oil nest straw.

Several conservation areas and mitigation banks have been established or identified in the area immediately surrounding Elk Hills (EHPP 1999b, Figure 5.3-1). These include the Coles Levee Ecosystem Preserve, the Lokern Natural area, the Occidental of Elk Hills, Inc., Conservation Area, and the Buttonwillow Ecological Reserve. Lands owned by BLM in the Lokern Natural Area are designated as an Area of Critical Environmental Concern (ACEC).

Previous to the sale of Elk Hills by the federal government, biological resources were extensively studied and documented by the Department of Energy (DOE) under requirements set forth in three federal biological opinions. Conditions of the sale included the transfer of the 1995 Biological Opinion which, among other things, required OEHI to place 7,075 acres of land as protected, undisturbed endangered species habitat. This area was set aside to compensate for all previous permanent surface disturbance on Elk Hills. The 1995 Biological Opinion does not cover the construction and operation of the proposed EHPP. However, any areas crossed by the proposed development that are currently highly disturbed are covered under the conservation management agreement and have been compensated.

SITE VICINITY

The plant site proper is located within Elk Hills in Township 30 South, Range 23 East, northeast Section 35. The associated linear facilities will be located almost entirely within Elk Hills. The Transmission Line Alternative 1B and 1B Variation crosses 1.4 miles of the Occidental of Elk Hills, Inc., Conservation Area and 0.5 mile of the Lokern Natural Area. The water supply pipeline crosses 0.5 mile of Bureau of Land Management (BLM) land and 0.7 mile of the Coles Levee Ecosystem Preserve.

Locations of biological resources identified during winter (November and December 1998) and spring (April 1999) surveys are provided in the AFC and Supplemental Filings (EHPP 1999ab; Table 5.3-3 pg 5.3-22, Appendix J-4, J-8, and J-9). Maps and tables of existing land disturbances along the project facilities are provided in ELK Hill's Response to Data Request #34 (EHPP 1999d). Elk Hills supports several protected species. Some species are common and evenly distributed

throughout the area, while others are less common and have irregular distributions. Short-nosed kangaroo rats, kit foxes, and Hoover's eriastrum can be expected to occur throughout the project area. Blunt-nosed leopard lizards and giant kangaroo rats inhabit areas with low topographic relief and sparse vegetation. Populations fluctuate in response to weather patterns and land uses, and therefore, the numbers sighted from surveys can vary greatly from year to year. In addition to species listed under each project component below, the following species were observed on numerous occasions along the transmission line routes and water supply pipeline: loggerhead shrikes, great-horned owls, burrowing owls, and barn owls. There were also a few sightings of bobcat, badger, and short-eared owls.

POWER PLANT SITE, LAYDOWN AREA & WAREHOUSE

The power plant, access road, laydown area and warehouse will require 17 acres of land, of which approximately 14 acres are disturbed by previous grading or are occupied by storage tanks and related equipment. The remaining land supports valley saltbush habitat (EHPP 1999a; Figure 3.3-1). Seventy-nine known or potential kit fox dens and two San Joaquin antelope squirrels were identified.

NATURAL GAS PIPELINE

The 2,500-foot long natural gas pipeline (10-inch) will be installed from an existing gas processing facility to the central portion of the west side of the new power plant. The pipeline route follows an existing road and will be installed above ground following an existing pipeline corridor (EHPP 1999f, Response to Data Request #62). Four potential kit fox dens and one stand of gypsum-loving larkspur were found along this route.

WATER SUPPLY PIPELINE

Water will be supplied by the West Kern Water District (WKWD), located east of the project, via a new 9.8 mile (16-inch) pipeline. A new pumping station will be located near the existing WKWD facilities. The pipeline will be above ground on pipe supports for 5.7 miles beginning from the power plant, and below ground the remaining 4.1 miles. Most of the route traverses valley saltbush habitat. The above ground portion of the pipeline will run adjacent to existing roads. The route crosses BLM land from MP 8.6 to 9.1 and the Coles Levee Ecosystem Preserve from MP 9.1 to 9.8. The pumping station is located on lands disturbed by WKWD. Species identified along this route include 189 kit fox dens, 14 San Joaquin antelope squirrels, one short-nosed kangaroo rat sighting, 148 stands of Hoover's eriastrum, 20 stands of heartscale atriplex, 6 stands of Lost Hills crownscale, and one stand of oil nest straw.

WASTE WATER DISPOSAL PIPELINE

The 4.4-mile long wastewater disposal pipeline (8-inch) will be installed above ground along existing roads adjacent to valley saltbush habitat. This pipeline will terminate into two new injection wells located in disturbed habitat. Species found along this route were 42 kit fox dens, one blunt-nosed leopard lizard, 38 stands of Hoover's eriastrum, 3 stands each of heartscale atriplex and Lost Hills crownscale, and one stand of oil nest straw.

TRANSMISSION LINE ALTERNATIVES

ROUTE 1A

This alternative route extends north from the power plant for 2 miles, then east for approximately seven miles where it terminates at a new 2.6-acre substation located east of Highway 119. The line crosses 8.4 miles of valley saltbush habitat and 0.5 miles of alkali sacaton habitat. The substation is located in low-quality valley saltbush habitat. Species found along this route include 198 kit fox dens, 3 giant kangaroo rat precincts, 3 short-nosed kangaroo rat, 2 blunt-nosed leopard lizard, and 4 San Joaquin antelope squirrel sightings, 244 stands of Hoover's eraistrum, 4 stands each of heartscale atriplex and Lost Hills crownscale, 10 stands of Tejon poppy, 7 stands of oil nest straw, and 1 stand of hollisteria.

ROUTE 1B

This 8.6-mile route extends north from the power plant for 2 miles in the same route as 1A and continues 3 miles northeast to the boundary of Elk Hills and another 3.6 miles to the Midway Substation in Buttonwillow. The first 5 miles of the route are in valley saltbush habitat. The remaining 3.6 miles will replace an existing 115 kV line that travels along the shoulder of existing paved roads or through lands developed for agriculture. Approximately 1.4 miles of this line crosses the OEHI Conservation Area (T30S, R23E, Sections 12 and 13). Approximately 0.5 mile crosses the Kern River Flood Plain (T30S, R24E, Section 6). This same 0.5 mile transverses within the boundaries of the Lokern Natural Area and the BLM's ACEC, however, it is not within any currently protected lands. Species observed along this route include 97 kit fox dens, two short-nosed kangaroo rat and 6 San Joaquin antelope squirrel sightings, 71 stands of Hoover's eraistrum, and one stand each of oil nest straw and hollisteria.

ROUTE 1B VARIATION

Elk Hill's response to Data Request #42 (EHPP 1999c&e) described a variation on the transmission line alternative 1B, labeling this Route 1B Variation. The variation route runs parallel to 1B and would replace an existing 115 kV line between the power plant and the Midway substation. The existing lattice towers of the 115 kV line would be replaced by new lattice towers (one-to-one replacement); however, the existing tower foundations would remain and new foundations will be constructed to support the lattice towers needed for the new 230 kV line. The first 5 miles of the route are in valley saltbush habitat and the remainder of the line travels along the shoulder of paved roads and agricultural lands as in Route 1B. This route will also transverse the OHEI Conservation Area (1.4 mile), the Kern River Flood Plain, Lokern Natural Area, and BLM ACEC (0.5 mile). Most of this route was included within the 1,100-foot survey corridor. However, portions of this route between the power plant site and MP 4.4 are located outside of the survey corridor. EHP conducted a survey of this area on September 5, 1999 and only found recorded occurrences of Hoover's eriastrum, which was found throughout the surveyed area. Additional surveys of this area during spring will be required.

IMPACTS

PROJECT SPECIFIC DIRECT AND INDIRECT IMPACTS

Potential impacts to biological resources from the construction, operation, and maintenance activities of the proposed project include:

- Permanent loss of habitat from the project footprints and access roads.
- Temporary loss of habitat from construction of the linear facilities.
- Mortality and injury.
- Construction activities and travel.
- Entrapment of wildlife in open trenches.
- Bird collisions with transmission lines.
- Habitat degradation from power plant emissions.

PERMANENT AND TEMPORARY LOSS OF HABITAT

The proposed project will result in permanent loss of habitat from the footprints of the project components and temporary loss of habitat from construction activities. To determine acres of disturbance, EHP assumes a 40-foot construction corridor along all linear facilities (Walsh 1999). Some of the land in Elk Hills is currently disturbed by past oil development-related activities (see maps provided in Walsh 1999). While it is understood that disturbed lands provide suitable habitat for some special status species such as the kit fox and Hoover's eriastrum, existing disturbed lands in Elk Hills have already been compensated for in an agreement between Occidental and USFWS. The compensation area is located within Elk Hills proper and is managed for the protection of listed species. Therefore, existing disturbed lands affected by the proposed project will not be mitigated further.

A summary of project-related and previous surface disturbance is provided in **BIOLOGICAL RESOURCES Tables 2 and 3**. Information provided by ElK Hills regarding acres required for temporary surface disturbance is inconsistent (Tables 3.8-2 and Tables 5.3-4 of the AFC, EHPP 1999; Table 1 of the Walsh Report, 1999). All three estimates given by Elk Hills are provided in **BIOLOGICAL RESOURCES Table 2**. Staff will need further clarification by the applicant on this discrepancy.

Loss of habitat is the primary cause of population declines and protected status of species in the southern San Joaquin Valley. Estimates of project-caused habitat disturbance range from 14.60 to 16.25 acres permanently impacted and 40.15 to 75.3 acres temporarily impacted. Of these, 3.08 acres and 8.09 acres will be, respectively, permanently and temporarily disturbed in existing conservation areas (Walsh Report 1999). The Conservation Management Agreement/Declaration of Restrictions for the Elk Hills Conservation Area requires a minimum of 7,075 acres to be protected for listed species. It also restricts the amount of surface disturbance to 10% per quarter section. The Conservation Area currently has 7,801 acres protected and therefore, proposed new permanent surface disturbance from the

transmission line (0.02 acres; EHPP 1999h) will not reduce the conservation area below minimum requirements. The amount of current permanent surface disturbance in each effected quarter in Section 12 is 1.0 to 1.5 acres and in Section 13 is 0.0 to 1.2 acres (EHPP1999d). Anticipated new permanent surface disturbance (0.02 acres) and temporary surface disturbance (6.23 acres) from the transmission line (1B and 1B Varation) will not exceed the 10% limitation (16 acres per quarter section).

According to Elk Hills, maintenance activities for the transmission lines will be infrequent and only result in temporary disturbance. Access roads will not be maintained or graded after construction (EHPP 1999f, 1999h). The construction laydown areas, pullsites, and access spurs are included in the surface disturbance estimates in **BIOLOGICAL RESOURCES Tables 2 and 3**. Details of construction activities are provided in the Response to Data Request #47 (EHPP 1999d).

BIOLOGICAL RESOURCES Table 3
Permanent Surface Disturbance[1] (acres)

	Project Requirements	Existing Surface Disturbance	New Surface Disturbance
Power Plant, Laydown, Access Rd	17.0	14.12	2.88
Gas Pipeline	1.80	1.80	0.0
Water Disposal Line	15.0	14.99	0.01
Water Source Line	36.5	24.88	11.67
Transmission Line			
Route 1A	1.70	0.01	1.69
Route 1B	0.1	0.04	0.06
Variation B			0.04
Totals:			
Route 1A	72.0	55.75	16.25
Route 1B	70.4	55.78	14.62
Variation 1B	NA[2]	NA	14.60

[1] Based on a 12 acre power site; 5 acre laydown and access road; a gas pipeline length of 640 feet (Walsh 1999); 10,000 sq ft per power pole, including area required for 100 sq ft per pole and equipment parking, line pulling, and tensioning; 20-ft access road width, where necessary, to pole sites; and, 54 poles for line 1A, 26 poles for line 1B, and 23 poles (EHPP 1999h) for Variation B (not including poles placed in non-natural habitat).

[2] Information Not Available to date (EHPP 1999h).

BIOLOGICAL RESOURCES Table 2
Temporary Surface Disturbance (acres)

	Project Requirements Table 5.3-4[1]	Project Requirements Table 3.8-2[2]	New Temporary Surface Disturbance[3,4]
Power Plant, Laydown, Access Rd	5.0	17.00	0.0
Gas Pipeline	2.4	0.7	0.07
Water Disposal Line	7.0	6.0	8.63
Water Source Line	18.0	12.0	21.52
Transmission Line			
Route 1A	38.4	39.6	14.87
Route 1B	29.1	35.6	9.93
1B Variation			22.61
Totals:			
Route 1A	70.8	75.3	45.09
Route 1B	61.5	71.3	40.15
Variation 1B	NI[5]	NI	52.83

[1] Acres provided in Table 5.3-4 of the AFC.
[2] Acres provided in Table 3.8-2 of the AFC.
[3] Acres provided in Walsh Report, Table 1.
[4] Acres for Variation 1B provided in Table 1, EHPP 1999h.
[5] Information Not Included.

The water supply line will cross 0.7 miles of land within the Coles Levee Preserve. This area is owned by CDFG and leased to Aera. Aera is currently negotiating conditions of their permit with CDFG. In the interim, Aera is operating under the premise of the permit issued by CDFG to ARCO, the previous leaseholder. Lands temporarily disturbed by the construction of the water line will require compensation at a ratio of 1:1, if not already allocated as preserve lands, or at a ratio of 2.1:1, if already allocated as preserve lands.

SPECIES MORTALITY AND INJURY

Species mortality can occur from surface disturbances caused by construction activities. Many wildlife species use dens or borrows as shelter or for escape and can be taken inadvertently when these are destroyed. Wildlife can also be trapped in open trenches or hit by construction vehicles. Plants located in construction routes can be destroyed. Bird mortality can occur from collisions with transmission lines.

As noted above under Setting - Site Vicinity and Table 5.3-3 of the AFC (EHPP 1999a), numerous occurrences of sensitive biological resources were found within the project's facilities, particularly the linear facilities. These occurrences were documented within 1,100-foot survey corridor surrounding the center lines of the transmission line routes and 500-ft survey corridors surrounding the center lines of the pipeline routes. Individuals that may be directly impacted by project construction would be those that occur within the construction corridors. However, it is unclear from the information provided how many sensitive species occurrences were located within the 40-foot construction corridors. Construction corridors can be sited to avoid sensitive areas, but due to the numbers found, it is anticipated that several

kit fox dens and stands of Hoover's eriastrum will be taken. Significantly fewer resources were observed along Transmission line route 1B than along 1A.

Surveys for blunt-nosed leopard lizard (BNLL) were conducted in conjunction with the April 1999 spring surveys for biological resources. However, unusually cool temperatures during this time may have reduced BNLL activity. Only three BNLL were observed (one along the transmission line Route 1A and two along the water supply route). Staff believes this is an underestimate of potential BNLL occurrences along the linear facilities. BNLL may be inadvertently taken in their burrows by construction activities, particularly during their inactivity period when temperatures are below 75 F and above 95 F.

POWER PLANT EMISSIONS

Water for the cooling towers will be supplied by WKWD. Water quality characteristics of the source water, cooling tower blowdown, and annual deposition rates from the cooling tower drift on surrounding vegetation is shown in **BIOLOGICAL RESOURCES Table 4** (EHPP 1999c, Data Response #37). Deposition rates of the inorganic constituents (fluoride, arsenic, iron, boron, and silica) based on 6.3 cycles of concentration are well below levels found typically in native soils. Salt deposition rates are well below levels known to cause stress to salt-sensitive plants species (agricultural crop species). The dominant species found on Elk Hills and adjacent lands is Atriplex, which is alkaline tolerant. Therefore, no significant impact to vegetation from cooling tower drift is expected.

BIOLOGICAL RESOURCES Table 4
Water Quality Characteristics and Annual Deposition Rate

Parameter	WKWD (Source) (mg/l)	Cooling Tower Blowdown (mg/l)	Annual Deposition Rate ($g/m^2/yr$)
Total Dissolved Solids	196.0	1241.1	0.00710
Calcium	22.5	97.1	0.00082
Magnesium	1.4	4.1	0.00005
Sodium	35.9	336.5	0.00130
Potassium	0.8	14.2	0.00003
Bicarbonate	117.0	100.0	0.00424
Sulfate	21.5	285.6	0.00078
Chloride	19.8	257.0	0.00072
Nitrate	<2.0		<0.00007
Fluoride	0.0003	0.0018	0.00001
Arsenic	0.0048	0.030	1.7×10^{-7}
Iron	<0.1	<0.63	$<3.62 \times 10^{-6}$
Boron	0.137	0.86	4.96×10^{-6}
Silica	0.0215	0.135	7.79×10^{-7}

CUMULATIVE IMPACTS

The California Environmental Quality Act (CEQA) defines cumulative impacts as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." The Elk Hills power

project is proposed to be built in an area of western Kern County that has experienced extensive energy development, and this development will continue. There is the potential for at least three additional power plants (La Paloma, Midway-Sunset, and Sunrise), to be built in the region in the near future. These developments have the potential to impact sensitive species and their habitats. Habitat loss in western Kern County is an ongoing regional concern of CDFG, BLM, USFWS, and the Energy Commission. With the exception of the Elk Hills/Buena Vista Valley/Lokern Natural Area complex, most remaining habitat in the area occurs as small and highly fragmented parcels.

To address this issue for western Kern County, CDFG and the USFWS look for habitat compensation when habitat losses are anticipated for all development projects. Compensation areas consisting of high quality listed species habitat has been identified and prioritized by their importance towards species recovery needs. On-going efforts by CDFG, USFWS, BLM, Energy Commission, private industry, and the Center for Natural Lands Management have established several acres of protected habitat in the Lokern Natural Area. The goal each stakeholder is to secure and protect as much habitat in this area as possible to keep this large contiguous area of undeveloped land intact.

Energy Commission biology staff are encouraging the applicants for power plant certification in Kern County to direct off-site compensation to lands in the Lokern Natural Area. Collectively, the compensation lands could result in the protection of larger-sized parcels than if compensated independently into several smaller parcels. The ratio of lands compensated to lands disturbed range from 1:1 to 4:1, depending on the nature of disturbance and current land use of lands disturbed. Therefore, the total acres of land set aside for species protection is greater than the total acres of land lost or disturbed by development. To reduce potential cumulative impacts from the EHPP, lands needed to off-set habitat loss will need to be purchased and protected in perpetuity prior to any surface disturbance.

MITIGATION

Elk Hills has proposed mitigation measures to avoid or reduce impacts to biological resources (EHPP 1999a, pages 5.3-28 - 32). Elk Hills will develop a Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) that will provide details for implementing all mitigation measures. An outline of this plan was provided in EHPP 1999g (Response to Data Request #51). A draft BRMIMP should be provided prior to the Final Staff Assessment and a final BRMIMP should be provided prior to the start of any construction activities.

ELK HILLS PROPOSED MITIGATION MEASURES

- Avoid sensitive resources to the extent practicable.
- Design transmission lines to reduce risk of avian electrocution.
- Implement a worker environmental awareness training program.

- Conduct pre-construction surveys.
- Establish buffer/avoidance zones around sensitive resources.
- Excavate kit fox dens and giant kangaroo rat burrows that will not be avoided.
- Identify and mark construction area boundaries.
- Restrict project-related vehicle traffic to established roads, designated temporary access roads, and parking areas.
- Provide a qualified biologist on site to monitor construction activities.
- Confine parking and equipment storage to laydown areas, cap pipes (4-inch or greater diameter) not in use, and visually inspect pipes for wildlife before use.
- Limit construction activities along pipelines and transmission lines to day hours.
- Cover and/or provide escape ramps to open trenches more than 2-feet deep.
- Conserve 4 inches of topsoil in temporary construction areas. Re-contour and spread topsoil over all areas temporarily disturbed by construction activities.
- Comply with mitigation measures specified in existing agreements between USFWS and CDFG.
- Dispose trash in closed containers and prohibit feeding wildlife.
- Prohibit domestic pets on site.
- Notify agencies if a species of concern is injured or killed.
- Submit a post construction compliance report 60-days after completion of the project.
- Acquire compensation lands or credits for habitat disturbance.

ENERGY COMMISSION STAFF PROPOSED MITIGATION MEASURES

HABITAT COMPENSATION

To determine the amount of habitat necessary to compensate for temporary and permanent loss of habitat from project construction, the following habitat compensation ratios provided by USFWS were used:

- 4 acres of habitat for every 1 acre of permanent disturbance to conserved lands.
- 3 acres of habitat for every 1 acre of permanent disturbance to other lands.
- 2.1 acres of habitat for every 1 acre of temporary disturbance to conserved lands.
- 1.1 acres of habitat for every 1 acre of temporary disturbance to other lands.

Information provided by Elk Hills to date indicates that a total of 99.195 to 136.5 acres of habitat will need to be secured prior to construction of the EHPP (**BIOLOGICAL RESOURCES Table 5**). In addition to purchasing habitat, Elk Hills

will be required to provide funds necessary for administration and long-term management of the compensatory habitat. Recent cost estimates provided by the Center for Natural Lands Management (Pace, pers comm, Oct 18, 1999) for land purchase and management in Kern County are $1,200 per acre: $625 for land purchase, $170 for administrative costs, and $405 for an endowment. Depending on the route chosen, the total costs for compensation will be $119,034 to $163,800.

BIOLOGICAL RESOURCES Table 5
Compensation Land (acres) Required From Project

	Permanent Disturbance	Compensation ratio	Acres Required	Temporary Disturbance	Compensation ratio	Acres Required	Total Acres Required
Route 1A							
Other	13.19	3	39.57	73.44	1.1	80.784	
Preserved	3.06	4	12.24	1.86	2.1	3.906	
Total:			51.81			84.69	**136.5**
Route 1B							
Other	11.54	3	34.62	32.06	1.1	35.266	
Preserved	3.08	4	12.32	8.09	2.1	16.989	
Total:			46.94			52.255	**99.195**
Route V- B							
Other	11.52	3	34.56	44.74	1.1	49.214	
Preserved	3.08	4	12.32	8.09	2.1	16.989	
Total:			46.88			66.203	**113.083**

Staff recommends that the required compensation funds be provided by Elk Hills to the Center for Natural Lands Management (CNLM), and that the funds be used to purchase the required acres of compensation habitat in the immediate vicinity of the CNLM Lokern Preserve within the Lokern Natural Area of western Kern County. The CNLM Lokern Preserve, located within the Lokern Natural Area, is located just north of Elk Hills. The CNLM preserve contains the same types of habitat and sensitive species that will be impacted from the EHPP construction. The Lokern Preserve was originally established by The Nature Conservancy in the late 1980's, however it is now owned and managed by CNLM, a private, non-profit organization dedicated to the protection and management of natural resources.

BLUNT-NOSED LEOPARD LIZARD

The blunt-nosed leopard lizard is a Fully Protected species (Fish and Game Code section 5050), and the Fish and Game Code prohibits take of any species with this classification. As a result, Elk Hills must employ all feasible means to avoid take during project construction and operation. Avoidance measures (e.g. use of fiber optics to locate active burrows and barrier fencing to keep leopard lizards out of work areas) will be developed in consultation with the CDFG and USFWS.

BURROWING OWL

The burrowing owl is protected by the Migratory Bird Treaty Act (Fish and Game Code 3513) since it migrates each year from areas that have cold winter temperatures. Burrowing owls found in the project area of western Kern County and other areas of California's Central Valley are mostly residents, but winter

migrants may also be present during the winter. To avoid impacting the burrowing owl, Elk Hills must implement avoidance measures during project construction and operation. Implementation measures for final burrowing owl avoidance protocols will be developed in consultation with CDFG and USFWS.

FACILITY CLOSURE

Sometime in the future, the EHPP will experience either a planned closure, or be unexpectedly (either temporarily or permanently) closed. When facility closure occurs, it must be done in such a way as to protect the environment and public health and safety. To address facility closure, an “on-site contingency plan” will be developed by the project owner, and approved by the Energy Commission Compliance Project Manager (CPM). Facility Closure mitigation measures will also be included in the Biological Resources Mitigation Implementation and Monitoring Plan prepared by the applicant.

PLANNED OR UNEXPECTED PERMANENT FACILITY CLOSURE

The region surrounding the proposed project site is a mosaic of disturbed and undisturbed valley saltbush scrub and non-native annual grassland habitats. The area required for the power plant, parking, gas pipeline, and water disposal line are in disturbed habitats. The remaining linear facilities will be located within valley saltbush habitats that provide food and cover for several protected plant and wildlife species. The facility closure plan needs to address habitat restoration measures to be implemented along the water supply and transmission line routes in the event of a planned or an unexpected permanent closure. Habitat restoration measures that should be addressed include such tasks as the removal of all structures and the immediate implementation of habitat restoration measures to re-establish native plant species and native habitat. In addition, planned or unexpected permanent facility closure may also trigger the removal of the transmission conductors, and possibly the entire transmission line, since birds are known to collide with transmission conductors. A higher level of restoration would likely be required in the conservation lands.

UNEXPECTED TEMPORARY CLOSURE

Staff does not have any biological resource facility closure recommendations in the event of an unexpected temporary closure of the EHPP. However, in the event that the Energy Commission CPM decides that the facility is permanently closed, the facility closure measures provided in the on-site contingency plan and Biological Resources Mitigation Implementation and Monitoring Plan would need to be implemented.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Construction and operation of the EHPP will not have significant impacts on biological resources if adequately mitigated. Mitigation measures proposed by Elk

Hills and Energy Commission staff will reduce all identified impacts to insignificant levels. Data provided by the applicant regarding temporary habitat disturbances required for construction activities is inconsistent and must be clarified before staff completes the Final Staff Assessment. Elk Hills must provide staff with a draft BRMIMP and identify the location or mechanism for acquiring compensation lands prior to the Final Staff Assessment. Elk Hills must also identify prior to the Final Staff Assessment, all sensitive resources located within the construction corridor, which of these will be avoided, and which of these cannot be avoided. Elk Hills must conduct pre-construction surveys prior to starting any construction activities. Additionally, Elk Hills must identify and implement the steps that will be taken to avoid take of blunt-nosed leopard lizard.

COMPLIANCE WITH LORS

Elk Hills must obtain a federal Biological Opinion from the USFWS. Because a portion of the water supply line is on BLM land, BLM will apply for a Section 7 permit from USFWS to get the Biological Opinion. Elk Hills must also apply for a Section 2081 Incidental Take Permit and a Section 1603 Streambed Alteration Agreement from CDFG. Elk Hills should also consult with CDFG regarding construction of the water supply line in the Coles Levee Ecosystem Preserve.

RECOMMENDATIONS

Staff recommends the Energy Commission adopt the following Conditions of Certification. Additional Conditions of Certification may be necessary pending any further information from Elk Hills or terms and conditions of state and federal permits.

CONDITIONS OF CERTIFICATION

DESIGNATED BIOLOGIST

BIO-1 Construction site and/or ancillary facilities preparation (described as any ground disturbing activity other than Energy Commission approved geotechnical work) shall not begin until an Energy Commission Compliance Project Manager (CPM) approved Designated Biologist is available to be on site.

Protocol: The Designated Biologist must meet the following minimum qualifications:

1. a Bachelor's Degree in biological sciences, zoology, botany, ecology, or a closely related field;Cthree years of experience in field biology;
2. one year of field experience with biological resources found in or near the project area; and
3. an ability to demonstrate to the satisfaction of the CPM the appropriate education and experience for the biological resources tasks that must be addressed during project construction and operation.

If the CPM determines the proposed Designated Biologist to be unacceptable, the project owner shall submit another individual's name and qualifications for consideration. If the approved Designated Biologist needs to be replaced, the project owner shall obtain approval of a new Designated Biologist by submitting to the CPM the name, qualifications, address, and telephone number of the proposed replacement. No disturbance will be allowed in any designated sensitive areas until the CPM approves a new Designated Biologist and the new biologist is on site.

Verification: At least 60 days prior to the start of any ground disturbance activities, the project owner shall submit to the CPM for approval, the name, qualifications, address and telephone number of the individual selected by the project owner as the Designated Biologist. If a Designated Biologist is replaced, the information on the proposed replacement, as specified in the condition, must be submitted in writing at least ten working days prior to the termination or release of the preceding Designated Biologist.

BIO-2 The CPM approved Designated Biologist shall perform the following during project construction and operation:

1) advise the project owner's Construction Manager on the implementation of the Biological Resource Conditions of Certification;
2) supervise or conduct mitigation, monitoring and other biological resources compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources, such as, wetlands and special status species; and
3) notify the project owner and the CPM of any non-compliance with any Biological Resources Condition of Certification.

Verification: During project construction, the Designated Biologist shall maintain written records of the tasks described above, and summaries of these records shall be submitted along with the Monthly Compliance Reports to the CPM. During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report.

BIO-3 The project owner's Construction Manager shall act on the advice of the Designated Biologist to ensure conformance with the Biological Resources Conditions of Certification.

Protocol: The project owner's Construction Manager shall halt, if necessary, all construction activities in areas specifically identified by the Designated Biologist as sensitive to assure that potential significant biological resource impacts are avoided.

The Designated Biologist shall:

1. inform the project owner and the Construction Manager when to resume construction, and
2. advise the CPM if any corrective actions are needed or have been instituted.

Verification: Within two (2) working days of a Designated Biologist notification of non-compliance with a Biological Resources condition of certification or a halt of construction, the project owner shall notify the CPM by telephone of the circumstances and actions being taken to resolve the problem or the non-compliance with a condition. For any necessary corrective action taken by the project owner, a determination of success or failure will be made by the CPM within five (5) 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.

BIOLOGICAL RESOURCES MITIGATION IMPLEMENTATION & MONITORING PLAN

BIO-4 The project owner shall submit to the CPM for review and approval a copy of the final Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) and, once approved, shall implement the measures identified in the plan.

Protocol: The final BRMIMP shall identify:

1. all Biological Resource Conditions included in the Commission's Final Decision;
2. a list and a map of locations of all sensitive biological resources to be impacted, avoided, or mitigated by project construction and operation;
3. a list of all terms and conditions of the USFWS Biological Opinion and the CDFG Incidental Take Permit;
4. a detailed description of measures, Best Management Practices, and take avoidance measures that will be implemented to avoid and/or minimize impacts to sensitive species and reduce habitat disturbance;
5. all locations, on a map of suitable scale, of laydown areas and areas requiring temporary protection and avoidance during construction;
6. aerial photographs (scale 1:200) of all areas to be disturbed during project construction activities - one set prior to site disturbance and one set after project construction. Include planned timing of aerial photography and a description of why times were chosen;
7. duration for each type of monitoring and a description of monitoring methodologies and frequency;
8. performance standards to be used to help decide if/when proposed mitigation is or is not successful;

9. all performance standards and remedial measures to be implemented if performance standards are not met;
10. a discussion of biological resource-related facility closure measures; and
11. a process for proposing plan modifications to the CPM and appropriate agencies for review and approval.

Verification: At least 45 days prior to start of any project-related ground disturbance activities, the project owner shall provide the CPM with the final version of the BRMIMP for this project, and the CPM will determine the plans acceptability. The project owner shall notify the CPM five (5) working days before implementing any CPM approved modifications to the BRMIMP.

Within 30 days after completion of project construction, the project owner shall provide to the CPM for review and approval, a written report identifying which items of the BRMIMP have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which mitigation and monitoring plan items are still outstanding.

WORKER ENVIRONMENTAL AWARENESS PROGRAM

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

Protocol: The Worker Environmental Awareness Program must:

1. be developed by the Designated Biologist and consist of an on-site or training center presentation in which supporting written material is made available to all participants;
2. discuss the locations and types of sensitive biological resources on the project site and adjacent areas;
3. present the reasons for protecting these resources;
4. present the meaning of various temporary and permanent habitat protection measures; and
5. identify whom to contact if there are further comments and questions about the material discussed in the program.

The specific program can be administered by a competent individual(s) acceptable to the Designated Biologist.

Each participant in the on-site Worker Environmental Awareness Program shall sign a statement declaring that the individual understands and shall abide by the guidelines set forth in the program materials. The person administering the program shall also sign each statement.

Verification: At least 60 days prior to the start of rough grading, the project owner shall provide copies of the Worker Environmental Awareness Program and all supporting written materials prepared by the Designated Biologist and the name and qualifications of the person(s) administering the program to the CPM for approval. The project owner shall state in the Monthly Compliance Report the number of persons who have completed the training in the prior month and a keep record all persons who have completed the training to date. The signed statements for the construction phase shall be kept on file by the project owner and made available for examination by the CPM 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 the duration of their employment and for six months after their termination.

CALIFORNIA DEPARTMENT OF FISH & GAME PERMITS

BIO-6 Prior to start of any ground disturbance activities, the project owner shall acquire an Incidental Take Permit from CDFG in accordance with Section 2081(b) of the California Fish and Game Code and implement the permit terms and conditions.

Verification: No less than fifteen days prior to the start of any project related ground disturbance activities, the project owner shall submit to the CPM a copy of the final CDFG Incidental Take Permit. Permit terms and conditions will be incorporated into the Biological Resources Mitigation Implementation and Monitoring Plan.

BIO-7 Prior to start of any ground disturbance activities, the project owner shall acquire a Streambed Alteration Agreement from CDFG in accordance with Section 1603 of the California Fish and Game Code and implement the permit terms and conditions.

Verification: No less than fifteen days prior to the start of any project related ground disturbance activities, the project owner shall submit to the CPM a copy of the final CDFG Streambed Alteration Agreement. Agreement terms and conditions will be incorporated into the Biological Resources Mitigation Implementation and Monitoring Plan.

U. S. FISH & WILDLIFE SERVICE SECTION 7 BIOLOGICAL OPINION

BIO-8 Prior to the start of any ground disturbance activities, the project owner shall provide a final copy of the Biological Opinion in accordance with Section 7 of the federal Endangered Species Act obtained from the U. S. Fish and Wildlife Service and incorporate the terms of the opinion into the Biological Resources Mitigation Implementation and Monitoring Plan. The project owner will implement the terms and conditions contained in the federal Biological Opinion.

Verification: At least 30 days prior to the start of any project related ground disturbance activities, the project owner shall submit to the CPM a copy of the Biological Opinion. Permit terms and conditions will be incorporated into the Biological Resources Mitigation Implementation and Monitoring Plan.

HABITAT COMPENSATION

BIO-9 To compensate for impacts to sensitive species habitat, the project owner shall provide a non-refundable check for $163,000 to the Center for Natural Lands Management to purchase, administer, and manage in perpetuity compensatory lands near the project vicinity.

Protocol: Final determination of compensatory acres required will be determined by the Energy Commission after Elk Hills has determined the transmission line route. If any habitat disturbance occurs beyond the 136.5 acres estimated, the project owner shall provide additional funds to the Center for Natural Lands Management at $1,200 per acre. Additional disturbance shall be determined by aerial photos taken before and after construction at a scale of 1" = 200.

Verification: Within one week of project certification, the project owner must provide written verification to the CPM that the required compensation funds have been received by the Center for Natural Lands Management.

Within 180 days after completion of project construction, the project owner shall provide the CPM aerial photographs taken after construction and an analysis of the amount of any additional habitat disturbance beyond that identified in the Final Staff Assessment. The CPM will notify the project owner of any additional funds required to compensate for any additional habitat disturbances at the adjusted market value at the time to acquire and manage habitat.

EHPP'S MITIGATION

BIO-10 The project owner shall implement the mitigation measures identified in Section 5.3.4 of the EHPP Application For Certification (EHPP 1999a). The project owner shall incorporate these mitigation measures into the BRMIMP unless the measures conflict with those required by U.S. Fish and Wildlife, California Department of Fish and Game, or Energy Commission Conditions.

All project facilities will be sited to avoid sensitive species and habitats, be located in existing permanently disturbed areas, and maximize the use of existing roads and corridors to extent practicable.

Transmission lines and poles will be designed to reduce risk of avian collision and electrocution.

Within 14 days prior to commencement of any construction activities, a qualified biologist(s) shall conduct pre-construction surveys of all areas subject to temporary access roads, vegetation clearance and/or grading for the occurrence of sensitive species. Sensitive areas shall be temporarily flagged to establish buffer/avoidance zones that will be monitored by the designated biologist during construction. Flagging shall be removed after construction is completed. USFWS, CDFG, and Energy Commission shall be notified if any active kit fox dens, giant kangaroo rat burrows, or blunt-nosed leopard lizard burrows are located in the vicinity of construction.

Buffer zones shall be:	
Occupied or active kit fox den	200 feet
Known kit fox den	100 feet
Kit fox natal den	300 feet
Potential kit fox den	50 feet
Giant kangaroo rat burrow	30 feet
San Joaquin antelope squirrel burrow	30 feet
Known blunt-nosed leopard lizard burrow	30 feet
Active burrowing owl burrow	50 feet
Special status plant species	50 feet

If damage or destruction to a known or potential kit fox den cannot be avoided during project construction, the den shall be monitored for three consecutive days and, once determined to be unoccupied, excavated by the designated biologist according to agency approved guidelines. If damage or destruction to a known or potential giant kangaroo rat burrow cannot be avoided during project construction, the burrows will be hand excavated to allow any animal occupying the burrow to escape, or, at the discretion of state or federal resource agencies, the giant kangaroo rat may be captured and released.

Construction area boundaries will be clearly delimited with stakes, flagging, and/or rope or cord to minimize inadvertent degradation or loss of adjacent wildlife habitat during construction.

All project related vehicle traffic shall be restricted to established roads, designated temporary access roads and routes, construction areas, storage areas, staging and parking areas. Off-road traffic outside of designated project areas will be prohibited.

Equipment storage and parking will be confined to designated areas that are not habitat for listed species. Construction pipes and poles with a diameter of 4 inches or greater stored overnight will be visually inspected for species of concern before use or capped if they cannot be visually inspected. If a species of concern is found within the pipe or pole, the pipe or pole cannot be moved until the animal has escaped on its own.

Construction activities on transmission lines and pipelines will be limited to daylight hours.

All excavated, steep-walled holes or trenches more than 2 feet deep will either be covered at the close of each working day by plywood or provided with one or more escape ramps (3:1) constructed of earth fill of wooden planks every 0.25 mile.

In temporary construction areas, four inches of top soil shall be conserved. Upon completion of construction, all areas subject to temporary ground disturbances, including storage and staging areas, temporary roads, pipeline corridors, and pulling areas, will be recontoured as necessary and spread with salvaged topsoil.

All food-related trash shall be disposed of in closed containers and removed from the site weekly.

No domestic pets shall be allowed on the construction sites.

If a species of concern is inadvertently injured or killed, the incident shall be immediately reported to USFWS, CDFG, and the Energy Commission.

Verification: Within 30 days after completion of the project construction, the project owner shall submit a post-construction compliance report that describes the following details: dates that construction occurred; data concerning success in meeting project mitigation measures; known project effects on any sensitive species encountered during the construction phase (including number of dens and small mammal burrows damaged or destroyed); occurrences of incidental take of federal and state listed species; an assessment of the extent and severity of project impacts on all sensitive wildlife habitats; and other appropriate information.

FACILITY CLOSURE

BIO-11 The project owner will incorporate into the planned permanent or unexpected permanent closure plan measures that address the local biological resources. The biological resource facility closure measures will also be incorporated into the EHPP project BRMIMP.

Protocol: The planned permanent or unexpected permanent closure plan will require the following biological resource-related mitigation measures:

1. Removal of transmission conductors and above ground pipelines when they are no longer used and useful; and
2. Measures to restore wildlife habitat to promote the re-establishment of native plant and wildlife species.
3. Any special measures that will be implemented in the Elk Hills Conservation Area.

Verification: At least 12 months (or a mutually agreed upon time) prior to the commencement of closure activities, the project owner shall address all biological resource-related issues associated with facility closure in a Biological Resources Element. The Biological Resources Element will be incorporated into the Facility Closure Plan, and include a complete discussion of the local biological resources and proposed facility closure mitigation measures.

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GEOLOGY

Robert Anderson

INTRODUCTION

The geology section discusses the project's potential impacts regarding geological hazards, geological and paleontological resources, and surface water hydrology. The purpose of the geology analysis is to verify that the applicable laws, ordinances, regulations, and standards (LORS) have been identified and that the project can be designed and constructed in accordance with all applicable LORS, and in a manner that protects environmental quality and assures public health and safety. The objective of staff is to ensure that there will be no significant adverse impacts to significant geological and paleontological resources, and surface water hydrology during project construction, operation and closure. The section concludes with the staff's proposed monitoring and mitigation measures with respect to geological hazards, geological and paleontological resources, and surface water hydrology, with the inclusion of ten conditions of certification.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

The applicable LORS are listed in the AFC, in Sections 5.4, 5.5 and 5.17 (EHPP 1999a). A brief description of the LORS for geological hazards and resources, paleontological resources, and drainage and erosion control follows:

FEDERAL

There are no federal LORS for geological hazards and resources, or grading and erosion control. The United States Bureau of Land Management (BLM) requires an excavation permit for excavations and grading on land under their jurisdiction. The Elk Hills Power Project power plant is not located on lands under the jurisdiction of the BLM. An excavation permit from BLM will be required since water supply pipeline route from mile post 8.6 to mile post 9.1 crosses land under the jurisdiction of the BLM (EHPP 1999a, page 5.7-18). Federal Land Planning Management Act (FLPMA) and NEPA also apply.

STATE AND LOCAL

The California Building Code (CBC) 1998 edition is based upon the Uniform Building Code (UBC), 1997 edition, which was published by the International Conference of Building Officials. The CBC is a series of standards that are used in the investigation, design (Chapters 16 and 18) and construction (including grading and erosion control as found in Appendix Chapter 33) that were based upon the UBC that includes supplemental standards specific to California. The CBC has been adopted by the Kern County Building and Services Department and supplements their grading and construction ordinances and regulations.

The California Environmental Quality Act (CEQA) Guidelines Appendix G provides a checklist of questions that a lead agency should normally address if relevant to a project's environmental impacts.

Section (V) (c) asks if the project will directly or indirectly destroy a unique paleontological resource or site or unique geological feature.

Sections (VI) (a), (b), (c), (d), and (e) pose questions that are focused on whether or not the project would expose persons or structures to geological hazards.

Sections (X) (a) and (b) pose questions about the project's effect on mineral resources.

The Standard Procedures, Measures for Assessment and Mitigation of Adverse Impacts to Non-renewable Paleontologic Resources (Society of Vertebrate Paleontology) are a set of procedures and standards for assessing and mitigating impacts to vertebrate paleontological resources. They were adopted in October 1994 by a national organization of vertebrate paleontologists (the Society of Vertebrate Paleontologists).

Kern County Development Standards (dated August 1995) Division Four Section 401-1 (Standards for Drainage) and Division Eight, Sections 408-1 and 408-2 (Retention Basin Volume and Hydraulic Design) apply to the site.

SETTING

The site is located in the Elk Hills, in Western Kern County. Geology at the site is made up of silt, sand and gravel outcropping of the Tulare Formation, alluvium and minor amounts of fill. The soil overlying most of the power plant footprint area has been disturbed. The site slope gradient is very shallow, so the potential for slope stability problems is remote. Groundwater was encountered at a depth of over 1,000 feet below existing grade in the footprint of the proposed power plant. Groundwater along the linear facilities varies from 200 feet below existing grade to over 1,000 feet below existing grade.

ANALYSIS AND IMPACTS

FAULTING AND SEISMICITY

No active faults are known to cross the proposed power plant footprint or the linear facilities. Several inactive faults cross electric transmission line route 1A and water supply pipeline Route 2. The project is located within seismic zone 4 as delineated on Figure 16-2 of the 1998 edition of the California Building Code. The active fault closest to the site is San Andreas fault which is located approximately 12 miles west of the site. The estimated peak horizontal ground acceleration for the site is 0.51g and is based upon a MW 8.0 earthquake occurring on the San Andreas Fault near the site. It should be noted that since the site is located upon a large anticlinal structure adjacent to the Coast Range Mountains, that earthquakes associated with blind thrust faults or possibly the Elk Hills Anticline may also affect the site. The applicant has estimated that the peak horizontal ground acceleration associated

with the blind thrust faults along the eastern side of the Coast Range Mountains is 0.29g (EHPP 1999a).

LIQUEFACTION, HYDROCOMPACTION, EXPANSIVE SOILS

Liquefaction is a condition in which a cohesionless soil may lose shear strength due to a sudden increase in pore water pressure. Liquefaction usually is observed in the upper 100 feet beneath a site if it occurs at all. The depth to groundwater at the proposed power plant location is in excess of 1,000 feet. The depth along the proposed linear facilities is reported to be in excess of 200 feet. Since the depth to ground water at the proposed power plant and the linear facilities is greater than 100 feet, the potential for liquefaction at the site is considered to be nil.

Hydrocompaction is the process of the loss of soil volume upon the application of water. The soils at the project site are partially saturated and dense and are not considered to be prone to hydrocompaction. In addition subsidence due to oil extraction has not been reported by the applicant nor was any subsidence at the site observed by Energy Commission staff during their tour of the proposed site in March 1999.

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 a high clay content. Near surface soils reported in the AFC, (EHPP 1999a) are classified as a sandy loam. An expansive index test was conducted on several samples from boring within the footprint of the proposed powerplant. One sample from Boring B-1 had a high Elastic Index Value (94). The sample was taken between 3 to 5 feet below existing grade. No other sample tested had a high Elastic Index Value. The soils at this location should be further assessed during the final geotechnical investigation.

GEOLOGICAL AND PALEONTOLOGICAL RESOURCES

The site is located on one of the largest oil and natural gas reserves in the United States. No other geological resources have been identified at the site or along the electric transmission line alignments, the natural gas supply line, or the water supply line. Directional drilling techniques and oil and gas extraction techniques allow the development of oil and gas at the site without interruption. The Department of Conservation, Division of Oil and Gas and Geothermal Resources requires that a setback from existing wells be maintained so that the wells may be serviced. Energy Commission staff have proposed a Condition of Certification (GEO-3) that should allow the project owner to work out a linear facility development plan that will ensure that construction of the power plant and linear facilities will not pose a hazard or a problem to existing oil wells.

The site is located on the alluvium. No paleontological resources are known to exist at the site. The Tulare is known to contain either vertebrate or invertebrate fossils or both. The alluvium in the vicinity of the site and linear facilities is not known to contain fossils. However the alluvium is known to contain fossils near Taft and Buttonwillow. Energy Commission staff have proposed conditions of certification

that will enable the applicant to mitigate impacts upon paleontological resources to a less than significant level should they be encountered during construction, operation, and closure of the project.

SURFACE WATER HYDROLOGY

The project is not located in a 100-year flood zone. The minimum grade for the power plant area will be 1% and all drainage will be directed away from buildings within the footprint. Spill containment features are described by the applicant to have a minimum of one foot of freeboard. Run-off during a 100-year 24-hour storm event should not overwhelm the capacity of the proposed surface water drainage system.

FACILITY CLOSURE

There are three kinds of facility closure. A definition and general approach to closure is presented in the General Conditions section of this document. Facility closure activities are not anticipated to impact geological or paleontological resources. This is due to the fact that no paleontological or geological resources are known to exist at the power plant location. In addition, decommissioning and closure of the power plant should not negatively affect geological or paleontological resources since the majority of the ground disturbed in plant decommissioning and closure would have been disturbed in the construction of the plant. Surface water hydrology impacts will depend upon the closure activities proposed.

ANALYSIS AND POTENTIAL IMPACTS

SITE SPECIFIC IMPACTS

The project is not likely to have any impact on geological or paleontological resources. There will be a minor, insignificant increase in the surface water drainage off-site. The applicant will need to further assess the extent of the expansive soil encountered in Boring B-1 since it is located in the footprint of the powerplant.

CUMULATIVE IMPACTS

It is staff's opinion that the potential for a significant adverse cumulative impact on paleontological resources, geological resources, or surface water hydrology is unlikely, if the Elk Hills Power Project is constructed according to the proposed conditions of certification. This opinion is based on the fact that the site is not known to have significant paleontological or geological resources.

MITIGATION

Based upon the literature and archives search, field surveys and the preliminary geotechnical investigation for the project, the applicant has proposed monitoring and mitigation measures to be followed during the construction of the power plant, related natural gas supply line, electrical transmission line, and the waste water

pipelines. Energy Commission staff agree with the applicant that there is a low probability that vertebrate fossils will be encountered during construction of the power plant and related features.

The proposed conditions of certification are to allow the Energy Commission Compliance Project Manager (CPM) and the applicant to adopt a compliance monitoring scheme that will ensure LORS applicable to geological hazards, geological and paleontological resources, and surface water hydrology for the project are complied with.

CONCLUSION AND RECOMMENDATIONS

The applicant will likely be able to comply with applicable LORS. The project should have no adverse impact with respect to geological and paleontological resources and surface water hydrology. Staff propose to ensure compliance with applicable LORS for geological hazards, geological and paleontological resources and surface water hydrology with the adoption of the proposed conditions of certification listed below.

PROPOSED CONDITIONS OF CERTIFICATION

GEO-1 Prior to the start of construction, the project owner shall assign to the project an engineering geologist(s), certified by the State of California, to carry out the duties required by the 1998 edition of the California Building Code (CBC) Appendix Chapter 33, Section 3309.4. The certified engineering geologist(s) assigned must be approved by the CPM (the functions of the engineering geologist can be performed by the responsible geotechnical engineer, if that person has the appropriate California license).

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 construction, the project owner shall submit to the CPM for approval the name(s) and license number(s) of the certified engineering geologist(s) assigned to the project. The submittal should include a statement that CPM approval is needed. The CPM will approve or disapprove of the engineering geologist(s) and will notify the project owner of its findings within 15 days of receipt of the submittal. If the engineering geologist(s) is subsequently replaced, the project owner shall submit for approval the name(s) and license number(s) of the newly assigned individual(s) to the CPM. The CPM will approve or disapprove of the engineering geologist(s) and will notify the project owner of the findings within 15 days of receipt of the notice of personnel change.

GEO-2 The assigned engineering geologist(s) shall carry out the duties required by the 1998 CBC, Appendix Chapter 33, Section 3309.4 Engineered Grading Requirement, and Section 3318.1 – Final Reports. Those duties are:

Prepare the Engineering Geology Report. This report shall accompany the Plans and Specifications when applying to the CBO for the grading permit.

Monitor geologic conditions during construction.

Prepare the Final Engineering Geology Report.

The Engineering Geology Report required by the 1998 CBC Appendix Chapter 33, Section 3309.3 Grading Designation, shall include an adequate description of the geology of the site, conclusions and recommendations regarding the effect of geologic conditions on the proposed development, and an opinion on the adequacy, for the intended use, of the site as affected by geologic factors.

The Final Engineering Geology Report to be completed after completion of grading, as required by the 1998 CBC Appendix Chapter 33, Section 3318.1, shall contain the following: A final description of the geology of the site and any new information disclosed during grading; and the effect of same on recommendations incorporated in the approved grading plan. The engineering geologist shall submit a statement that, to the best of his or her knowledge, the work within their area of responsibility is in accordance with the approved Engineering Geology Report and applicable provisions of this chapter.

Verification: (1) Within 15 days after submittal of the application(s) for grading permit(s) to the CBO, the project owner shall submit a signed statement to the CPM stating that the Engineering Geology Report has been submitted to the CBO as a supplement to the plans and specifications and that the recommendations contained in the report are incorporated into the plans and specifications. (2) Within 90 days following completion of the final grading, the project owner shall submit copies of the Final Engineering Geology Report required by the 1998 CBC Appendix Chapter 33, Section 3318 Completion of Work, to the CPM and the CBO.

GEO-3 The project owner shall submit a linear facility (transmission lines and utility lines) development plan, addressing any actions to be undertaken by the project owner to ensure no hazard or problems will be created with the existing wells in the construction site and laydown areas, to the Department of Conservation, Division of Oil and Gas and Geothermal Resources (DOGGR) for review and comment. The linear facility development plant shall include a discussion of how a minimum setback from existing oil wells is to be maintained.

Verification: At least sixty days prior to the start of construction, the project owner shall submit to the CPM a copy of DOGGR's letter commenting on the linear facility development plan. Within fifteen (15) days of the receipt of the linear facility development plan and the DOGGR comment letter on the plan, the CPM will either approve or comment and deny the plan, and transmit the approval or denial letter to the project owner.

PAL-1 Prior to the start of any project-related construction activities (defined as any construction-related vegetation clearance, ground disturbance and preparation, and site excavation activities), the project owner shall ensure

that the designated paleontological resource specialist approved by the CPM is available for field activities and prepared to implement the conditions of certification.

The designated paleontological resources specialist shall be responsible for implementing all the paleontological conditions of certification and for using qualified personnel to assist in this work.

Protocol: The project owner shall provide the CPM with the name and statement of qualifications for the designated paleontological resource specialist.

The statement of qualifications for the designated paleontological resources specialist shall demonstrate that the specialist meets the following minimum qualifications: a degree in paleontology or geology or paleontological resource management; and at least three years of paleontological resource mitigation and field experience in California, including at least one year's experience leading paleontological resource mitigation and field activities.

The statement of qualifications shall include a list of specific projects the specialist has previously worked on; the role and responsibilities of the specialist for each project listed; and the names and phone numbers of contacts familiar with the specialist's work on these referenced projects.

If the CPM determines that the qualifications of the proposed paleontological resource specialist are not in concert with the above requirements, the project owner shall submit another individual's name and qualifications for consideration.

If the approved, designated paleontological resource specialist is replaced prior to completion of project mitigation, the project owner shall obtain CPM approval of the new designated paleontological resource specialist by submitting the name and qualifications of the proposed replacement to the CPM, at least ten (10) days prior to the termination or release of the preceding designated paleontological resource specialist.

Should emergency replacement of the designated specialist become necessary, the project owner shall immediately notify the CPM to discuss the qualifications of its proposed replacement specialist.

Verification: At least ninety (90) days prior to the start of construction, the project owner shall submit the name and resume and the availability for its designated paleontological resource specialist, to the CPM for review and approval. The CPM shall provide written approval or disapproval of the proposed paleontological resource specialist.

At least ten (10) days prior to the termination or release of a designated paleontological resource specialist, the project owner shall obtain CPM approval of

the replacement specialist by submitting to the CPM the name and resume of the proposed new designated paleontological resource specialist. Should emergency replacement of the designated specialist become necessary, the project owner shall immediately notify the CPM to discuss the qualifications of its proposed replacement specialist.

PAL-2 Prior to the start of project construction, the designated paleontological resource specialist shall prepare a Paleontological Resources Monitoring and Mitigation Plan to identify general and specific measures to minimize potential impacts to sensitive paleontological resources, and submit this plan to the CPM for review and approval. After CPM approval, the project owner's designated paleontological resource specialist shall be available to implement the Monitoring and Mitigation Plan, as needed, throughout project construction.

In addition to the project owner's adoption of the guidelines of the Society of Vertebrate Paleontologists, as modified in the Application for Certification for the DEC, dated December 1998, the Paleontological Resources Monitoring and Mitigation Plan shall include, but not be limited to, the following elements and measures:

A discussion of the sequence of project-related tasks, such as any pre-construction surveys, fieldwork, flagging or staking; construction monitoring; mapping and data recovery; fossil preparation and recovery; identification and inventory; preparation of final reports; and transmittal of materials for curation;

Identification of the person(s) expected to assist with each of the tasks identified within this condition for certification, and a discussion of the mitigation team leadership and organizational structure, and the inter-relationship of tasks and responsibilities;

Where monitoring of project construction activities is deemed necessary, the extent of the areas where monitoring is to occur and a schedule for the monitoring;

An explanation that the designated paleontological resource specialist shall have the authority to halt or redirect construction in the immediate vicinity of a vertebrate fossil find until the significance of the find can be determined;

A discussion of equipment and supplies necessary for recovery of fossil materials and any specialized equipment needed to prepare, remove, load, transport, and analyze large-sized fossils or extensive fossil deposits;

Inventory, preparation, and delivery for curation into a retrievable storage collection in a public repository or museum, which meets the Society of Vertebrate Paleontologists standards and requirements for the curation of paleontological resources; and

Identification of the institution that has agreed to receive any data and fossil materials recovered during project-related monitoring and mitigation work,

discussion of any 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.

Verification: At least sixty (60) days prior to the start of construction on the project, the project owner shall provide the CPM with a copy of the Monitoring and Mitigation Plan prepared by the designated paleontological resource specialist for review and approval. If the plan is not approved, the project owner, the designated paleontological resource specialist, and the CPM shall meet to discuss comments and negotiate necessary changes.

PAL-3 Prior to the start of construction, and throughout the project construction period as needed for all new employees, the project owner and the designated paleontological resource specialist shall prepare and conduct CPM-approved training to all project managers, construction supervisors, and workers who operate ground disturbing equipment. The project owner and construction manager shall provide the workers with the CPM-approved set of procedures for reporting any sensitive paleontological resources or deposits that may be discovered during project-related ground disturbance.

Protocol: The paleontological training program shall discuss the potential to encounter paleontological resources in the field, the sensitivity and importance of these resources, and the legal obligations to preserve and protect such resources.

The training shall also include the set of reporting procedures that workers are to follow if paleontological resources are encountered during project activities. The training program shall be presented by the designated paleontological resource specialist and may be combined with other training programs prepared for cultural and biological resources, hazardous materials, or any other areas of interest or concern.

Verification: At least (30) thirty days prior to the start of project construction, the project owner shall submit to the CPM for review, comment, and written approval, the proposed employee training program and the set of reporting procedures the workers are to follow if paleontological resources are encountered during project construction.

If the employee training program and set of procedures are not approved, the project owner, the designated paleontological resource specialist, and the CPM shall meet to discuss comments and negotiate necessary changes, before the beginning of construction.

Documentation for training of additional new employees shall be provided in subsequent Monthly Compliance Reports, as appropriate.

PAL-4 The designated paleontological resource specialist shall be present at all times he or she deems appropriate to monitor construction-related grading, excavation, trenching, and/or augering in areas where potentially fossil-bearing sediments have been identified. If the designated paleontological resource specialist determines that full-time monitoring is not necessary in certain portions of the project area or along portions of the linear facility routes, the designated specialist shall notify the project owner.

Verification: The project owner shall include in the Monthly Compliance Reports a summary of paleontological activities conducted by the designated paleontological resource specialist.

PAL-5 The project owner, through the designated paleontological resource specialist, shall ensure recovery, preparation for analysis, analysis, identification and inventory, the preparation for curation, and the delivery for curation of all significant paleontological resource materials encountered and collected during the monitoring, data recovery, mapping, and mitigation activities related to the project.

Verification: The project owner shall maintain in its compliance files copies of signed contracts or agreements with the designated paleontological resource specialist and other qualified research specialists who will ensure the necessary data and fossil recovery, mapping, preparation for analysis, analysis, identification and inventory, and preparation for and delivery of all significant paleontological resource materials collected during data recovery and mitigation for the project. The project owner shall maintain these files for a period of three years after completion and approval of the CPM-approved Paleontological Resources Report and shall keep these files available for periodic audit by the CPM.

PAL-6 The project owner shall ensure preparation of a Paleontological Resources Report by the designated paleontological resource specialist. The Paleontological Resources Report shall be completed following completion of the analysis of the recovered fossil materials and related information. The project owner shall submit the paleontological report to the CPM for approval.

Protocol: The report shall include (but not be limited to) a description and inventory list of recovered fossil materials; a map showing the location of paleontological resources encountered; determinations of sensitivity and significance; and a statement by the paleontological resource specialist that project impacts to paleontological resources have been mitigated.

Verification: The project owner shall submit a copy of the Paleontological Resources Report to the CPM for review and approval under a cover letter stating that it is a confidential document. The report is to be prepared by the designated paleontological resource specialist within 90 days following completion of the analysis of the recovered fossil materials.

PAL-7 The project owner shall include in the facility closure plan a description regarding facility closure activity's potential to impact paleontological resources. The conditions for closure will be determined when a facility closure plan is submitted to the CPM twelve months prior to closure of the facility. If no activities are proposed that would potentially impact paleontological resources, then no mitigation measures for paleontological resource management are required in the facility closure plan.

Protocol: The closure requirements for paleontological resources are to be based upon the Paleontological Resources Report and the proposed grading activities for facility closure.

Verification: The project owner shall include a description of closure activities described above in the facility closure plan.

REFERENCES

EHPP (Elk Hills Power Project). 1999a. Application for Certification,Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission, Februray 24, 1999.

EHPP (Elk Hills Power Project). 1999b. Application for Certification, Addendum I, Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission, March 14, 1999.

EHPP (Elk Hills Power Project). 1999c. Application for Certification, Elk Hills PowerProject (99-AFC-1), confidential filing for Paleontological Resources. Submitted to the California Energy Commission, February 24, 1999.

SVP (Society of Vertebrate Paleontologists). 1994. Measures for Assessment and Mitigation of Adverse Impacts to Non-renewable Paleontologic Resources: Standard Procedures. October 1994.

FACILITY DESIGN

Steve Baker, Kisabuli and Al McCuen

INTRODUCTION

Facility Design encompasses the civil, structural, mechanical and electrical engineering aspects of the project. The purpose of the Facility Design analysis is to verify that laws, ordinances, regulations and standards (LORS) applicable to the design and construction of the project have been identified; and that the project and ancillary facilities have been described in sufficient detail, including design criteria and analysis methods, to provide reasonable assurance that the project can be designed and constructed in accordance with all applicable LORS, and in a manner that protects environmental quality and assures public health and safety.

This analysis also examines whether special design features should be considered during final design to deal with conditions unique to the site which could influence public health and safety, environmental protection or the operational reliability of the project. This analysis further identifies the design review and construction inspection process and establishes conditions of certification that will be used to ensure compliance with the intent of the LORS and any special design requirements.

FINDINGS REQUIRED

The Warren Alquist Act requires the commission to "prepare a written Decision ….which includes…(a) Specific provisions relating to the manner in which the proposed facility is to be designed, sited, and operated in order to protect environmental quality and assure public health and safety [and] (d)(1) Findings regarding the conformity of the proposed site and related facilities…with public safety standards…and with other relevant local, regional, state and federal standards, ordinances, or laws…”(Pub. Resources Code, §25523).

SUBJECTS DISCUSSED

Subjects covered in this analysis include:

- Identification of the LORS applicable to facility design;
- Evaluation of the applicant’s proposed design criteria, including the identification of those that are essential to ensuring protection of the environment and public health and safety;
- Proposed modifications and additions to the AFC that are necessary to comply with applicable LORS;
- Identification of the Energy Commission’s design review and construction inspection process, which is used to ensure compliance with applicable LORS and protection of the environment and public health and safety; and

- Conditions of certification proposed by staff to ensure that the project will be designed and constructed to comply with all applicable LORS, and protect environmental quality and assure public health and safety.

SETTING

Elk Hills Power, LLC (Elk Hills) proposes to construct and operate the Elk Hills Power Project (EHPP), a 500-megawatt (MW) powerplant in western Kern County, California. EHPP will be located on a 12-acre site in Section 35, Township 30 South, Range 23 East, MDB&M, Kern County, California. EHPP is located in seismic zone 4, the highest seismic shaking zone in the country. Additional engineering details of the proposed project are contained in the Application for Certification (AFC), in Appendices A through H (EHPP 1999a).

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The applicable LORS for each engineering discipline, civil, structural, mechanical and electrical, are included as part of the engineering appendices, Appendices A through H, and summarized in Section 6.0, Engineering (EHPP 1999a). A summary of these LORS includes: Title 24, California Code of Regulations, which adopts the current edition of the California Building Code (CBC) as minimum legal building standards; the 1998 CBC for design of structures; American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code; and National Electrical Manufacturers Association (NEMA) standards.

ANALYSIS

The basis of this analysis is the applicant's proposed analysis methods, construction methods and list of LORS and design criteria set forth in the AFC. Applicable engineering sections include:

Section 1.2	Project Ownership
Section 1.5	Project Schedule
Section 3	Facility Description and Location
Section 3.6	Transmission Line Description
Section 3.7	Pipelines
Section 3.8	Project Construction
Section 6	Laws, Ordinances, Regulations and Standards (LORS)

Appendices

1. Appendix A	Foundation and Civil Engineering Design Criteria
2. Appendix B	Structural and Seismic Engineering Design Criteria
3. Appendix C	Mechanical Engineering Design Criteria
4. Appendix D	Control Systems Engineering Design Criteria
5. Appendix E	Electrical Engineering Design Criteria
6. Appendix F	Major Equipment List
7. Appendix G	Geotechnical Engineering Investigations

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 a natural gas pipeline and electric transmission line. The applicant proposes to use accepted industry standards (see AFC Appendix A for a list of the applicable industry standards), design practices, and construction methods in preparing and developing the site. The applicant's proposed methods follow industry standard practices. Staff concludes that the project, including its linear facilities, is likely to comply with the applicable site preparation LORS, and proposes conditions of certification included below 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 to repair or replace, or that require a long lead time to repair or replace, or those used for the storage, containment, or handling of hazardous or toxic materials. Major structures and equipment are listed in the conditions of certification (**GEN-2** below).

The AFC contains a list of the civil, structural, mechanical and electrical design criteria that demonstrate the likelihood of compliance with applicable LORS, and which staff believes are essential to ensuring that the project is designed in a manner that protects the environment and public health and safety.

PROPOSED MODIFICATIONS

The AFC (EHPP 1998a, Appendices A and B) identifies applicable LORS, which include the 1997 UBC. The project should be designed and constructed to the 1998 edition of the CBC, and other applicable codes and standards in effect at the time design and construction of the project actually commence. In the event the design of EHPP is submitted to the Chief Building Official (CBO)[1] for review when the successor to the 1998 CBC is in effect, the 1998 CBC provisions, identified herein, shall be replaced with the applicable successor provisions.

CBC LATERAL FORCE REQUIREMENTS

The procedures and limitations for the seismic design of structures by the 1998 CBC are determined considering seismic zoning, site characteristics, occupancy, structural configuration, structural system and height. Different design and analysis procedures are recognized in the 1998 CBC for determining seismic effects on structures. The dynamic lateral force procedure of Section 1631 is always acceptable for design. The static lateral force procedure of Section 1630 is allowed under certain conditions of regularity, irregularity, occupancy and height determined under Section 1629. Nonbuilding structures are included in Section 1634. Most of the structures in power plant projects are considered nonbuilding structures.

[1] The CBO is the Energy Commission's duly appointed representative, which may be the City or County Chief Building Official, or other appointed representative.

STATIC LATERAL FORCE PROCEDURE

In seismic Zones 3 and 4, the static lateral force procedure of Section 1630 may be used for the following:

1. Regular structures under 240 feet in height with lateral force resistance provided by systems, listed in Table 16-N, except where Section 1629.8.4, Item 4, applies. (Structures, regular or irregular, located on Soil Profile Type SF, that has a period greater than 0.7 second require dynamic analysis.)
2. Irregular structures not more than five stories or 65 feet in height.

DYNAMIC LATERAL FORCE PROCEDURE

In seismic zones 3 and 4, the dynamic lateral force procedure of Section 1631 shall be used for all other structures, including the following:

1. Structures having a stiffness, weight or geometric vertical irregularity of Type 1, 2 or 3, as defined in Table 16-L, or structures having irregular features not described in Table 16-L or 16-M, except as permitted by Section 1630.4.2. (Where a combination of structural systems is included in the same structure, the structure can be analyzed as two independent structures for purposes of determining regularity.)
2. Structures over five stories or 65 feet, not having the same structural system throughout their height except as permitted by Section 1631.2. (An elastic design response spectrum constructed in accordance with Figure 16-3 of the 1998 CBC, using the values of Ca and Cv consistent with the specific site can be used.)
3. Structures, regular or irregular, located on Soil Profile Type SF, that have a period greater than 0.7 seconds.

RIGID STRUCTURES LATERAL FORCE DESIGN

Rigid structures (those with a fundamental period less than 0.06 second) and their anchorages shall be designed using procedures consistent with the requirements of Section 1634.3 and any other applicable provisions of Section 1634.

TANKS WITH SUPPORTED BOTTOMS

Flat bottom tanks or other tanks with supported bottoms founded at or below grade shall be designed consistent with Section 1634.4 and any other applicable provisions of Section 1634.

OTHER NONBUILDING STRUCTURES

Nonbuilding structures not covered by Sections 1634.3 and 1634.4 shall be designed consistent with the requirements of Section 1634.5 and any other applicable provisions of Section 1634.

ENSURING THE APPROPRIATE LATERAL FORCE PROCEDURE

In order to ensure that structures are analyzed using the appropriate lateral force procedure, staff has included Proposed Condition of Certification **STRUC-1** below, 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.

CIVIL/STRUCTURAL FEATURES

The EHPP will consist of two combustion turbine generators (CTGs), two heat recovery steam generators (HRSGs), one steam turbine generator (STG) and one condenser. The balance of plant (BOP) will include a single 1.0 million gallon feedwater storage tank, a wet cooling tower, a 12,000 gallon anhydrous ammonia storage tank, control and administrative buildings, and feedwater pumps. The applicant proposes that these major components will be supported on reinforced concrete mat foundations at grade. Each HRSG will be provided with a self-supporting steel stack. The stacks will extend 120 feet above grade. The powerplant and related facilities will be designed to meet the seismic requirements of the California Building Code.

The CTGs, HRSGs, STG and condenser will be located outdoors and will be supported at grade on reinforced concrete mat foundations. The three step-up transformers and two auxiliary transformers will also be supported at grade on reinforced concrete mat foundations. BOP mechanical and electrical equipment will be supported at grade on individual reinforced concrete pads.

MECHANICAL SYSTEMS

Mechanical features of the project include two CTGs and HRSGs. Each CTG system will be capable of producing approximately 153 MW of electricity at site conditions. Power will be generated by the CTGs at 18 kV and stepped up by two transformers to 230 kV.

Exhaust gas from each CTG will flow directly through a HRSG with duct burner and selective catalytic reduction (SCR), before passing through the exhaust stack.

The CTGs will be equipped with dry low NOX combustors used to control NOX. The HRSG will be equipped with an SCR system, utilizing anhydrous ammonia, and associated support equipment. The CTGs will also be equipped with evaporative inlet air cooling and steam injection for power augmentation.

Other features of the project include: water and wastewater treatment equipment; pressure vessels, piping systems and pumps; anhydrous ammonia storage, handling and piping system; air compressors; fire protection systems; and heating, ventilation, air conditioning (HVAC), potable water, plumbing and sanitary sewage systems.

MECHANICAL LORS AND DESIGN CRITERIA

The application (EHPP 1999a, Appendix C) lists and describes the mechanical codes, standards and design criteria that will be employed in project design

documents, procurement specifications and contracts. Design work will be performed in accordance with the appropriate LORS. This list indicates that the applicant is aware of the codes, standards, and design criteria appropriate for such a project. This approach will likely assure the project's mechanical systems are designed to the appropriate codes and standards. Staff has proposed conditions of certification (**MECH-1** through **MECH-4**, below) to monitor compliance with this requirement.

ELECTRICAL SYSTEMS

Major electrical features of the project other than transmission include generators, power control wiring, protective relaying, grounding system, cathodic protection system and site lighting (EHPC 1998a, Appendix E).

Power and Control Wiring. In general, conductors will be insulated on the basis of a normal maximum conductor temperature of 90ºC in 40ºC ambient air with a maximum emergency overload temperature of 130ºC and a short circuit temperature of 250ºC. In areas with higher ambient temperatures, larger conductors will be used or higher temperature rated insulation will be selected.

Protective Relaying. These relays protect equipment in the auxiliary power supply system, generator terminal systems, 230 kV system, 4.16 kV systems, turbine-generator system, and the electrical loads powered from these systems. The protective relaying scheme will be designed to remove or alarm any of the abnormal occurrences.

Classification of Hazardous Areas. Areas where flammable and combustible liquids, gases, and dusts are handled and stored will be classified for determining the minimum criteria for design and installation of electrical equipment to minimize the possibility of ignition. The criteria for determining the appropriate classification are specified in Article 500 of the National Electrical Code (NFPA/ANSI C1).

Grounding. The station grounding system will be an interconnected network of bare copper conductors and copper clad ground rods. The system will be provided to protect plant personnel and equipment from hazard, which can occur during power system faults and lightning strikes. The station-grounding grid will be designed for adequate capacity to dissipate heat from ground current under the most severe conditions in areas of high ground fault current concentrations.

Site Lighting. The site lighting system will provide personnel with illumination for the performance of general yard tasks, safety, and plant security. Power used to supply outdoor roadway and area lighting will be 277 volts.

Freeze Protection. A freeze protection system will be provided for selected outdoor piping as required. Parallel circuit type heating cable will be utilized where possible.

Cathodic Protection System. Cathodic protection and other corrosion control measures for all plant structures, including the exterior surface of underground piping and bottoms of surface mounted steel tanks will be provided as required.

The AFC (EHPP 1999a, Appendix E) lists and describes the electrical codes, standards and design criteria that will be employed in project design documents,

procurement specifications and contracts. Design work will be performed in accordance with the appropriate LORS. This list indicates that the applicant is aware of the codes, standards, and design criteria appropriate for such a project. This approach will likely assure the project's electrical systems are designed to the appropriate codes and standards.

Staff concludes that the applicant can design the electrical systems in accordance with all LORS and in a manner which protects the environment and public health and safety by complying with the applicable LORS and electrical design criteria (EHPP 1999a, Appendix E). Staff has proposed conditions of certification (**ELEC-1** and **ELEC-2**, below) to monitor this compliance.

ANCILLARY FACILITIES

NATURAL GAS SUPPLY LINE

The project will be fueled with locally produced natural gas from the Elk Hills Oil and Gas Field. Natural gas will be conveyed to the powerplant site via a 2,500 foot, 10-inch supply pipeline extending from a 20-inch gas pipeline supplied from the existing, nearby gas processing facilities operated by Occidental of Elk Hills, Inc. (OEHI).

EMISSION CONTROLS

NOx emissions from the combustion process will be reduced to 2.5 parts per million by volume dry (ppmvd), or less, at 15 percent oxygen, by utilizing dry low NOx combustion technology and a SCR system. The SCR system will use anhydrous ammonia for the reduction process.

WATER SUPPLY PIPELINE

West Kern Water District (WKWD) will supply water for the proposed project. The water will be conveyed via a 9.8 mile, 16-inch water supply pipeline extending from the existing WKWD facilities located east of the powerplant site and adjacent to State Highway 119.

WASTEWATER PIPELINE

Wastewater collected in the plant wastewater collection tank is disposed of by injection into new disposal wells. The new disposal wells will be located near existing disposal wells used to dispose of produced water from OEHI's operation. The wastewater discharge of the plant will be conveyed by a new 4.4 mile, 6-inch pipeline to the new wells, located south of the powerplant site.

PROJECT QUALITY PROCEDURES

The AFC describes a Project Quality Program that will be used on the project 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 powerplant. 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 will likely ensure that the project is designed, procured, fabricated and installed in accordance with LORS.

COMPLIANCE MONITORING

THE ENERGY COMMISSION'S DESIGN REVIEW AND CONSTRUCTION INSPECTION PROCESS

Under Section 104.2 of the CBC, the building official is authorized and directed to enforce all the provisions of the CBC. For all energy facilities certified by the Energy Commission, the Energy Commission is the building official and has the responsibility to enforce the code. In addition, the Energy Commission has the power to render interpretations of the CBC and to adopt and enforce rules and supplemental regulations to clarify the application of the CBC's provisions.

The Energy Commission's design review and construction inspection process is developed to conform to CBC requirements and ensure that all facility design conditions of certification are met. As provided by Section 104.2.2 of the CBC, the Energy Commission appoints experts to carry out the design review and construction inspections and act as delegate CBO on behalf of the Energy Commission. These delegate agents typically include the local building official and independent consultants hired to cover technical expertise not provided by the local official. The costs of the reviews and inspections are paid by the applicant through permit fees as provided by CBC Sections 107.2 and 107.3. While building permits in addition to the Energy Commission certification are not required for this project, in lieu permit fees are paid by the applicant consistent with CBC Section 107, to cover the costs of reviews and inspections.

Engineering and compliance staff have completed the following to ensure the design review and construction inspection process is consistent with the applicant's timing of the project:

1. Staff has met with the local building department to discuss the Energy Commission compliance process and the potential involvement of the local building official as delegate agent.
2. Staff has signed a Memorandum of Understanding (MOU) with Kern County outlining the roles and responsibilities of the County and its subcontractors as delegate agents appointed by the Energy Commission to ensure compliance with the CBC and facility design conditions of certification.
3. Staff has met with the County and its subcontractor to discuss the details of the design review and construction inspection process, fees, types of submittals required of the process and timing of the review.

Staff has developed conditions of certification (see the section below, titled "Proposed Conditions of Certification") to ensure compliance with LORS and protection of the environment and public health and safety. Some of these facility design conditions address the roles, responsibilities and qualifications of Elk Hills' 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 each submittal of design plans, calculations, and specifications submitted to the CBO. These conditions require that no element of construction proceed without 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 with construction activities, these conditions are written to require that no element of construction of permanent facilities, which is difficult to reverse, may proceed without approval of plans from the CBO. For those elements of construction that are not difficult to reverse and are allowed to proceed without approval of the plans, Elk Hills shall have the responsibility to fully modify those elements of construction to comply with all design changes that result from the CBO's plan review and approval process.

FACILITY CLOSURE

A facility closure was evaluated under three scenarios; Planned Closure, Unexpected Temporary Closure and Unexpected Permanent Closure.

PLANNED 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. Future conditions that may affect the decommissioning decision are largely unknown at this time.

In order to assure that decommissioning of the facility will be completed in a manner that is environmentally sound, safe, and will protect public health and safety, the applicant shall submit a decommissioning plan to the Energy Commission and Kern County for review and approval prior to the commencement of decommissioning. The plan shall include a discussion of the following items:

1. Proposed decommissioning activities for the project and all appurtenant facilities constructed as part of the project;
2. All applicable LORS, local/regional plans, and a discussion of the conformance of the proposed decommissioning activities to the applicable LORS and local/regional plans;
3. The activities necessary to restore the site if the plan requires removal of all equipment and appurtenant facilities; and
4. Decommissioning alternatives, other than complete site restoration.

UNEXPECTED TEMPORARY CLOSURE

Under this scenario, it is expected that the facility is closed unexpectedly, on a short-term basis. Natural disasters, such as an earthquake or severe storm, can

cause an unexpected temporary closure of the facility. If damage to the facilities is too great, the temporary closure may become permanent.

If the facility is closed on a temporary basis, the applicant shall secure the site in order to protect public health and safety. If temporary closure becomes permanent, the applicant shall follow the “Planned Closure” procedures outlined in the Planned Closure.

UNEXPECTED PERMANENT CLOSURE

Under this scenario, the project owner closes the facility unexpectedly on a permanent basis. In this case, the project owner shall implement the closure procedures outlined above for “Planned Closure”.

The above requirements should serve as adequate protection, even in the unlikely event of project abandonment. To ensure that these measures are included in the Facility Closure Plan, staff has proposed a Condition of Certification (GEN-9) to ensure that these measures are included in the Facility Closure Plan.

CONCLUSIONS AND RECOMMENDATIONS

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 AFC, and the project LORS and design criteria in the record. Staff concludes that the design, construction and eventual closure of the project are likely to comply with applicable LORS. If properly implemented, design criteria, including staff proposed modifications, will ensure that LORS are met during the project design and construction phases.

The conditions of certification proposed will ensure that the proposed facilities are designed, constructed, operated, and eventually closed in accordance with applicable LORS. This will occur through the use of design review, plan checking and field inspections, which are to be performed by the local CBO or other commission delegate agent. Staff will audit the CBO or delegate agent to ensure satisfactory performance.

The Energy Commission design review and construction inspection process will be in place for the project and will allow construction to start as scheduled if the project is certified. The process will provide the necessary reviews to ensure compliance with applicable facility design LORS and conditions of certification.

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 required by GEN-9, prior to the commencement of decommissioning, that the decommissioning procedure is likely to result in satisfactory decommissioning performance.

RECOMMENDATIONS

If the Energy Commission certifies the project, staff recommends that:

1. The Conditions of Certification proposed herein be adopted to ensure that the project is designed and constructed to comply with applicable LORS, and also to protect environmental quality, and assure public health and safety;
2. The project be designed and built to the 1998 CBC (or successor standard, if such is in effect); and
3. The CBO review the final designs, conduct plan checking and perform field inspections during construction, and staff audit and monitor the CBO to ensure satisfactory performance.

CONDITIONS OF CERTIFICATION

GEN-1 The project owner shall design, construct and inspect the project in accordance with the 1998 California Building Code (CBC)[2] and all other applicable LORS in effect at the time initial design plans are submitted to the CBO for review and approval. The CBC in effect is that edition that has been adopted by the California Building Standards Commission and published at least 180 days previously.

In the event that the EHPP is submitted to the CBO when a successor to the 1998 CBC is in effect, the 1998 CBC provisions identified herein 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.

Verification: Within 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) after receipt of the Certificate of Occupancy, the project owner shall submit to the California Energy Commission 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 for facility design. The project owner shall provide the CPM a copy of the Certificate of Occupancy within 30 days of receipt from the CBO [1998 CBC, Section 109 – Certificate of Occupancy.]

GEN-2 The project owner shall furnish to the CPM and to the CBO a schedule of facility design submittals, a Master Drawing List, and a Master Specifications List. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and

[2] The Sections, Chapters, Appendices and Tables, unless otherwise stated, refer to the Sections, Chapters, Appendices and Tables of the 1998 California Building Code (CBC).

equipment (see a list of major structures and equipment in **Table 1: Major Equipment List** and **Table 2: Major Structures, Equipment and Associated Foundations** below). 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 rough grading, the project owner shall submit the schedule, a Master Drawing List, and a Master Specifications List to the CBO and to the CPM. The project owner shall provide schedule updates in the Monthly Compliance Report.

Table 1: Major Equipment List

Quantity	Description	Size/Capacity*	Remarks
2	Combustion Turbine (CT).	153 MW	Dry low No_X combustion control and starter package.
1	Steam turbine	171 MW	Condensing reheat type.
3	Generator.	193 MVA	TEWAC or hydrogen cooling system.
2	CT inlet air filter.	640,000 CFM	
2	Inlet air-cooling.		Evaporative type.
2	Heat Recovery Steam Generator (HRSG).	420,000 lb./hr.	HP and LP
1	Fuel gas filter separator.	3,000 MMBTU/hr.	685 psig minimum inlet.
2	HRSG stack.	18' dia.x120' high	
2	CO catalyst.		Sized to achieve LACT/LAER.
2	Selective catalytic reduction (SCR).		Sized to achieve LACT/LAER.
1	Ammonia injection skid.		
1	Anhydrous ammonia storage tank.	12,000 gal.	
3	HP/IP HRSG feedwater pump.	100%	610 gpm each.
1	Service/Fire water storage.	1.0 million gal.	
2	Demineralized water pumps.	500 gpm	HP with interstage bleed.
1	Demineralized water treatment package.	500 gpm	
1	Demineralized water storage tank.	69,000 gal.	
1	Steam surface condenser.	1,040 mm Btu/h	
3	Condensate pump.	1,200 gpm	
3	Circulating water pump.	55,000 gpm	
1	Wet cooling tower.	1,040 mm Btu/h	
1	Firewater pump skid.	2-500 gpm pumps	
1	Oily water separator.		
3	Step-up transformer.	18.3 – 230 kV	To electrical grid.

Table 2: Major Structures, Equipment and Associated Foundations

Quantity	Description	Dimensions (ft)*		
		Length	Width	Height
2	Combustion gas turbine generator and starter package (CT).	75	45	45
2	CT air inlet filter with air cooling.	35	35	35
3	Generator with enclosure.	40	20	25
2	Heat recovery steam generator (HRSG).	78	50	97
2	HRSG stack.		18 dia.	120
2	Generator breaker.	15	20	25
1	Steam turbine and condenser.	45	50	30
1	Wet cooling tower.	330	51	35
2	Auxiliary transformer.	25	25	25
3	Step-up transformer.	45	30	25
1	Demineralized water storage tank.	--	20 dia.	30
1	Fire/Service water storage tank.	--	60 dia.	45
1	Anhydrous ammonia storage tank.	20	12 dia.	12,000 gal.
1	Control building.	80	50	15
1	Administration.	80	50	15
1	Water treatment building.	80	50	20
1	Warehouse.	100	60	20
1	Guard house	15	10	10

***All capacities and dimensions are approximate and may change during project final design.**

GEN-3 The project owner shall make payments to the CBO for design review, plan check and construction inspection, equivalent to the fees listed in the 1998 CBC, Chapter 1, Section 107 and Table 1-A, Building Permit Fees; Appendix Chapter 33, Section 3310 and Table A-33-A, Grading Plan Review Fees; and Table A-33-B, Grading Permit Fees. If Kern County has adjusted the CBC fees for design review, plan check and construction inspection, the project owner shall pay the adjusted fees.

Verification: The project owner shall make the required payments to the CBO at the time of submittal of the plans, design calculations, specifications, or soil reports. 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 the applicable fee has 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 a resident engineer (RE), to be in general responsible charge of the project [Building Standards Administrative Code (Cal. Code Regs., tit. 24, § 4-209, Designation of Responsibilities).]

The RE may delegate responsibility for portions of the project to other registered engineers. Registered mechanical and electrical engineers may be delegated responsibility for mechanical and electrical portions of the project respectively. A project may be divided into parts, provided each part is clearly defined as a distinct unit. Separate assignment of general responsible charge may be made for each designated part.

Protocol: The RE shall:

1. Monitor construction progress to ensure compliance with LORS;

2. Ensure that construction of all the facilities conforms in every material respect to the applicable LORS, these Conditions of Certification, approved plans, and specifications;

3. Prepare documents to initiate changes in the approved drawings and specifications when directed by the project owner or as required by conditions on the project;

4. Be responsible for providing the project inspectors and testing agency(ies) with complete and up-to-date set(s) 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 as not conforming to the approved plans and specifications.

The RE shall have the authority to halt construction and to require changes or remedial work, if the work does not conform to applicable requirements.

If the RE or the delegated engineers are reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

Verification: At least 30 days (or 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 name, qualifications and registration number of the RE and any other delegated engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the RE and other delegated engineer(s) within five days of the approval.

If the RE or the delegated engineer(s) are 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.

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) 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; D) a mechanical engineer; and E) an electrical engineer. [California Business and Professions Code section 6704 et seq., and sections 6730 and 6736. Requires 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 project owner shall submit to the CBO for review and approval, the names, qualifications and registration numbers of all engineers assigned to the project. [1998 CBC, Section 104.2, Powers and Duties of Building Official.]

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.

Protocol: A: The civil engineer shall:

1. Design, or be responsible for design, stamp, and sign all plans, calculations, and specifications for proposed site work, civil works, and related facilities. At a minimum, these include: grading, site preparation, excavation, compaction, construction of secondary containment, foundations, erosion and sedimentation control structures, drainage facilities, underground utilities, culverts, site access roads, and sanitary sewer systems; and

2. Provide consultation to the RE during the construction phase of the project, and recommend changes in the design of the civil works facilities and changes in the construction procedures.

Protocol: B: The geotechnical engineer or civil engineer, experienced and knowledgeable in the practice of soils engineering, shall:

1. Review all the engineering geology reports, and prepare final soils grading report;

2. Prepare the soils engineering reports required by the 1998 CBC, Appendix Chapter 33, Section 3309.5 – Soils Engineering Report, and Section 3309.6 – Engineering Geology Report;

3. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with the requirements set forth in the 1998 CBC, Appendix Chapter 33, section 3317, Grading Inspections;

4. Recommend field changes to the civil engineer and RE;

5. Review the geotechnical report, field exploration report, laboratory tests, and engineering analyses detailing the nature and extent of the site soils that may be susceptible to liquefaction, rapid settlement or collapse when saturated under load; and

6. Prepare reports on foundation investigation to comply with the 1998 CBC, Chapter 18 section 1804, Foundation Investigations.

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. [1998 CBC, section 104.2.4, Stop orders.]

Protocol: C: The design engineer shall:

1. Be directly responsible for the design of the proposed structures and equipment supports;

2. Provide consultation to the RE during design and construction of the project;

3. Monitor construction progress to ensure compliance with LORS;

4. Evaluate and recommend necessary changes in design; and

5. Prepare and sign all major building plans, specifications and calculations.

Protocol: D: 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 with all of the mechanical engineering design requirements set forth in the Energy Commission's Decision.

Protocol: E: 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 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.

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 1998 CBC, Chapter 17, Section 1701, Special Inspections, Section, 1701.5 Type of Work (requiring special inspection), and Section 106.3.5, Inspection and observation program.

Protocol: 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 RE. All discrepancies shall be brought to the immediate attention of the RE for correction, then, if uncorrected, to the CBO and the CPM; and

4. Submit a final signed report to the RE, CBO, and CPM, stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans and specifications and the applicable provisions of the applicable edition of the CBC.

A certified weld inspector, certified by the American Welding Society (AWS), and/or American Society of Mechanical Engineers (ASME), as applicable shall inspect welding performed on-site requiring special inspection (including structural, piping, tanks and pressure vessels).

Verification: At least 15 days 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 The project owner shall keep the CBO informed regarding the status of engineering and construction. If any discrepancy in design and/or construction is discovered, the project owner shall document the discrepancy and recommend the corrective action required. The discrepancy documentation shall become a controlled document and shall be submitted to the CBO for review and approval. The discrepancy documentation shall reference this condition of certification and, if appropriate, the applicable sections of the CBC and/or other LORS.

Verification: The project owner shall submit monthly construction progress reports to the CBO and CPM. The project owner shall transmit a copy of the CBO's approval or disapproval of any corrective action taken to resolve a discrepancy to the CPM within 15 days. If disapproved, the project owner shall advise the CPM,

within five days, the reason for disapproval, and the revised corrective action to obtain CBO's approval.

GEN-8 The project owner shall obtain the CBO's final approval of all completed work. The project owner shall request the CBO to inspect the completed structure and review the submitted documents. When the work and the "as-built" and "as graded" plans conform to the approved final plans, the project owner shall notify the CPM regarding the CBO's final approval. The marked up "as-built" drawings for the construction of structural and architectural work shall be submitted to the CBO. Changes approved by the CBO shall be identified on the "as-built" drawings [1998 CBC, Section 108, Inspections.]

Verification: Within 15 days of the completion of any work, the project owner shall submit to the CBO, with a copy to the CPM, (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.

GEN-9 The project owner shall file a closure/decommissioning plan with Kern County and the CPM for review and approval at least 12 months (or other mutually agreed to time) prior to commencing the closure activities. If the project is abandoned before construction is completed, the project owner shall return the site to its original condition.

Protocol: The closure plan shall include a discussion of the following:

1. The proposed closure/decommissioning activities for the project and all appurtenant facilities constructed as part of the project;

2. All applicable LORS, all local/regional plans, and a discussion of the conformance of the proposed decommissioning activities to the applicable LORS and local/regional plans;

3. Activities necessary to restore the site if the EHPP decommissioning plan requires removal of all equipment and appurtenant facilities; and
4. Closure/decommissioning alternatives, other than complete restoration of the site.

Verification: At least 12 months prior to closure or decommissioning activities, the project owner shall file a copy of the closure/decommissioning plan with Kern County and the CPM for review and approval. Prior to the submittal of the closure plan, a meeting shall be held between the project owner and the CPM for discussing the specific contents of the plan.

CIVIL-1 Prior to the start of site grading, 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 report as required by the 1998 CBC, Appendix Chapter 33, Section 3309.5, Soils Engineering Report and Section 3309.6, Engineering Geology Report.

Verification: At least 15 days prior to the start of site grading, the project owner shall submit the documents described above to the CBO for 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 geotechnical engineer or 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. [1998 CBC, Section 104.2.4, Stop orders.]

Verification: The project owner shall notify the CPM, within five days, when earthwork and construction is stopped as a result of unforeseen adverse geologic/soil conditions. Within five days of the CBO's approval, the project owner shall provide to the CPM a copy of the CBO's approval to resume earthwork and construction in the affected areas.

CIVIL-3 The project owner shall perform inspections in accordance with the 1998 CBC, Chapter 1, Section 108, Inspections, Chapter 17, Section 1701.6, Continuous and Periodic Special Inspection and Appendix Chapter 33, Section 3317, Grading Inspection. All plant site-grading operations shall be subject to inspection by the CBO and the CPM.

If, in the course of inspection, it is discovered that the work is not being done in accordance with the approved plans, the discrepancies shall be reported immediately to the resident engineer, the CBO, and the CPM. The project owner shall prepare a written report detailing all discrepancies and non-compliance items, and the proposed corrective action, and send copies to the CBO and the CPM.

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. 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 facilities, the project owner shall obtain the CBO's approval of the final "as-graded" grading plans, and final "as-built" plans for the erosion and sedimentation control facilities [1998 CBC, Section 109, Certificate of Occupancy.]

Verification: Within 30 days of the completion of the erosion and sediment control mitigation and drainage facilities, the project owner shall submit to the CBO the responsible civil engineer's signed statement that the installation of the facilities and all erosion control measures were completed in accordance with the final approved combined grading plans, and that the facilities are adequate for their intended purposes. The project owner shall submit a copy of this report to the CPM in the next Monthly Compliance Report.

STRUC-1 Prior to the start of any increment of construction, the project owner shall submit to the CBO for 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:

1. Major project structures;
2. Major foundations, equipment supports and anchorage;
3. Large field fabricated tanks;
4. Turbine/generator pedestal; and
5. Switchyard structures.

In addition, the project owner shall, prior to the start of any increment of construction, get approval from the CBO of the lateral force procedures proposed for project structures to comply with the lateral force provisions of the CBC.

Protocol: 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 (i.e., 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 [1998 CBC, Section 108.4, 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 at least 90 days (or a lesser number of days mutually agreed to by the project owner and the CBO), prior to the start of on-site fabrication and installation of each structure, equipment support, or foundation [1998 CBC, Section 106.4.2, Retention of plans and Section 106.3.2, Submittal documents.]; and

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 [1998 CBC, Section 106.3.4, Architect or Engineer of Record.]

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 any increment of construction, the project owner shall submit to the CBO, with a copy to the CPM, the responsible design engineer's signed statement that the final design plans, specifications and calculations conform with all of the requirements set forth in the Energy Commission's Decision.

If the CBO discovers non-conformance with the stated requirements, the project owner shall resubmit the corrected plans to the CBO within 20 days of receipt of the nonconforming submittal with a copy of the transmittal letter to the CPM.

The project owner shall submit to the CPM a copy of a statement from the CBO that the proposed structural plans, specifications, and calculations have been approved and are in conformance with the requirements set forth in the applicable LORS.

STRUC-2 The project owner shall submit to the CBO the required number of sets of the following:

1. Concrete cylinder strength test reports (including date of testing, date sample taken, design concrete strength, tested cylinder strength, age of test, type and size of sample, location and quantity of concrete placement from which sample was taken, and mix design designation and parameters);

2. Concrete pour sign-off sheets;

3. Bolt torque inspection reports (including location of test, date, bolt size, and recorded torques);

4. Field weld inspection reports (including type of weld, location of weld, inspection of non-destructive testing (NDT) procedure and results, welder qualifications, certifications, qualified procedure description or number (ref: AWS); and

5. Reports covering other structure activities requiring special inspections shall be in accordance with the 1998 CBC, Chapter 17, Section 1701,

Special Inspections, Section 1701.5, Type of Work (requiring special inspection), Section 1702, Structural Observation and Section 1703, Nondestructive Testing.

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 to the CBO, with a copy of the transmittal letter to the CPM. The NCR shall reference the condition(s) of certification and the applicable CBC chapter and section. Within five days of resolution of the NCR, the project owner shall submit a copy of the corrective action to the CBO and the CPM.

The project owner shall transmit a copy of the CBO's approval or disapproval of the corrective action to the CPM within 15 days. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action to obtain CBO's approval.

STRUC-3 The project owner shall submit to the CBO design changes to the final plans required by the 1998 CBC, Chapter 1, Section 106.3.2, Submittal documents, and Section 106.3.3, Information on plans and specifications, including the revised drawings, specifications, calculations, and a complete description of, and supporting rationale for, the proposed changes, and shall give the CBO prior notice of the intended filing.

Verification: On a schedule suitable to the CBO, the project owner shall notify the CBO of the intended filing of design changes, and shall submit the required number of sets of revised drawings and the required number of copies of the other above-mentioned documents to the CBO, with a copy of the transmittal letter to the CPM. The project owner shall notify the CPM, via the Monthly Compliance Report, when the CBO has approved the revised plans.

STRUC-4 Tanks and vessels containing quantities of toxic or hazardous materials exceeding amounts specified in Chapter 3, Table 3-E of the 1998 CBC shall, at a minimum, be designed to comply with Occupancy Category 2 of the 1998 CBC. Chapter 16, Table 16–K of the 1998 CBC requires use of the following seismic design criteria: I = 1.25, Ip = 1.5 and Iw = 1.15.

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 installation of the tanks or vessels containing the above specified quantities of highly toxic or explosive substances that would be hazardous to the safety of the general public if released, the project owner shall submit to the CBO for 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 Prior to the start of any increment of piping construction, the project owner shall submit, for CBO review and approval, the proposed final design drawings, specifications and calculations for each plant piping system (exclude domestic water, refrigeration systems, and small bore piping, i.e., piping and tubing with a diameter less than two and one-half inches). The submittal shall also include the applicable QA/QC procedures. The project owner shall design and install all piping, other than domestic water, refrigeration, and small bore piping to the applicable edition of the CBC. Upon completion of construction of any piping system, the project owner shall request the CBO's inspection approval of said construction [1998 CBC, Section 106.3.2, Submittal documents, Section 108.3, Inspection Requests.]

Protocol: The responsible mechanical engineer shall submit a signed and stamped statement to the CBO when:

1. The proposed final design plans, specifications and calculations conform with all of the piping requirements set forth in the Energy Commission's Decision; and

2. All of the other piping systems, except domestic water, refrigeration systems and small bore piping have been designed, fabricated and installed in accordance with all applicable ordinances, regulations, laws and industry standards, including, as applicable:

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); and

Specific City/County code.

The CBO may require the project owner to employ special inspectors to report directly to the CBO to monitor shop fabrication or equipment installation [1998 CBC, Section 104.2.2, Deputies.]

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 any increment of piping construction, the project owner shall submit to the CBO for approval, with a copy of the transmittal letter to the CPM, the above listed documents for that increment of construction of piping systems, including a copy of the signed and stamped engineer's certification of conformance with the Energy Commission's Decision. The project owner shall transmit a copy of the CBO's inspection approvals to the CPM in the Monthly Compliance Report following completion of any inspection.

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 the 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 said installation [1998 CBC, Section 108.3 – Inspection Requests.]

Protocol: 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 a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of on-site fabrication or installation of any pressure vessel, the project owner shall submit to the CBO for review and approval, final design plans, specifications and calculations, 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 send copies of the CBO plan check approvals to the CPM in the following Monthly Compliance Report. The project owner shall also transmit a copy of the CBO's and/or Cal-OSHA inspection approvals to the CPM in the Monthly Compliance Report following completion of any inspection.

MECH-3 Prior to the start of construction of any heating, ventilating, air conditioning (HVAC) or refrigeration system, the project owner shall submit to the CBO for review and approval the design plans, specifications, calculations and quality control procedures for that 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 applicable edition of the CBC. Upon completion of any increment of construction, the project owner shall request the CBO's inspection and approval of said 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

[1998 CBC, Section 108.7, Other Inspections; Section 106.3.4, Architect or Engineer of Record.]

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 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 applicable edition of the CBC, with a copy of the transmittal letter to the CPM.

The project owner shall send copies of CBO comments and approvals to the CPM in the next Monthly Compliance Report. The project owner shall transmit a copy of the CBO's inspection approvals to the CPM in the Monthly Compliance Report following completion of any inspection.

MECH-4 Prior to the start of each increment of plumbing construction, the project owner shall submit for CBO's approval the final design plans, specifications, calculations, and QA/QC procedures for all plumbing systems, potable water systems, drainage systems (including sanitary drain and waste), toilet rooms, building energy conservation systems, and temperature control and ventilation systems, including water and sewer connection permits issued by the local agency. Upon completion of any increment of construction, the project owner shall request the CBO's inspection approval of said construction [1998 CBC, Section 108.3, Inspection Requests, Section 108.4, Approval Required.]

Protocol: The project owner shall design, fabricate and install:

1. Plumbing, potable water, all drainage systems, and toilet rooms in accordance with Title 24, California Code of Regulations, Division 5, Part 5 and the California Plumbing Code (or other relevant section(s) of the currently adopted California Plumbing Code and Title 24, California Code of Regulations); and

2. Building energy conservation systems and temperature control and ventilation systems in accordance with Title 24, California Code of Regulations, Division 5, Chapter 2-53, Part 2.

The final plans, specifications and calculations shall clearly reflect the inclusion of approved criteria, assumptions and methods used to develop the design. In addition, the responsible mechanical engineer shall stamp and sign all plans, drawings and calculations and submit a signed statement to the CBO that the proposed final design plans, specifications and calculations conform with all of the requirements set forth in the Energy Commission’s Decision.

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 construction of any of the above systems, the project owner shall submit to the CBO the final design plans, specifications and calculations, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with the applicable edition of the CBC, and send the CPM a copy of the transmittal letter in the next Monthly Compliance Report.

The project owner shall transmit a copy of the CBO's inspection approvals to the CPM in the next Monthly Compliance Report following completion of that increment of construction.

ELEC-1 For the 480 volts and higher systems, the project owner shall not begin any increment of electrical 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 [1998 CBC, Section 108.4, Approval Required, and Section 108.3, Inspection Requests.]

Protocol: The following activities shall be reported in the Monthly Compliance Report:

1. receipt or delay of major electrical equipment;
2. testing or energization of major electrical equipment; and
3. 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 electrical construction, the project owner shall submit to the CBO for review and approval the final design plans, specifications and calculations for electrical equipment and systems 480 volts and greater, including a copy of the signed and stamped statement from the responsible electrical engineer attesting compliance with the applicable LORS, and send the CPM a copy of the transmittal letter in the next Monthly Compliance Report.

ELEC-2 The project owner shall submit to the CBO the required number of copies of items A and B for review and approval and one copy of item C [CBC 1998, Section 106.3.2, Submittal documents.]

A. Final plant design plans to include:
   1. one-line diagrams for the 13.8 kV, 4.16 kV and 480 V systems;
   2. system grounding drawings;
   3. general arrangement or conduit drawings; and
   4. other plans as required by the CBO.

B. Final plant calculations to 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;
7. lighting energy calculations; and
8. other reasonable calculations as customarily required by the CBO.

C. 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 a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of each increment of electrical equipment installation, the project owner shall submit to the CBO for review and approval the final design plans, specifications and calculations, for electrical equipment and systems 480 volts and greater enumerated above, including a copy of the signed and stamped statement from the responsible electrical engineer certifying compliance with the applicable LORS. The project owner shall send the CPM a copy of the transmittal letter in the next Monthly Compliance Report.

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POWER PLANT RELIABILITY

Steve Baker

INTRODUCTION

In this analysis, 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 the resulting project would likely not degrade the overall reliability of the electric system it serves.

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 Elk Hills Power, LLC (Elk Hills) has predicted a level of reliability for the power plant (see below), staff believes Elk Hills should not be held responsible for achieving this goal, so long as the plant's reliability matches or exceeds that of similar plants.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Presently, there are no laws, ordinances, regulations or standards (LORS) that establish either power plant reliability criteria or procedures for attaining reliable operation. However, the 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 (Cal. Code Regs., tit. 20, § 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.

SETTING

In the regulated monopoly electric industry of past decades, the utility companies assured overall system reliability, in part, by maintaining a "reserve margin." This amounted to having on call, at all times, sufficient generating capacity, in the form of standby power plants, to quickly handle unexpected outages of generating or transmission facilities. The utilities generally maintained a seven- to ten-percent reserve margin, meaning that sufficient capacity was on call to quickly replace from seven to ten percent of total system resources. This margin proved adequate, in part because of the reliability of the power plants that constituted the system.

Now, in the newly restructured competitive electric power industry, the responsibility for maintaining system reliability falls largely to the California Independent System Operator (Cal-ISO), a newly-formed entity that will work with the California Power Exchange to purchase, dispatch and sell electric power throughout the state. How Cal-ISO will ensure system reliability is only now being determined; protocols are being developed and put in place that will, it is anticipated, allow sufficient reliability to be maintained under the competitive market system. "Must-run" power purchase agreements and "participating generator" agreements are two mechanisms currently being considered to ensure an adequate supply of reliable power (Mavis 1998, pers. comm.).

The Cal-ISO also requires those power plants selling ancillary services, as well as those holding reliability must-run contracts, to fulfill certain requirements, including:

- filing periodic reports on plant reliability;
- reporting all outages and their causes; and
- scheduling all planned maintenance outages with the Cal-ISO (Detmers 1999, pers. comm.).

The Cal-ISO's mechanisms to ensure adequate power plant reliability apparently are being 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 will 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 exhibit individual reliability sufficiently lower than this historical level, the assumptions used by Cal-ISO to ensure system reliability will prove invalid, with potentially disappointing results. Until the restructured competitive electric power system has undergone a shakeout period, and the effects of varying power plant reliability are understood and compensated for, staff deems it wise to encourage power plant owners to continue to build and operate their projects to the level of reliability to which all in the industry have become accustomed.

Elk Hills proposes to operate the Elk Hills Power Project (EHPP) as a 500 MW baseload and load following unit operating at output levels from 30 to 100 percent of baseload at an overall annual availability factor between 92 and 96 percent (EHPP 1999a, AFC §§ 1.7, 3.4.2, 3.9, 4.3.1). Elk Hills further plans to sell reliability-related power services, including regulation, operating (spinning) reserves, reactive power, and perhaps black start capability (EHPP 1999a, AFC § 3.9).

ANALYSIS

A reliable power plant is one that is available when called upon to operate. Achieving this reliability is accomplished by ensuring adequate levels of equipment availability, plant maintainability, fuel and water availability, and resistance to natural

hazards. Staff examines these factors for the EHPP and compares them to industry norms. If they compare favorably, staff can conclude that the EHPP will not degrade utility system reliability.

Throughout its intended life, the project will be expected to perform reliably in baseload and load following duty. Power plant systems must be able to operate for extended periods (sometimes months on end) without shutting down for maintenance or repairs. This requirement for equipment availability is typically addressed by control of quality in machinery design, construction, and installation. Plant reliability is further assured by providing for plant maintainability and sufficient redundancy of critical equipment, fuel and water availability, and resistance to natural hazards.

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).

QA/QC PROGRAM

The QA/QC program delineated by Elk Hills (EHPP 1999a, AFC § 4.3.5) describes a program typical of the power industry. Equipment and supplies will be purchased from qualified suppliers, suppliers' QA/QC programs will be audited, and construction and installation will be inspected, all in accordance with the QA plan. 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 baseload and load following 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.

Elk Hills plans to provide some redundancy of function (EHPP 1999a, AFC §§ 3.4.4.3, 3.4.4.4, 3.4.6.2, 3.4.11.3, 4.3.2, Table 4.3-1). For example:

- The following plant components are provided in a set of three 100 percent capacity units:
  - boiler feed pumps.
- The following plant components are provided in sets of two 100 percent capacity units:
  - condensate pumps;

  - air compressors;
  - water treatment system pumps; and
  - service water pumps and heat exchangers.

- The following plant components are provided in a set of three 50 percent capacity units:
  - plant water supply pumps;
  - circulating water pumps; and
  - reverse osmosis trains.

- The computerized control and protective system for the gas turbine generators and HRSGs, known as the Distributed Control and Information System (DCIS), will exhibit typical redundancy.

While some power plants may exhibit slightly greater levels of equipment redundancy, the fact that the project consists of two parallel trains of gas turbine generators/HRSGs provides inherent reliability. Failure of a non-redundant component of one train should not cause the other train to fail, thus allowing the plant to continue to generate (at reduced output). With this opportunity for continued operation in the face of equipment failure, staff believes that the equipment redundancy described here represents an adequate design approach for a project such as this.

MAINTENANCE PROGRAM

Elk Hills proposes to establish a plant maintenance program typical of the industry (EHPP 1999a, AFC § 4.3.1). This program will begin with review of designs and procurement specs for maintainability, and will include monitoring of equipment performance and condition, record keeping, and appropriate maintenance work. In conjunction with an overall plant quality control program (EHPP 1999a, AFC § 4.3.5), staff expects that this will allow the project to 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

The EHPP will burn locally produced natural gas from the surrounding Elk Hills Oil & Gas Field, transmitted to the plant via a new 2,500 foot long, ten-inch diameter pipeline that originates at an existing 20-inch diameter pipeline. This existing line connects, in turn, to the 36-inch diameter Mojave interstate gas pipeline, which is part of an interstate network of gas supply pipelines.

The Elk Hills field holds gas reserves more than adequate to supply the project's needs for 30 years (the intended plant life); the field's resources are estimated at 1,200 billion cubic feet (BCF), compared to the 754 BCF the project will consume.

Should the Elk Hills field be depleted before the EHPP's economic lifetime has passed, gas can be drawn from the Mojave pipeline system. This offers access to far more gas than the plant would require (EHPP 1999a, AFC §§ 1.6.5, 3.4.5, 4.3.3). Staff agrees with Elk Hills' prediction that there will be adequate natural gas supply and pipeline capacity to meet the project's needs.

WATER SUPPLY RELIABILITY

Water for the EHPP will be supplied by the West Kern Water District under long-term contract (EHPP 1999a, AFC §§ 1.6.6, 3.1, 3.4.6, 3.7.2, 4.3.4). Water will be pumped through a new 9.8-mile long, 16-inch diameter pipeline by three 50 percent capacity pumps and stored in a one million gallon raw water storage tank. Staff regards this arrangement as an adequately reliable supply. (Please refer to that portion of this document entitled **Soil and Water Resources**.)

POWER PLANT RELIABILITY IN RELATION TO NATURAL HAZARDS

Natural forces can threaten the reliable operation of a power plant. High winds, flooding,[1] tsunamis (tidal waves) and seiches (waves in inland bodies of water) will not likely represent a hazard for this project, but seismic shaking (earthquake) presents a credible threat to reliable operation (see that portion of this document entitled **Facility Design**).

SEISMIC SHAKING

The site lies within Seismic Zone 4. The project will be designed and constructed to the latest appropriate LORS. 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. (Please see that section of this document entitled **Facility Design**.) 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. 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.

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 Council (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 statistics for the years 1993 through 1997 (NERC 1998):

For Combined Cycle units (All MW sizes)

Availability Factor = 91.10 percent

[1] The project is located outside of a 100-year floodplain (EHPP 1999a, AFC §§ 1.8).

The GE gas turbines that will be employed in the project have been on the market for several years now, and can be expected to exhibit typically high availability. Elk Hills' prediction of an annual availability factor from 92 to 96 percent (EHPP 1999a, AFC §§ 1.7, 3.4.2, 3.9, 4.3.1) is not out of line with the NERC figure for similar plants throughout North America (see above). In fact, these new, large machines can well be expected to outperform the fleet of various gas turbines that make up the NERC statistics. Further, since the plant will 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 (EHPP 1999a, AFC §§ 4.3.1, 4.3.5). This practice holds out the promise of adequately high plant availability. Elk Hills' 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.

FACILITY CLOSURE

Closure of the facility, whether planned or unplanned, cannot impact project reliability. Reliability impacts on the electric system from facility closure, should there be any, are dealt with in that portion of this document entitled **Transmission System Engineering**.

CONCLUSION

Elk Hills predicts an equivalent availability factor from 92 to 96 percent, which agrees well with the industry norm of 91 percent for this type of plant. Based on a review of the proposal, staff concludes that the plant will be built and operated in a manner consistent with industry norms for reliable operation. This should provide an adequate level of reliability. No impacts, individual or cumulative, are possible from the operation or closure of this project.

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POWER PLANT EFFICIENCY

Steve Baker

INTRODUCTION

The Energy Commission makes findings as to whether energy use by the Elk Hills Power Project (EHPP) will result in significant adverse impacts on the environment, as defined in the California Environmental Quality Act (CEQA). If the Energy Commission finds that the EHPP'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 impacts. 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:

- determine whether the facility will likely present any adverse impacts upon energy resources;
- determine whether these adverse impacts are significant; and if so,
- determine whether feasible mitigation measures exist that would eliminate the adverse impacts, or reduce them to a level of insignificance.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

FEDERAL

No federal laws apply to the efficiency of this project.

STATE

CALIFORNIA ENVIRONMENTAL QUALITY ACT GUIDELINES

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" (Cal. Code Regs., tit. 14, § 15126.4(a)(1)). Appendix F of the Guidelines further suggests consideration of such factors as the project's energy requirements and energy use efficiency; its effects on local and regional energy supplies and energy resources; its requirements for additional energy supply capacity; its compliance with existing energy standards; and any alternatives that could reduce wasteful, inefficient and unnecessary consumption of energy (Cal. Code regs., tit. 14, § 15000 et seq., Appendix F).

LOCAL

No local or county ordinances apply to power plant efficiency.

SETTING

Elk Hills Power, LLC (EHP) proposes to construct and operate a (nominal) 500 MW combined cycle power plant to generate baseload and load-following power and various ancillary services (EHP 1999a, AFC §§ 1.7, 2.1, 3.9). The EHPP will consist of two F-class combustion turbine generators with evaporative inlet air coolers and steam injection producing approximately 153 MW each, two heat recovery steam generators (HRSGs) with duct burners, and one 171 MW steam turbine generator, totaling 477 MW (EHP 1999a, AFC §§ 1.1, 3.4.2, 3.4.3.1, 3.4.3.2). With the duct burners supplying injection steam to the gas turbines, gas turbine output increases to 166 MW each, and total plant output rises to 503 MW (EHP 1999a, Figs. 3.4-4 and 3.4-5).

ANALYSIS

ADVERSE IMPACTS ON ENERGY RESOURCES

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. The EHPP will burn natural gas at a maximum rate exceeding 71 billion Btu per day (EHP 1999a, AFC Fig. 3.4-4). This is a substantial rate of energy consumption, and holds the potential to impact energy supplies.

Under expected project conditions, electricity will be generated at a peak load efficiency of approximately 53.6 percent LHV[1] (EHP 1999a, AFC Fig. 3.4-4); compare this to the average fuel efficiency of a typical utility company baseload power plant at approximately 35 percent LHV.

ADVERSE EFFECTS ON ENERGY SUPPLIES AND RESOURCES

EHP has described its sources of supply of natural gas for the EHPP (EHP 1999a, AFC § 1.1, 1.6.2, 1.6.5, 3.1, 3.4.5, 4.3.3). The project will burn locally-produced natural gas from the surrounding Elk Hills Oil and Gas Field. The existing gas supply infrastructure is connected to the Mojave gas pipeline; should the Elk Hills

[1] Lower heating value.

field eventually become exhausted, fuel for the project could be supplied from the Mojave pipeline. The EHPP would thus have access to supplies from the Southwest. These sources represent far more gas than would be required for a project this size. It is therefore highly unlikely that the EHPP could pose a substantial increase in demand for natural gas in California.

Additional Energy Supply Requirements

Natural gas fuel will be supplied to the project via a new 2,500-foot long, 10-inch diameter pipeline from an existing 20-inch diameter Elk Hills pipeline, an 800 psi[2] system connected to the Mojave pipeline (EHP 1999a, AFC §§ 1.6.5, 4.3.3). Even in the event that the Elk Hills gas field should become exhausted, the natural gas supply system in California is so large and well-established, there is no real likelihood that the EHPP will require development of new sources of energy.

Compliance with Energy Standards

No standards apply to the efficiency of the EHPP or other non-cogeneration projects.

Alternatives to Reduce Wasteful, Inefficient and Unnecessary Energy Consumption

The EHPP 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

The EHPP will be configured as a compound-train combined cycle power plant, in which electricity is generated by two gas turbines, and additionally by a steam turbine that operates on heat energy recuperated from the gas turbines' exhaust. 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 steam turbines operating alone. Such a configuration is well suited to the large, steady loads met by a baseload plant, intended to supply energy efficiently for long periods of time.

The number of turbines further contributes to efficiency at part load. Gas turbine generators operate most efficiently at one particular output level, typically at full load. Whenever desired output is less than full load, the unit must be throttled back. Rather than being forced to throttle back one large turbine, with the consequent reduction in efficiency, the power plant operator will have the option of shutting off one gas turbine. This allows the plant to generate at less than full load while maintaining optimum efficiency, suitable for a plant meant for flexible generation,

[2] Pounds per square inch.

such as load-following duty. Loads down to 50 percent of full load allow one gas turbine, operating at full load, and the steam turbine to maintain peak efficiency.

Additionally, for further operational flexibility, the HRSGs will be equipped with duct burners, to supply additional steam to be injected into the gas turbines for power augmentation (EHP 1999a, § 1.7, 3.4.2, 3.9). This increases maximum power output, and extends the range of power outputs at which the plant can operate at optimum or near optimum efficiency.

Equipment Selection

Modern gas turbines embody the most fuel-efficient electric generating technology available today. The "F-class" gas turbines to be employed in the EHPP represent some of the most modern and efficient such machines now available. EHP will employ a combined cycle power train from a prominent manufacturer, the General Electric PG7241FA (known as the "Frame 7FA"), nominally rated in a two-on-one train combined cycle at 530 MW and 56.5 percent efficiency LHV at ISO[3] conditions (EHP 1999a, AFC § 3.4.3.1; EHP 1999e, data response 2; GTW 1998).[4]

A possible alternative is the Siemens-Westinghouse 501F, another F-class gas turbine nominally rated at 546 MW and 55.8 percent efficiency at ISO conditions in two-on-one train combined cycle configuration (GTW 1998). This machine was considered along with the GE machine in the original AFC; EHPP has subsequently closed a deal with General Electric for the GE machines (EHP 1999e, data response 2).

Another possible alternative is the ASEA Brown-Boveri KA-24, still another "F-class" machine. While the KA-24 promises slightly higher fuel efficiency (57.9 percent) (GTW 1998) than the other F-class machines, any differences among the three in actual operating efficiency will be insignificant. Selecting among these machines is thus based on other factors, such as generating capacity, cost, ability to meet air pollution limitations, and commercial availability. The ABB machine, for instance, is available only in one-on-one power trains, with one gas turbine and one steam turbine paired on a single shaft generating a nominal 271 MW (Orsini 1999, pers. comm.). The GE and Siemens-Westinghouse machines, which can be configured more flexibly, offer some advantage here.

Efficiency of Alternatives to the Project

The project objectives include generation of baseload or load following electricity, as market conditions dictate, and the flexibility to tailor output to provide such ancillary services as peaking, operating reserves, reactive power, and possibly black start capability (EHP 1999a, AFC §§ 1.7, 2.1, 3.4.2, 3.9).

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[3] International Standards Organization (ISO) standard conditions are 15°C (59°F), 60 percent relative humidity, and one atmosphere of pressure (equivalent to sea level).

[4] Nominal, or expected, plant output of approximately 500 MW is significantly less than these figures, due chiefly to the location of the project site. Site altitude (1,330 feet above mean sea level) (EHP 1999a, AFC § 3.3) and average temperature conspire to reduce maximum power output and generation efficiency.

Alternative Generating Technologies

EHP addresses alternative generating technologies in its application (EHP 1999a, AFC § 3.11.4.2). Oil-burning, coal-burning, solar, wind, hydroelectric, biomass and geothermal technologies are all considered. Given the project objectives, location and air pollution control requirements, staff agrees with EHP 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-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.

Capital cost is also important in selecting generating machinery. Recent progress in the development of large, stationary gas turbines, aided by the incorporation into these machines of technological advances made in the development of aircraft jet engines, has created a situation in which several large manufacturers compete vigorously to sell their machines. This, combined with the cost advantages of assembly-line manufacturing, has driven down the prices of these machines. Thus, the power plant developer can purchase a turbine generator that not only offers the best available fuel efficiency, but at the same time sells for the lowest per-kilowatt capital cost.

One possible alternative to an F-class gas turbine is the Siemens-Westinghouse 501G gas turbine generator, which employs partial steam cooling to allow slightly higher temperatures, yielding greater efficiency. While the 501G is rated at 58 percent efficiency, 2.2 percent higher than the 501F, the G machine produces 367 MW to the 501F's 272 MW; a 500 MW power plant would thus not be practical. Instead, a single 501G would yield a 367 MW (nominal) plant, while a dual arrangement would yield a 726 MW plant. Given the minor efficiency improvement promised by the G-class turbine, and the likelihood that the plant will frequently be dispatched at less than full load, EHPP's decision to purchase "F-class" machines is a reasonable one.

A further choice of alternatives involves the selection of gas turbine inlet air cooling methods. The two commonly used techniques are the evaporative cooler and the chiller; both devices increase gas turbine power output by cooling the gas turbine inlet air. A chiller can offer greater power output than the evaporative cooler on hot, humid days, but consumes electric power to operate its refrigeration process, thus slightly reducing overall net power output and, thus, overall efficiency. An evaporative cooler boosts power output best on dry days; it uses less electric power than a chiller, thus yielding slightly higher operating efficiency. The difference in efficiency between these two techniques is so small as to be insignificant. EHP plans to install evaporative cooling, but suggests the possibility of later installing a chiller if economics justify the change (EHP 1999a, AFC §§ 3.4.2, 3.4.3.1, 3.4.6, 3.11.4.5). Given project climate and the relative lack of superiority of one system

over the other, staff deems this an approach that will yield no 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. There are no alternatives that could significantly reduce energy consumption.

CUMULATIVE IMPACTS

Nearby power plant projects that hold the potential for cumulative impacts when aggregated with the EHPP include the La Paloma, Sunrise and Midway-Sunset Cogen West power plants. As discussed above, supplies of natural gas fuel, and the means for transporting this fuel to the facilities consuming it, are more than adequate. These several power plants will not strain the resource to a degree that could result in cumulative energy impacts.

FACILITY CLOSURE

Closure of the facility, whether planned or unplanned, will not influence, nor will it be influenced by, project efficiency. Any efficiency impacts due to closure of the project would be on the electric system as a whole. Yet the vast size of the electric system serving California, the number of generating plants offering to sell power into it, and the existence of the California Independent System Operator and Power Exchange to ensure the efficient management of the system, all lend assurance that closure of this facility will not produce significant adverse impacts on efficiency.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The EHPP, if constructed and operated as proposed, would generate 500 MW of electric power at an overall project fuel efficiency of approximately 56 percent. While it will consume substantial amounts of energy, it will do so in the most efficient manner practicable. It will not create significant adverse effects on energy supplies or resources, will not require additional sources of energy supply, and will not consume energy in a wasteful or inefficient manner. No energy standards apply to the project. Staff therefore concludes that the EHPP would present no significant adverse impacts upon energy resources.

No cumulative impacts on energy resource are likely. Facility closure would not likely present significant impacts on electric system efficiency.

RECOMMENDATION

From the standpoint of energy efficiency, staff recommends certification of the EHPP. No Conditions of Certification are proposed.

REFERENCES

GTW (Gas Turbine World). 1998. *Gas Turbine World 1998-1999 Performance Specs*, volume 18. December 1988.

EHP (Elk Hills Power, LLC). 1999a. Application for Certification, Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission, February 24, 1999.

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TRANSMISSION SYSTEM ENGINEERING

Mark Hesters and Al McCuen

INTRODUCTION

The Transmission System Engineering (TSE) analysis provides the basis for the findings in the Energy Commission's decision. This preliminary staff assessment indicates whether or not the transmission facilities associated with the proposed project conform to all applicable laws, ordinances, regulations and standards (LORS) required for safe and reliable electric power transmission.

Elk Hills Power Company (Elk Hills) proposes to connect their project, the Elk Hills Power Project (EHPP) to Pacific Gas & Electric Company's (PG&E) transmission system. The California Independent System Operator (Cal-ISO) is responsible for ensuring electric system reliability for all participating transmission owning utilities and determines both the standards necessary to achieve reliability and whether a proposed project conforms with those standards. The Energy Commission will rely on the Cal-ISO's determinations to make its finding related to applicable reliability standards, the need for additional transmission facilities, and environmental review of the whole of the project. In this case, staff is primarily a facilitator, coordinating the Cal-ISO's process and results with the certification process and the Energy Commission decision. The Cal-ISO will provide testimony at the Energy Commission's hearings.

Staff's analysis also evaluates the power plant substation, outlet line, termination facilities and outlet alternatives identified by the applicant and provides proposed conditions of certification to ensure that the project complies with applicable LORS during the design, construction, operation and potential closure of the project.

Public Resources Code, section 25523 requires the Energy Commission to "prepare a written decision…which includes: …findings regarding conformity of the proposed site and related facilities…with public safety standards…and with other relevant local, regional, state, and federal standards, ordinances, and laws." Under the California Environmental Quality Act (CEQA) the Energy Commission must conduct an environmental review of the "whole of the project," which may include facilities not licensed by the Energy Commission (CCR, tit. 14, §15378). Therefore, the Energy Commission must identify and evaluate the environmental effect of construction and operation of any new or modified transmission facilities beyond the project's interconnection with the existing transmission system that are required as a result of the power plant addition to the California transmission system.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

California Public Utilities Commission (CPUC) General Order 95 (GO-95), "Rules for Overhead Electric Line Construction", formulates uniform requirements for construction of overhead lines. Compliance with this order ensures adequate service and safety to persons engaged in the construction, maintenance, operation or use of overhead electric lines and to the public in general.

- CPUC Rule 21 provides standards for the reliable connection of parallel generating stations connected to participating transmission owners.
- Western Systems Coordinating Council (WSCC) Reliability Criteria provides the performance standards used in assessing the reliability of the interconnected system. These Reliability Criteria require the continuity of service to loads as the first priority and preservation of interconnected operation as a secondary priority. The WSCC Reliability Criteria includes the Reliability Criteria for Transmission System Planning, Power Supply Design Criteria, and Minimum Operating Reliability Criteria. Analysis of the WSCC system is based to a large degree on WSCC Section 4 "Criteria for Transmission System Contingency Performance" which requires that the results of power flow and stability simulations verify established performance levels.

Performance levels are defined by specifying the allowable variations in voltage, frequency and loading that may occur on systems other than the one in which a disturbance originated. Levels of performance range from no significant adverse effect outside a system area during a minor disturbance (loss of load or facility loading outside emergency limits) to a performance level that only seeks to prevent system cascading and the subsequent blackout of islanded areas. While controlled loss of generation, load, or system separation is permitted in extreme circumstances, their uncontrolled loss is not permitted (WSCC 1998).

- North American Electric Reliability Council (NERC) Planning Standards provides policies, standards, principles and guides to assure the adequacy and security of the electric transmission system. With regard to power flow and stability simulations, these Planning Standards are similar to WSCC's Criteria for Transmission System Contingency Performance. The NERC planning standards provide for acceptable system performance under normal and contingency conditions, however the NERC planning standards apply not only to interconnected system operation but also to individual service areas (NERC 1998).
- Cal-ISO Reliability Criteria also provide policies, standards, principles and guides to assure the adequacy and security of the electric transmission system. With regard to power flow and stability simulations, these Planning Standards are similar to WSCC's Criteria for Transmission System Contingency Performance and the NERC Planning Standards. The Cal-ISO Reliability Criteria incorporate the WSCC Criteria and NERC Planning Standards. However, the Cal-ISO Reliability Criteria also provide some additional requirements that are not found in the WSCC Criteria or the NERC Planning Standards. The Cal-ISO Reliability Criteria apply to all existing and proposed facilities interconnecting to the Cal-ISO controlled grid.
- Cal-ISO Scheduling Protocols and Dispatch Protocols require conformance with NERC, WSCC, and Local Area Reliability and Planning Criteria. These standards will be applied to the assessment of the system reliability implications of the Sunrise project. Also of major importance to the Sunrise project, and other privately funded projects which may sell through the California Power Exchange (Cal-PX) are the Cal-ISO Day/Hour Ahead Inter-zonal Congestion

Management Scheduling Protocol (SP 10), the Transmission System Loss Management Scheduling Protocol (SP 4), and the Creation of the Real Time Merit Order Stack (SP 11). The Congestion Management Scheduling Protocol provides that the operation of power plants not violate system criteria when market participants request generation dispatch or the use of major interties. The Real Time Merit Order Stack is developed based on increasing energy bid prices so that the least cost bids are accepted early on and if congestion is anticipated the highest bids are not selected. The Transmission System Loss Management Scheduling Protocol uses the Cal-ISO power flow model to identify total transmission losses at each generating unit and scheduling point. Additional calculations are performed to determine net power output required by the generating units to meet their scheduled obligations (Cal-ISO 1998a, Cal-ISO 1998b).

- Cal-ISO Participating Generator Agreement consists of detailed explanations of the requirements in the Cal-ISO Tariff pertaining to the paralleled generating unit.

PROJECT DESCRIPTION

The Elk Hills project is a combined cycle power project located in western Kern County. The project will have a nominal output of 500 MW. The project will be located on approximately 12 acres of land in the Elk Hills Oil and Gas Field, about 25 miles west of Bakersfield, California. Please refer to the Project Description section of this staff assessment for a more detailed presentation of the site and. This will be a merchant power plant that will sell electricity in the California market.

The Elk Hills project will access the California market through a new Elk Hills switching station or PG&E's Midway substation near Buttonwillow, California. EHPP is seeking certification for three transmission line alternatives, one of which will be used by the project. The first route, Transmission Alternative 1A, loops in to the existing Midway - Wheeler Ridge 230 kV line through a new Elk Hills switchyard. The second route, Transmission Alternative 1B, is a direct connection to the Midway substation through a new line built by Elk Hills (EHPP 1999a, AFC pages 3-53 to 3-59). The third route, Transmission Alternative 1B variation, replaces a portion of the existing Taft - Midway 115 kV line with a double circuit 230 kV line (EHPP 1999c, Data Response page 3).

ELK HILLS SWITCHYARD

The plant's three generators will be individually connected to 13.8/230 kV step-up transformers and then connected to the Elk Hills 230 kV ring bus switchyard (EHPP 1999a, AFC pages 3-23 to 3-27). This is an acceptable configuration for the switchyard.

TRANSMISSION LINE CHARACTERISTICS

The conductors for line Routes 1A and 1B will consist of two three-phase 230 kV circuits. Each of the conductors will be made of 1590 kcmil aluminum conductor, steel reinforced (ACSR) code named "lapwing." At 230 kV each conductor will have a thermal rating of 588 MVA (EHPP 1999a, AFC pages 3-60). For Transmission

Alternative 1B variation, the replacement conductor for the Taft – Midway 115 kV line has not been determined; however, a conductor like the 1590 kcmil ACSR is expected to be used (EHPP 1999c, Data Response pages 3 and 4).

POLES

All three line routes will use single shaft galvanized tubular steel poles up to the point of interconnection at either the substation for the Midway – Wheeler Ridge loop-in or the Midway substation. This configuration of poles is acceptable.

TRANSMISSION LINE ROUTE 1A

Route 1A is a nine mile line to a new Elk Hills switching station that loops into the existing Midway – Wheeler Ridge 230 kV transmission line. The existing Midway - Wheeler Ridge 230 kV line would be cut at the Elk Hills switching station. For nomenclature purposes the Midway – Wheeler Ridge 230 kV line would become the Midway – Elk Hills 230 kV line and the Wheeler Ridge – Elk Hills 230 kV line. The Elk Hills switching station will be constructed in a ring configuration with six 230 kV bays. Two bays will connect the Elk Hills switchyard to the Elk Hills switching station, two bays will connect the Wheeler Ridge – Elk Hills 230 kV circuits and two bays will connect the Elk Hills switching station to the Midway substation via the existing 230 kV double circuit line.

The line will cross the California Aqueduct twice, once entering and once exiting the new Elk Hills switching station. For a more detailed description of the line route see the Elk Hills AFC pages 3-53 to 3-59 (EHPP 1999a, AFC pages 3-53 to 3-59).

TRANSMISSION LINE ROUTE 1B

Route 1B is a 8.6 mile line that connects the Elk Hills power plant to the Midway substation. The line runs parallel to the existing Midway – Taft 115 kV line for most of the route. An existing 12 kV overhead distribution line may need to be moved underground so that there is room for the Elk Hills – Midway 230 kV line in the Kern county right-of-way. The line will cross the California Aqueduct, State Highway 58 and will encroach on the Wasco Way right-of-way. Each crossing or encroachment will require permits from the owners. For a more detailed description of Transmission Line Route B see the Elk Hills AFC page 3-59 (EHPP 1999a, AFC page 3-59).

TRANSMISSION LINE ROUTE 1B VARIATION

The Route 1B variation is similar to Route 1B except the Midway-Taft 115 kV line is replaced with a 230 kV line from Elk Hills to Midway. PG&E will determine the conductor size and type, but the applicant expects that a conductor similar to 715 kcmil SSAC will be used. This alternative will require a new Elk Hills switching station. The switching station will be owned and operated by PG&E at Elk Hills' expense.

The switching station will consist of a six-breaker 230 kV ring bus, a 230/115 kV transformer and a three breaker 115 kV bus. Each of the three combustion turbine generators at the EHPP will have a 15 MVA transformer and breaker that will

connect to the new switching station. The two 115 kV circuits from Taft substation and the single 115 kV circuit from OEHI's Navy 35R plant will connect to the 115 kV bus at the switching station and then to a 150 MVA, 230/115 kV transformer. This will feed a ring bus with six breakers. A full description and picture of this alternative is in the Elk Hills Power Project Addenda to Responses to California Energy Commission Data Request #2, #41 and #42, pages 3 and 4. A drawing of the proposed switching station appears in the System Impact Study Plan for the Elk Hills Power Project contained in the addendum to the data response, page 5 (EHPP 1999c, Data Response pages 3 to 5 and 5)

The existing poles between the new Elk Hills switching station and the Midway substation may not be able to carry 230 kV circuits. If the all the structures need to be replaced then Elk Hills would prefer to take down the existing structures during off-peak months and replace them with steel poles on a structure for structure basis. If the existing line cannot be taken out of service, then the new structures will be built as closely as possible to the existing structures. In either case, the foundations for the existing lattice towers would remain intact in order to minimize ground disturbance (EHPP 1999c, Data Response pages 3 to 5).

EXISTING FACILITIES AND RELATED SYSTEMS

The following electric facilities are located near the Sunrise project site and transmission line routes:

- PG&E's Midway Substation: Connected to PG&E's 115 kV, 230 kV and 500 kV transmission systems;
- PG&E's Midway-Santa Maria 115 kV transmission line;
- PG&E's Midway-Taft 115 kV transmission line;
- PG&E's Taft –Elk Hills 69 kV line.
- PG&E/ California Department of Water Resources' Midway-Wheeler Ridge 230 kV line.

The proposed line routes cross several roads as well as the California Aqueduct. Line crossings may be required in and around the Midway substation. **Condition of Certification 1(f)** requires that line crossings be coordinated with the line owner and comply with the owners standards. Major road crossings include State Highway 58, Wasco Way, and Tupman Road (Elk Hills AFC pages 3-53 to 3-60).

SYSTEM RELIABILITY

INTRODUCTION

A system reliability study is performed to determine the affects of connecting a new power plant to the existing electric grid. The study should not only identify impacts but also ways negative impacts can be minimized or eliminated. Any new transmission facilities, or downstream facilities, required for connection to the grid are considered part of the project and are subject to the full AFC review process. The System Impact Study for all three transmission line alternatives is scheduled to

be complete on November 18, 1999 and will be discussed in the Final Staff Assessment. This study will identify the need for downstream facilities and will give the Cal-ISO the information needed for a preliminary interconnection approval. The Cal-ISO will give its final approval to the project after reviewing the Detailed Facilities Study.

The Cal-ISO decided to assign responsibility for congestion on transmission facilities caused by new generators to the project. The FERC rejected this tariff and directed the Cal-ISO to reconvene a stakeholder process to redesign the interconnection policy. This original tariff was called the "Advanced Congestion Cost Mitigation" solution to congestion. This solution would require the project owner to mitigate congestion impacts prior to connecting to the Cal-ISO controlled grid. The options for advanced mitigation include upgrading overloaded facilities, the construction of new facilities, remedial action schemes (RAS), a combination of upgrading and RAS, or absorbing congestion costs caused by the new generation by paying others to curtail. Staff expects the project owner and the ISO to develop remedial action schemes that will mitigate any congestion caused by the Sunrise project. The RAS will be included as conditions of certification for the project. The Cal-ISO will provide testimony on the Preliminary Facilities Study and Interim Detailed Facilities Study Status Report and will provide conclusions and findings in the Energy Commission's hearings.

SYSTEM RELIABILITY STUDY

A system reliability evaluation determines whether the new project would cause thermal overloads, voltage violations (voltages too high or low), and/or electric system instability (excessive oscillations). In addition to the above analysis, studies are performed to verify that sufficient reactive power (see Definition of Terms) is available. The reliability evaluation must be conducted for all credible "emergency" conditions. Emergency conditions could include the loss of a single or double circuit line, the loss of a transformer or generator, or a combined loss of these facilities. A System Impact Study is conducted in advance of potential system changes, such as the addition of the Elk Hills project into the system, in order to prevent criteria violations. The criteria used in this evaluation include the WSCC Planning Criteria, NERC Planning Standards and applicable Cal-ISO reliability criteria. The reliability implications of the Elk Hills project and the need for additional facilities will be determined by the Cal-ISO based on the Detailed Facilities Study, which will be provided later. Elk Hills did provide a System Impact Study in their AFC however, this study was not adequate because it did not assume the Sunrise Cogeneration and Power Project (Sunrise) was operating. Elk Hills will complete a study that includes the Sunrise project on November 19, 1999.

Power delivered from the Elk Hills project to the existing transmission network in all three route options will impact power flows on existing transmission lines and substations in the Kern county region. The Elk Hills project will have the most impact on the Midway substation and the transmission network's ability to move power from the north to the south during heavy load periods and from the south to north during light load periods. The PG&E System Impact Study for EHPP will include the La Paloma Project producing 1,048 MW and the Sunrise Project

producing 338 MW. Power flow studies will analyze the affects of Elk Hills on line flows for three cases (EHPP 1998c, Data Response page 6) as follows:

1. Heavy summer 2001: this case will be developed from the WSCC full-loop 2001 Heavy Summer case.
2. Light winter 2001: this case will be developed from the full-loop Light Winter WSCC case.
3. Heavy spring 2001: this case will be developed from the WSCC 2001 full-loop Heavy Spring case.

To fully comply with NERC's reliability criteria, "extreme contingency" analysis must be conducted, but is not presently available. Such analysis is required by reliability criteria not to identify facility upgrades or new facilities, but rather to identify necessary mitigation consisting of operational measures. These measures include congestion management and the implementation of RAS. These studies will be included in a Detailed Facilities Study. The Cal-ISO will make its final determination based on the Detailed Facilities Study.

Short circuit analyses are conducted to assure that breaker ratings are sufficient to withstand high levels of current during a fault (such as when a line touches the ground). The acceptability of breaker ratings can also be determined during the compliance phase; it need not be done during the AFC process. Condition of Certification **TSE 1b** has been provided to ensure that breaker ratings are adequate.

Conformance verification with reliability criteria and interconnection standards will be assessed in the Commission's Compliance and Monitoring Process (see Conditions of Certification **TSE 1, 2 and 3**). Staff's proposed conditions of certification require a Detailed Facilities Study and an executed Interconnection Agreement between Elk Hills and PG&E. As a practical matter staff anticipates that the Detailed Facilities Study and approval by the Cal-ISO will be available near the end of the siting process.

ALTERNATIVES

Elk Hills has analyzed three potential line routes and is seeking certification for all of them. Each of the routes has been described in the Transmission System Engineering Project Description.

CUMULATIVE IMPACTS

There is insufficient data to fully evaluate cumulative impacts on the transmission system. Three other projects, La Paloma, Sunrise, and the Morro Bay Power Project (Morro Bay), located in the same general area, have filed AFCs with the Energy Commission. Staff expects one more project, the Midway-Sunset Power Project (Midway-Sunset), will file an AFC later this year. Finally, the Pastoria Power Project (Pastoria) AFC is expected later this year as well, and while it is not located in the same area, it may affect the transmission system in the region.

The Sunrise AFC included a Preliminary Facilities Study for three phases of the Sunrise project. Thus a reliability analysis was completed for 328 MW, 507 MW and 845 MW projects. The case with an 845 MW Sunrise project provides information on the effects of approximately 1,785 MW of new generation connected to the Midway substation. The analysis includes 940 MW for the La Paloma Project plus all three phases or 845 MW for Sunrise. This 1,745 MW level is very close to the expected output of La Paloma, Sunrise phase 1 and the expected Midway-Sunset Expansion (940 + 320 + 500 = 1,760). Under normal operating conditions, there were no voltage or thermal loading problems. When contingencies occurred, specifically when either the Midway 500/230 kV banks 11 or 12 were out of service, there were overloads. These overloads would be mitigated through the implementation of remedial action schemes (SCPP 1998a, AFC, Preliminary Facilities Study).

Both the Sunrise and Elk Hills projects have described interconnection options that loop into the Midway-Wheeler Ridge 230 kV transmission line that is co-owned by PG&E and the California Department of Water Resources. If the projects use this option, eight breakers at the Midway substation will need to be replaced and a remedial action scheme will be implemented under specific conditions (Elk Hills, 1999a, AFC Informational Review). The Midway-Sunset and Pastoria projects have not filed AFCs with the Energy Commission. Staff does not have any information on the effects of these projects on the transmission grid and cannot analyze potential impacts due to these projects.

FACILITY CLOSURE

INTRODUCTION

The parallel operation of generating stations is controlled, in part by CPUC Rule 21. This rule and standard utility practices for interconnecting a generating unit provide for the participating transmission owner (PTO) to have control of breakers and disconnect switches where the outlet line terminates (the Midway substation) and general control over the interconnected generators. Prior to construction and interconnection of a generating unit, the PTO reviews and comments on the plans and specifications for the power plant and termination equipment that are important to safe and reliable parallel operation[1] and inspects the interconnection facilities. Contractual provisions may be developed to provide backup, or other power service, and codify procedures to be followed during parallel operation. Before generating stations are permitted to bid into the Cal-PX and be dispatched by the Cal-ISO, generator standards must be met and the generating station must commit to comply with instructions of the Cal-ISO dispatchers. All participating generators must sign a Participating Generator Agreement (Cal-ISO 1998a, Cal-ISO 1998b). Procedures for planned, unexpected temporary closure and unexpected permanent closure must be developed or verified to facilitate effective communication and

[1] As an example, the PTO has control over the generating unit breakers so that only when the PTO's line crews have completed maintenance, for instance, and are clear of the line or other facilities, could the unit reclose into the system.

coordination between the generating station owner, the PTO and the Cal-ISO to ensure safety and system reliability.

CPUC General Order 95, Rule 31.6 requires that "lines or portions of lines permanently abandoned shall be removed by their owners so that such lines shall not become a public nuisance or a hazard to life or property." Condition of certification **TSE-1c** requires compliance with this rule.

The ability of the above LORS to reasonably assure safe and reliable conditions, in the event of facility closure, was evaluated for three scenarios:

PLANNED CLOSURE

This type of closure occurs in a planned and orderly manner such as at the end of its useful economic or mechanical life or due to gradual obsolescence. Under such circumstances, the requirement for the owner to provide a closure plan 12 months prior to closure, in conjunction with applicable LORS, is considered sufficient to provide adequately for safety and reliability. For instance, a planned closure provides time for the owner to coordinate with the PTO[2] to assure (as one example) that the PTO's system will not be closed into the outlet thus energizing the project substation. Alternatively, the owner may coordinate with the PTO to maintain some power service via the outlet line to supply critical station service equipment or other loads[3].

UNEXPECTED TEMPORARY CLOSURE

This unplanned closure occurs when the facility is closed suddenly and/or unexpectedly for a short term due to unforeseen circumstances such as a natural or other disaster or emergency. During such a closure the facility cannot insert power into the utility system. Closures of this sort can be accommodated by establishment of an on-site contingency plan (see General Conditions Including Compliance Monitoring and Closure Plan).

UNEXPECTED PERMANENT CLOSURE

This unplanned closure occurs when the project owner abandons the facility. This is considered to be a permanent closure. This includes unexpected closure where the owner remains accountable for implementing the on-site contingency plan. It can also include unexpected closure where the project owner is unable to implement the contingency plan, and the project is essentially abandoned. An on-site contingency plan, that is in place and approved by the CPM prior to the beginning of commercial operation of the facilities, will be developed to assure safety and reliability (see General Conditions Including Compliance Monitoring and Closure Plan).

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[2] The PTO, in this instance, is PG&E, the system owner to which the project is interconnected.
[3] These are mere examples. Many more exist.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Staff will not receive the System Impact Study for the Elk Hills project until November 19, 1999, too late to include in the PSA. The System Impact Study will arrive in time to be included in the Final Staff Assessment.

RECOMMENDATIONS

Staff proposes the following conditions of certification to insure system reliability and conformance with LORS.

CONDITIONS OF CERTIFICATION

TSE-1 The project owner shall ensure that the design, construction and operation of the proposed transmission facilities will conform to requirements listed below. The substitution of Compliance Project Manager (CPM) approved "equivalent" equipment and equivalent substation configurations is acceptable.

a) The Elk Hills project 230 kV substation shall include busses in a ring configuration or a breaker and a half scheme.

b) Breakers and bus in the power plant switchyard and other switchyards where it's appropriate shall be sized to comply with a short circuit analysis.

c) The power plant switchyard, outlet line and termination shall meet or exceed the requirements CPUC General Order 95.

d) One of the three transmission line route and termination alternatives shall be constructed.

e) Termination facilities at the Midway substation shall comply with applicable Cal-ISO and PG&E interconnection standards (PG&E Interconnection Handbook and CPUC Rule 21).

f) 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.

g) The applicant shall provide a Detailed Facilities Study including a description of remedial action scheme sequencing and timing and an executed Facility Interconnection Agreement for the Elk Hills project transmission interconnection with PG&E. The Detailed Facilities Study and Interconnection Agreement shall be coordinated with the Cal-ISO.

Verification: At least 60 days prior to start of construction of transmission facilities, the project owner shall submit to the CPM for approval, 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 1a through 1g above. The Detailed Facilities Study and executed interconnection agreement shall concurrently be provided. Substitution of equipment and substation configurations shall be identified and justified by the project owner for CPM approval.

TSE-2 The project owner shall inform the CPM of any impending changes, which may not conform to the requirements 1a through 1g of TSE-1, and have not received CPM 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 CPM.

Verification: At least 60 days prior to construction of transmission facilities, the project owner shall inform the CPM of any impending changes which may not conform to requirements of TSE-1 and request approval to implement such changes.

TSE-3 The project owner shall be responsible for the inspection of the transmission facilities during and after project construction, and any subsequent CPM approved changes thereto, to ensure conformance with CPUC GO-95 and CPUC Rule No. 21 and these TSE 1 and TSE 2. In case of non-conformance, the project owner shall inform the CPM in writing, within 10 days, of discovering such non-conformance and describe the corrective actions to be taken.

Verification: Within 60 days after synchronization of the project, the project owner shall transmit to the CPM an engineering description(s), and one-line drawings of the “as-built” facilities, signed and sealed by the registered electrical engineer in charge. A statement attesting to conformance with CPUC GO-95, CPUC Rule No. 21, the PG&E Interconnection Handbook, and these conditions shall be concurrently provided.

REFERENCES

Cal-ISO (California Independent System Operator). 1998a. Cal-ISO Tariff Scheduling Protocol, posted April 1998, Amendments 1,4,5,6, and 7 incorporated.

Cal-ISO (California Independent System Operator). 1998b. Cal-ISO Dispatch Protocol, posted April 1998.

NERC (North American Electric Reliability Council). 1998. NERC Planning Standards, September 1997.

WSCC (Western Systems Coordinating Council). 1997. Reliability Criteria, August 1998.

EHPP (Elk Hills Power Project). 1999a. Application for Certification, Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission, February 24.

EHPP (Elk Hills Power Project). 1999c. Response to California Energy Commission (CEC) staff data requests nos. 1-44, Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission, August 3, 1999.

SCPP(Sunrise Cogeneration and Power Project) 1998a. Application for Certification, Sunrise Cogeneration and Power Company (98-AFC-4). Submitted to the California Energy Commission, December 21, 1998.

DEFINITION OF TERMS

ACSR	Aluminum cable steel reinforced. A composite conductor made up of a steel core surrounded by aluminum wire.
Ampacity	Current-carrying capacity, expressed in amperes, of a conductor at specified ambient conditions, at which damage to the conductor is nonexistent or deemed acceptable based on economic, safety, and reliability considerations.
Ampere	The unit of current flowing in a conductor.
Bundled	Two wires, 18 inches apart.
Bus	Conductors that serve as a common connection for two or more circuits.
Conductor	The part of the transmission line (the wire) which carries the current.
Congestion Management	Congestion management is a scheduling protocol, which provides that dispatched generation and transmission loading (imports), will not violate criteria.
Emergency Overload	See Single Contingency. This is also called an L-1.
Kcmil or kcm	Thousand circular mil. A unit of the conductor's cross sectional area, when divided by 1,273, the area in square inches is obtained.
Kilovolt (kV)	A unit of potential difference, or voltage, between two conductors of a circuit, or between a conductor and the ground.
L-1	The outage of a single circuit.
Megavar	One megavolt ampere reactive.
Megavars	Mega-volt-Ampere-Reactive. One million Volt-Ampere-Reactive. Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system.
Megavolt ampere (MVA)	A unit of apparent power, equals the product of the line voltage in kilovolts, current in amperes, the square root of 3, 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. Also called an L-1.
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 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, will trip a selected generating unit upon a circuit overload.
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.
Thermal rating	See ampacity.
TSE	Transmission System Engineering.
Undercrossing	A transmission configuration where a transmission line crosses below the conductors of another transmission line, generally at 90 degrees.
Underbuild	A transmission or distribution configuration where a transmission or distribution circuit is attached to a transmission tower or pole below (under) the principle transmission line conductors.

ALTERNATIVES

Marc S. Pryor

PURPOSE OF THE ALTERNATIVES ANALYSIS

Staff is required to examine the "feasibility of available site and facility alternatives to the applicant's proposal that substantially lessen the significant adverse impacts of the proposal on the environment". The purpose of staff's alternatives analysis is to provide the Energy Commission with 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(d); Cal. Code Regs., tit. 20, § 1765.) This analysis identifies the potential significant impacts of the proposed project, technology alternatives and alternative sites that are capable of reducing or avoiding significant impacts.

ALTERNATIVE ANALYSIS CRITERIA

The "Guidelines for Implementation of the California Environmental Quality Act" (CEQA), Title 14, California Code of Regulations Section 15126(d), provide 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 project objectives..." In addition, the analysis must address the "no project" alternative. (Cal. Code Regs., tit. 14, §15126(d).)

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 of which the effect cannot be reasonably ascertained and of which the implementation is remote and speculative. (Cal. Code Regs., tit. 14, §15125(d)(5).) However, if the range of alternatives is defined too narrowly, the analysis may be inadequate. (*City of Santee v. County of San Diego* (4th Dist. 1989) 214 Cal.App. 3d 1438.)

To prepare this alternatives analysis, the staff used the methodology summarized below:

- Identify the basic objectives of the project.
- Identify and evaluate alternatives to the project. The principle project alternatives examined that do not require the construction of a natural gas-fired facility are increased energy efficiency (or demand side management) and construction of alternative technologies (e.g., geothermal, wind or solar).
- Identify and evaluate alternative locations or sites.
- Evaluate the impacts of not constructing the project (the "no project" alternative).

DETERMINING THE SCOPE OF THE ALTERNATIVES ANALYSIS

The purpose of staff's alternatives analysis is to provide the Energy Commission with a reasonable range of feasible alternatives which could substantially reduce or avoid any potentially significant adverse impacts of the proposed project. To accomplish this, staff must determine the appropriate scope of analysis. Consequently, it is necessary to identify and determine the potential significant impacts of the proposed project and then focus on alternatives that are capable of reducing or avoiding significant impacts.

This section presents staff's analysis of generation and siting alternatives, and the "no project" alternative [CEQA Guidelines, section 15112(d)(2)]. In addition, alternative routes for the proposed project's linear facilities are addressed. Alternatives were developed in response to comments and information provided by Energy Commission staff and staffs of other agencies.[1]

In considering location alternatives, the staff determined a reasonable geographical area. Since alternatives must consider the underlying objectives of the proposed project, staff confined the geographic area for location alternatives to the Elk Hills Oil and Gas Field. The locations chosen are consistent with the EHPP's objectives and the applicant's siting criteria of use of previously disturbed areas; existence of a restricted access land buffer, close proximity to and availability of suitable transmission line interconnections, process water and natural gas supplies; compatibility with oil field activities, proximity to another power plant facility (35R); and other environmental considerations such as visual resources and air quality. (EHPP 1999a, p. 3-79.)

BASIC OBJECTIVES OF THE PROJECT

After studying the applicant's Application for Certification (AFC), Energy Commission staff has determined the project's objectives to be:

The construction and operation of a merchant power plant in the region that supplies economic, reliable, and environmentally sound electrical energy and capacity in the newly deregulated power market.

To locate near key infrastructure, such as transmission line interconnections, and supplies of process water and natural gas.

PROJECT DESCRIPTION AND SETTING

A more complete description of the project and its setting is in the **Project Description** section of this Preliminary Staff Assessment (PSA).

[1] Other sections of this PSA (e.g., Air Quality) provide discussions of additional mitigation alternatives of a specific technical nature that are not considered in this section.

POWER PLANT

Located in the arid western Kern County region, the Elk Hills region has been heavily exploited for oil and natural gas production since the early 20th Century. Although zoned primarily as agricultural land, the Elk Hills have seen little, if any, typical agricultural activities, such as the raising of crops and cattle grazing. Narrow and deep ravines and equally narrow and steep ridges characterize much of the terrain. Scattered throughout the field are well sites that have been leveled to accommodate drilling, access roads and many pipelines of assorted uses.

The proposed EHPP would be a nominal 500-megawatt, combined-cycle, natural gas-fired power plant with two combustion turbine generators/heat recovery steam generator (HRSG) combinations. Steam generated in the two HRSGs would be combined and used to run one steam turbine generator. The power plant would be located on 12 acres in the middle of the former Elk Hills Naval Petroleum Reserve Number 1, which was operated by the Government of the United States from the early 1900's until its purchase by Occidental of Elk Hills, Inc. (OEHI) in February 1998. The former Reserve is now referred to as the Elk Hills Oil and Gas Field and comprises 75 square miles (47,000 acres). (EHPP 1999a, Sections 1 and 3.) See **ALTERNATIVES Figure 1** for a map of the location of the proposed project site and related facilities.

The EHPP would be the second power plant located in the middle of the Elk Hills Oil and Gas Field. Nearby the proposed site is a 45-megawatt cogeneration power plant, known as 35R, that was constructed by the U.S. Government in 1994 to supply electrical power and heat to the Elk Hills Reserve. (EHPP 1999a, p. 3-75.)

RELATED FACILITIES

TRANSMISSION LINE

Electricity generated by the EHPP would be transmitted to Pacific Gas & Electric's (PG&E) Midway Substation at the unincorporated community of Buttonwillow, approximately nine miles north of the power plant site. The applicant has proposed two alternative transmission line routings, 1A and 1B, and a variation of 1B. It is the applicant's intention that all three routes be approved. (See Siting and Related Facilities Alternatives below.)

RAW WATER SUPPLY PIPELINE

Water for the EHPP would be supplied by the West Kern Water District (WKWD) via a new 9.8-mile long, 16-inch steel pipeline extending from WKWD's existing facilities east of the proposed power plant site and adjacent to State Highway 119. The first 4.1 miles of the raw water supply pipeline would be placed underground alongside existing underground pipelines. Of this 4.1 miles, 0.7 mile of pipeline crosses the Coles Levee Ecosystem Preserve and 0.5 mile crosses Bureau of Land Management land. The remainder of the pipeline is on Elk Hills Oil and Gas Field property and features above ground mounting on pipe supports for the last 5.7 miles.

ALTERNATIVES Figure 1
Location of the Proposed Site and Related Facilities

This figure is not available in electronic format.

WASTEWATER DISPOSAL PIPELINE

A new 4.4-mile long, 8-inch wastewater pipeline is proposed to convey wastewater from the plant site south to two new injection wells, both on Elk Hills Oil and Gas Field property. These injection wells would be located near existing disposal wells used to dispose of produced water from OEHI's oil and gas field operations. Except for a portion of the pipeline that would go under Elk Hills Road, the pipeline would be mounted above ground on pipe supports.

NATURAL GAS SUPPLY PIPELINE

OEHI's locally produced natural gas would be supplied to the power plant via a new 2,500-foot long, 10-inch supply pipeline. This pipeline would be mounted above ground on pipe supports as well.

POTENTIAL SIGNIFICANT ENVIRONMENTAL IMPACTS

At this time there are only two technical areas that have identified potential significant environmental impacts: air quality and biological resources[2]. It is staff's opinion that the mitigation measures the applicant has proposed will reduce any potential significant environmental impacts to less than significant levels.

ALTERNATIVES TO THE PROJECT

GENERATION TECHNOLOGY ALTERNATIVES

Public Resources Code, section 25305(c) limits the scope of alternatives analyses during a siting case under specific conditions. This section states that conservation, load management, or other demand reducing measures reasonably expected to occur shall be explicitly examined in the Energy Commission's Electricity Report and shall not be considered as alternatives to a proposed facility during the siting process. Thus, such alternatives are not included in this PSA.

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 and wind[3]. Each of these technologies could be attractive from an environmental perspective because of the absence or reduced level of air pollutant emissions.

Solar and wind resources require large land areas in order to generate 500 megawatts of electricity. Specifically, central receiver solar thermal projects require

[2] The Soils and Water Resources section of this PSA is expected to be issued separately on December 6, 1999. At this time, staff has not identified potential significant environmental impacts on water resources. If this situation changes, staff may need to re-evaluate siting alternatives.

[3] Previous staff research has determined that there are no geothermal or hydroelectric resources in the western San Joaquin Valley region (La Paloma Generating Project, Final Staff Assessment, April 1999.)

approximately 9 to 10 acres per megawatt; 500 megawatts would require approximately 4,500 to 5,000 acres, or about 400 times the amount of space taken by the proposed plant site and linear facilities. Parabolic trough solar thermal technology requires similar acreage per megawatt. Wind generation "farms" generally require about 17 acres per megawatt, with 500 megawatts requiring 8,500 acres, more than 700 times the amount of space taken by the proposed plant site and linear facilities. (CEC 1996, pp. B.15.2 & B.15.3)

The alternative technologies discussed above have the potential for significant land use, biological and visual impacts. This is true in the western San Joaquin Valley, which has a number of sensitive species and related habitat areas, and many broad views of the Coast Range from Interstate 5. Looking outside the San Joaquin Valley, the development uncertainties and the potential for impacts at remote resource areas are significant constraints. Consequently, staff does not believe that geothermal, hydroelectric, solar and wind technologies present any feasible alternatives to the proposed project.

SITING AND RELATED FACILITIES ALTERNATIVES

POWER PLANT SITING ALTERNATIVES

Staff believes that due to the oil and gas field's large geographic extent, the proposed project's separation from other activities, such as farming and residential, long history of extensive oil and gas field disturbances, availability and proximity to a natural gas supply, and the physical security maintained by OEHI (controlled access roads and fencing), the consideration of site alternatives outside the Elk Hills Oil and Gas Field are unnecessary.

Staff examined the three siting alternatives proposed by the applicant, Alternative Sites A, B and C. (EHPP 1999a, pp. 3-75 through 3-79.) All are located within the Elk Hills Oil and Gas Field and share the common attributes mentioned above. The basic characteristics of each site that differentiates it from the others, including the preferred site, are presented below. Please see **ALTERNATIVES Figure 2**.

ALTERNATIVE SITE A

Alternative Site A is a vacant, 12-acre unused portion of the property that is in a partially disturbed condition. The topography of the site is the roughest of all the sites and is of low quality as biological habitat. Situated about 3,500 feet west of the preferred site, Alternative Site A is both farther away and not visible from Elk Hills Road. However, access from Elk Hills Road is not as direct and improved as the other sites. Work to effect road improvements could impact more biological, cultural and paleontological resources than the applicant's preferred site due to the greater access distance involved.

ALTERNATIVE SITE B

Alternative Site B is about 1,500 feet south of Alternative Site A and is currently a large, graveled area used for the storage of oil and gas field equipment. This site is

ALTERNATIVES Figure 2
Location of Alternative Sites

This figure is not available in electronic format.

also about 3,500 feet from Elk Hills Road, but access is more direct and utilizes better roadways. Alternative Site B is also not visible from Elk Hills Road. Use of this site would displace the current storage use to a different, and as yet unknown, location. This could impact biological, cultural and paleontological resources at the replacement location.

ALTERNATIVE SITE C

Located about four miles south of the preferred site and situated on the southwestern slope of the Elk Hills, Alternative Site C is currently occupied by out of service tanks. This site is in the same general location as the proposed wastewater injection wells, and is adjacent to Elk Hills Road. The site is quite visible from both Elk Hills Road and the nearest community, Valley Acres, three miles away. Vehicular access to the site is similar to the preferred site's access characteristics. The lengths of the transmission line and raw water supply pipeline would each be about four miles longer than those associated with the other sites. In addition, Alternative Site C is lower in elevation than the other sites (600 feet above mean sea level, as opposed to 1,300 feet) which may pose greater air quality impact concerns than the others pose.

RELATED FACILITIES ALTERNATIVES

The following related facilities pertain only to those associated with the applicant's preferred power plant site.

TRANSMISSION LINES

ALTERNATIVE 1A

Route 1A is a transmission line mounted on steel poles that originates at the power plant site and trends north for about two miles. For most of the two miles, the transmission line route would parallel the existing 115 kV Midway-Taft transmission line that runs north-south between the Midway Substation and the city of Taft, which is about ten miles south of the plant site. (The Midway-Taft transmission line is mounted on steel latticework towers in the Elk Hills area and on concrete poles north of the California Aqueduct. This transmission line is associated to some degree with all three of Elk Hills Power's proposed transmission line route alternatives/variation.)

At the two-mile distance, Route 1A turns east and extends about seven miles to a proposed new substation near the unincorporated community of Tupman. The substation would be located near and to the west of the California Aqueduct, and would connect with the existing Midway-Wheeler Ridge transmission line. Because the Midway-Wheeler Ridge transmission line is east of the aqueduct, the connection with the proposed substation would have to the cross the aqueduct twice. These crossings would require agreement between PG&E and the California Department of Water Resources who share ownership of the Midway-Wheeler Ridge line.

ALTERNATIVE 1B

The first two miles of Route 1B are the same as 1A and is also a transmission line mounted on steel poles. From this point the route proceeds almost directly to the Midway Substation, crossing the California Aqueduct at about milepost 4.3, and following the east side of Wasco Way. Route 1B would parallel the aforementioned Midway-Taft transmission line which, along Wasco Way, is mounted on concrete poles that are located west of the roadway. Wasco Way is in a cotton-growing agricultural area. The transmission line would interconnect with PG&E's system at the Midway substation, which is about 8.6 miles north of the preferred power plant site.

ALTERNATIVE 1B VARIATION

The Route 1B variation would combine the Midway-Taft transmission line with the proposed Route 1B, thus replacing the existing lattice tower and concrete poles of the Midway-Taft transmission line with steel poles. The routing would follow the existing Midway-Taft transmission line's route which, along Wasco Way, is located on the west side of the roadway. This route would also interconnect at the Midway substation. Route 1B will have the least environmental and visual impact due to the fact that two transmission lines will use a single set of poles. This would be most noticeable in the agricultural area along Wasco Way.

RAW WATER SUPPLY

A detailed analysis of raw water supply alternatives will be presented in the Soil and Water Resources section of this PSA, which is scheduled for separate filing on December 6, 1999.

NATURAL GAS SUPPLY PIPELINE

The ½-mile long pipeline route crosses an area with minimal environmental resources and is the most expeditious route. Therefore, staff concluded that route alternatives need not be examined.

COMPARATIVE CUMULATIVE LENGTHS OF RELATED FACILITIES BY SITE

ALTERNATIVES Table 1 shows lengths of related facilities associated with the preferred site and the three alternative sites. The overall length for the preferred is 23.7 miles. The alternatives all have greater overall lengths associated with them, ranging from 24.6 miles for Site A to 31.7 miles for Site C. This equates to percentage increases from 4% to 34%. The preferred site, with either transmission line Route 1B or the Route 1B variation would decrease the total length to 23.3 miles or about 2% less.

ALTERNATIVES Table 1
Lengths of Linear Facilities (miles)

	Preferred Site			Alternative Sites								
				Site A			Site B			Site C		
Linear Facilities[1]												
Raw Water Pipeline	9.8			10.1			10.5			13.8		
Wastewater Pipeline	4.4			5.0			5.5			0.4		
Natural Gas Pipeline	0.5			0.5[2]			0.5[2]			4.5[2]		
Transmission Line	1A	1B	1B Var	1A	1B	1B Var	1A	1B	1B Var	1A	1B	1B Var
	9.0	8.6	8.6	9.0	8.6	8.6[2]	9.4	9.0	9.0	13.0	12.6	12.6
Total (maximum) & [%} Increase	23.7			24.6 [4%]			25.9 [9%]			31.7 [34%]		

[1] Source: EHPP 1999a, Table 3.11-1, p. 3-81
[2] Source: Champion 1999, personal communication

THE "NO PROJECT" ALTERNATIVE

CEQA Guidelines and Energy Commission regulations require consideration of the "no project" alternative. This alternative assumes that the project is not constructed, and is compared to the proposed project. A determination is made whether the "no project" alternative is superior, equivalent, or inferior to the proposed project.

In the AFC, the applicant presented the "no project" alternative as not feasible and provided four supporting arguments for their conclusion (EHPP 1999a, p. 3-73 and 3-74.)

1. the proposed project would serve to fill part of California's need for "… a substantial amount of additional generation capacity …;
2. the proposed project will "… help to replace nuclear and fossil fuel generation resources retired due to age or cost of producing power";
3. "… existing power plants operating in place of the EHPP would most likely consume more fuel and emit more air pollutants per kilowatt-hour generated"; and
4. the project would insulate ratepayers or taxpayers from risk, and would assist ratepayers by increasing competition and therefore decrease electricity rates.

If this project is not built, the same market conditions that encouraged it to be proposed will encourage others. Therefore, the "no project" alternative is feasible. It is quite feasible that a substantial amount of additional generating capcity will be proposed even in the absence of this project. Staff can reasonably expect California's need for new plants to be filled with or without the proposed project. There is no reason to assume that the total amount of capacity actually built would differ, with or without this project.

It follows then, that the extent to which retired, nuclear and fossil generation resources will be replaced by new resources can be expected to be the same with or without this project. The extent to which generation from existing power plants would consume fuel and emit pollutants would be the same with or without this project. And whatever effect new plants might have insulating ratepayers and taxpayers from risk will occur whether or not the proposed plant is included among the new plants actually built.

The "no project" alternative would eliminate the expected economic benefits which the proposed project would bring to Kern County. These include minimum property tax revenues of approximately $20 million over the first ten years of operation. Local construction supply and materials purchases are estimated to be $25 million, with sales tax revenues accrued during construction from these sales estimated to be approximately $1.8 million. During operations, the project owner is estimated to spend approximately $3 million per year locally, resulting in an estimated sales tax revenue of about $217,000. (EHPP 1999a, pp. 5.8-21 and 5.8-22.)

Staff has determined that the "no project" alternative is environmentally superior to the proposed project in an unmitigated condition. This is because the EHPP would, in an unmitigated condition, have significant environmental impacts on air quality, water and biological resources. Not constructing and operating an (unmitigated) power plant would avoid these impacts. However, as stated above, staff believes mitigation measures proposed by the applicant will reduce any impacts to less than significant levels, assuming staff's belief that there are no potentially significant water resources impacts is correct. In addition, staff recognizes potential economic benefits will be derived from the project. Therefore, staff believes that, overall, the "no project" alternative is not superior to the proposed project.

CONCLUSIONS AND RECOMMENDATION

Staff has determined the proposed power plant site is the best option among those considered because it: 1) provides the closest and most direct access, 2) would present fewer impacts to biological, cultural and paleontological resources, 3) does not present as great a visual impact and air quality impacts as Alternative Site C, and 4) would not require longer water, natural gas supply and wastewater pipelines. Staff does not believe that energy efficiency measures and alternative technologies (geothermal, solar, wind, and hydroelectric) present any feasible alternatives to the proposed project.

Assuming there are no potential significant water resources impacts that cannot be mitigated to less than significant levels, staff recommends that the Energy Commission find the proposed Elk Hills site, raw water pipeline, wastewater pipeline, and the natural gas supply pipeline to be the preferred options for these features. With regard to the transmission line route options, staff believes any of the three are suitable because the environmental impacts associated with each can be reduced to less than significant levels. Yet, staff prefers the Route 1B Variation which would reduce environmental and visual impacts compared to the other alternatives because it combines the new transmission line with an existing line.

REFERENCES

Elk Hills Power, L.L.C. 1999a. Application For Certification for the Elk Hills Power Project.

Champion, Dennis. Personal communication with Marc S. Pryor, November 11, 1999.

GENERAL CONDITIONS INCLUDING COMPLIANCE MONITORING AND CLOSURE PLAN

Nancy Tronaas

INTRODUCTION

The project General Conditions Including Compliance Monitoring and Closure Plan (Compliance Plan) has 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 conjunction with air and water quality, public health and safety, environmental and other applicable regulations, guidelines, and conditions adopted or established by the California Energy Commission (Energy Commission) and specified in the written decision on the Application for Certification or otherwise required by law.

The Compliance Plan is composed of the following elements:

1. General conditions 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; and

- 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; and

- establish requirements for facility closure plans.

2. Specific conditions of certification:

- Specific conditions of certification that follow each technical area contain the measures required to mitigate any and all potential adverse project impacts associated with construction, operation and closure to an insignificant level. Each specific condition of certification also includes a verification provision that describes the method of verifying that the condition has been satisfied.

COMPLIANCE PROJECT MANAGER (CPM) RESPONSIBILITIES

A CPM will oversee the compliance monitoring and shall be responsible for:

- ensuring that the design, construction, operation, and closure of the project facilities is in compliance with the terms and conditions of the Commission Decision;
- resolving complaints;
- processing post-certification changes to the conditions of certification, project description, and ownership or operational control;
- documenting and tracking compliance filings; and,
- ensuring that the compliance files are maintained and accessible.

The CPM is the contact person for the Energy Commission and will consult with appropriate responsible agencies and the Energy Commission 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, it should be understood that the approval would involve all appropriate staff and management.

The Commission has established a toll free compliance telephone number of **1-800-858-0784** for the public to contact the Commission about power plant construction or operation-related questions, complaints or concerns.

PRE-CONSTRUCTION AND PRE-OPERATION COMPLIANCE MEETING

The CPM may schedule pre-construction and pre-operation compliance meetings prior to the projected start-dates of construction, plant operation, or both. The purpose of these meetings will be to assemble both the Energy Commission's and the 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 to confirm that they have been met, or if they have not been met, to ensure that the proper action is taken. In addition, these meetings shall ensure, to the extent possible, that Energy Commission conditions will not delay the construction and operation of the plant due to oversight or inadvertence and to preclude any last minute, unforeseen issues from arising.

ENERGY COMMISSION RECORD

The Energy Commission shall maintain as a public record, in either the Compliance file or Docket 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 changes and the resulting staff or Energy Commission action taken.

PROJECT OWNER RESPONSIBILITIES

It is the responsibility of the project owner to ensure that the general compliance conditions and the conditions of certification are satisfied. The general compliance conditions regarding post-certification changes specify measures that the project owner must take when requesting changes in the project design, compliance conditions, or ownership. Failure to comply with any of the conditions of certification or the general compliance conditions may result in reopening of the case and revocation of Energy Commission certification, an administrative fine, or other action as appropriate.

ACCESS

The CPM, responsible Energy Commission staff, and delegate 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

The project owner shall maintain project files on-site or at an alternative site approved by the CPM, for the life of the project. The files shall contain copies of all “as-built” drawings, all documents submitted as verification for conditions, and all other project-related documents for the life of the project, unless a lesser period is specified by the conditions of certification.

Energy Commission staff and delegate agencies shall, upon request to the project owner, be given unrestricted access to the files.

COMPLIANCE VERIFICATIONS

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 involved condition(s) of certification by condition number and include 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.

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 submittals shall be addressed as follows:

Compliance Project Manager
California Energy Commission
1516 Ninth Street (MS-2000)
Sacramento, CA 95814

If the project owner desires Energy Commission staff action by a specific date, they shall so state in their submittal and include a detailed explanation of the effects on the project if this date is not met.

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, and in most cases without full Energy Commission approval.

Verification of compliance with the conditions of certification can be accomplished by:

- reporting on the work done and providing the pertinent documentation in monthly and/or annual compliance reports filed by the project owner or authorized agent as required by the specific conditions of certification;

- appropriate letters from delegate agencies verifying compliance;

- Energy Commission staff audit of project records; and/or

- Energy Commission staff inspection of mitigation and/or other evidence of mitigation.

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 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

A compliance matrix is to 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 compliance conditions in a spreadsheet format. The compliance matrix must identify:

- the technical area,
- the condition number,
- a brief description of the verification action or submittal required by the condition,
- the date the submittal is required (e.g., 60 days prior to construction, after final inspection, etc.),
- the expected or actual submittal date,
- the date a submittal or action was approved by the Chief Building Official (CBO), CPM, or delegate agency, if applicable, and
- the compliance status for each condition (e.g., “not started”, “in progress” or “completed date”).

Completed or satisfied conditions do not need to be included in the compliance matrix after they have been identified as completed/satisfied in at least one monthly or annual compliance report.

MONTHLY COMPLIANCE REPORT

During construction of the project, the project owner or authorized agent shall submit Monthly Compliance Reports 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:

- 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;
- 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, and should be submitted as attachments to the Monthly Compliance Report;
- an initial, and thereafter updated, compliance matrix which shows the status of all conditions of certification (fully satisfied and/or closed conditions do not need to be included in the matrix after they have been reported as closed);
- a list of conditions which have been satisfied during the reporting period, and a description or reference to the actions which satisfied the condition;

- a list of any submittal deadlines that were missed accompanied by an explanation and an estimate of when the information will be provided;
- a cumulative listing of any approved changes to conditions of certification;
- a listing of any filings with, or permits issued by, other governmental agencies during the month;
- 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 conditions of certification;
- a listing of the month's additions to the on-site compliance file;
- any requests to dispose of items that are required to be maintained in the project owner's compliance file; and
- a listing of complaints, notices of violation, official warnings, and citations received during the month; a description of the resolution of any complaints which have been resolved, and the status of any unresolved complaints.

The first Monthly Compliance Report is due the month following the Energy Commission business meeting date that the project was approved, unless the otherwise agreed to by the CPM. The first Monthly Compliance Report shall include an initial list of dates for each of the events identified on the Key Events List. The Key Events List is found at the end of this section.

ANNUAL COMPLIANCE REPORT

After the air district has issued a Permit to Operate, 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 identify the reporting period and shall contain the following:

- an updated compliance matrix which shows the status of all conditions of certification (fully satisfied and/or closed conditions do not need to be included in the matrix after they have been reported as closed);
- a summary of the current project operating status and an explanation of any significant changes to facility operations during the year;
- 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, and should be submitted as attachments to the Annual Compliance Report;
- a cumulative listing of all post-certification changes approved by the Energy Commission or cleared by the CPM;
- an explanation for any submittal deadlines that were missed, accompanied by an estimate of when the information will be provided;

- a listing of filings made to, or permits issued by, other governmental agencies during the year;
- a projection of project compliance activities scheduled during the next year;
- a listing of the year's additions to the on-site compliance file, and
- an evaluation of the on-site contingency plan for unexpected facility closure, including any suggestions necessary for bringing the plan up to date [see General Conditions for Facility Closure addressed later in this section]; and
- a listing of complaints, notices of violation, official warnings, and citations received during the year; a description of the resolution of any complaints which have been resolved, and the status of any unresolved complaints.

REPORTING OF COMPLAINTS, NOTICES, AND CITATIONS

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. The telephone number shall be posted at the project site and easily visible to passersby during construction and operation.

In addition to the monthly and annual compliance reporting requirements described above, the project owner shall report and provide copies of all complaint forms, notices of violation, notices of fines, official warnings, and citations, within 10 days of receipt, to the CPM. 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 following form:

NON-NOISE COMPLAINT RESOLUTION FORM
ELK HILLS POWER PROJECT:
AFC Number: 99-AFC-1

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.)

CONFIDENTIAL INFORMATION

Any information, which the project owner deems confidential shall be submitted to the Energy Commission's Docket with an application for confidentiality pursuant to Title 20, California Code of Regulations, section 2505(a). Any information, which is determined to be confidential, shall be kept confidential as provided for in Title 20, California Code of Regulations, section 2501 et. seq.

DEPARTMENT OF FISH AND GAME FILING FEE

Pursuant to the provisions of Fish and Game Code Section 711.4, the project owner shall pay a filing fee in the amount of eight hundred and fifty dollars ($850). The payment instrument shall be provided to the Commission's Project Manager at the time of project certification and shall be made payable to the California Department of Fish and Game. The Commission's Project Manager will submit the payment to the Office of Planning and Research at the time of filing of the notice of decision pursuant to Public Resources Code Section 21080.5.

FACILITY CLOSURE

INTRODUCTION

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 which provide the flexibility to deal with the specific situation and project setting which will exist at the time of closure. 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, unexpected temporary closure and unexpected permanent closure**.**

PLANNED CLOSURE

This planned closure occurs at the end of a project's life, 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.

UNEXPECTED TEMPORARY CLOSURE

This unplanned 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.

UNEXPECTED PERMANENT CLOSURE

This unplanned closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unexpected closure where the owner remains accountable for implementing the on-site contingency plan. It can also include unexpected closure where the project owner is unable to implement the contingency plan, and the project is essentially abandoned.

GENERAL CONDITIONS FOR FACILITY CLOSURE

PLANNED CLOSURE

In order that a planned facility closure does not create adverse impacts, a closure process, that will provide 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 twelve months prior to commencement of closure activities (or other period of time agreed to by the CPM). 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:

- identify and discuss any impacts and mitigation proposed 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;
- 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;
- identify any facilities or equipment intended to remain on site after closure, the reason, and any future use; and
- address conformance of the plan with all applicable laws, ordinances, regulations, standards, local/regional plans in existence at the time of facility closure, and applicable conditions of certification.

Also, 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 Commission may hold public hearings as part of its approval procedure.

In addition, prior to submittal of the proposed facility closure plan, a meeting shall be held between the project owner and the Commission CPM for the purpose of discussing the specific contents of the plan.

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 or the environment, but shall not commence any other closure activities, until Commission approval of the facility closure plan is obtained.

UNEXPECTED TEMPORARY CLOSURE

In order to ensure that public health and safety and the environment are protected in the event of an unexpected 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, 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 that 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 recommend 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 unexpected 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 unexpected temporary closure, the project owner shall notify the CPM, as well as other responsible agencies, by telephone, fax, e-mail, etc., 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 circumstances and expected duration of the closure.

If the CPM determines that a temporary closure is likely to be permanent, or for a duration of more than twelve months, a closure plan consistent with that 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).

UNEXPECTED PERMANENT CLOSURE

The on-site contingency plan required for unexpected temporary closure shall also cover unexpected permanent facility closure. All of the requirements specified for unexpected temporary closure shall also apply to unexpected 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 unlikely event of abandonment.

In the event of an unexpected permanent closure, the project owner shall notify the CPM, as well as other responsible agencies, by telephone, fax, e-mail, etc., 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 that for a planned closure shall be developed and submitted to the CPM within 90 days of the permanent closure (or other period of time agreed to by the CPM).

DELEGATE AGENCIES

To the extent permitted by law, the Energy Commission may delegate authority for compliance verification and enforcement to various state and local agencies that have expertise in subject areas where specific requirements have been established as a condition of certification. If a delegate agency does not participate in this program, the Energy Commission staff will establish an alternative method of verification and enforcement. Energy Commission staff reserves the right to independently verify compliance.

In performing construction and operation monitoring of the project, the Energy Commission staff acts as, and has the authority of, the Chief Building Official (CBO). The Commission staff retains this authority when delegating to a local CBO. Delegation of authority for compliance verification includes the authority for enforcing codes, the responsibility for code interpretation where required, and the authority to use discretion as necessary, in implementing the various codes and standards.

Whenever an agency's responsibility for a particular area is transferred by law to another entity, all references to the original agency shall be interpreted to apply to the successor entity.

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 Commission Decision.

Moreover, to ensure compliance with the terms and conditions of certification and applicable laws, ordinances, regulations, and standards, delegate agencies are authorized to take any action allowed by law in accordance with their statutory authority, regulations, and administrative procedures.

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 1230 et. seq., 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 current law or regulations.

INFORMAL DISPUTE RESOLUTION PROCEDURE

The following procedure is designed to informally resolve disputes concerning 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 this procedure for resolving a dispute. Disputes may pertain to actions or decisions made by any party including the Energy Commission's delegate agents.

This procedure may precede the more formal complaint and investigation procedure specified in Title 20, California Code of Regulations, section 1230 et. seq., 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 procedure 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 referred to the full Energy Commission for consideration via the complaint and investigation process. The procedure for informal dispute resolution is as follows:

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 and within seven working days of the CPM's request, provide a written report of the results of the investigation, including corrective measures proposed or undertaken, to the CPM. Depending on the urgency of the noncompliance matter, the CPM may conduct a site visit and/or request the project owner to provide an initial report, within forty-eight hours, followed by a written report filed within seven days.

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 undertaken, either party may submit a written request to the CPM for a meeting with the project owner. Such request shall be made within fourteen days of the project owner's filing of its written report. Upon receipt of such a request, the CPM shall:

- immediately schedule a meeting with the requesting party and the project owner, to be held at a mutually convenient time and place;
- secure the attendance of appropriate Energy Commission staff and staff of any other agency with expertise in the subject area of concern as necessary;
- 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
- after the conclusion of such a meeting, promptly prepare and distribute copies to all in attendance and to the project file, a summary memorandum which fairly and accurately identifies the positions of all parties and any conclusions 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

If either the project owner, Energy Commission staff, or the party requesting an investigation is not satisfied with the results of the informal dispute resolution process, such party may file a complaint or a request for an investigation with the Energy Commission's General Counsel. Disputes may pertain to actions or decisions made by any party including the Energy Commission's delegate agents. Requirements for complaint filings and a description of how complaints are processed are in Title 20, California Code of Regulations, section 1230 et. seq.

The Chairman, upon receipt of a written request stating the basis of the dispute, may grant a hearing on the matter, consistent with the requirements of noticing provisions. The Commission shall have the authority to consider all relevant facts involved and make any appropriate orders consistent with its jurisdiction (Title 20, California Code of Regulations, sections 1232 - 1236).

POST CERTIFICATION CHANGES TO THE COMMISSION DECISION: AMENDMENTS, STAFF CHANGES AND VERIFICATION CHANGES

The project owner must petition the Energy Commission, pursuant to Title 20, California Code of Regulations, section 1769, to 1) delete or change a condition of certification; 2) modify the project design or operational requirements; 3) transfer ownership or operational control of the facility; or 4) change a condition verification requirement.

A petition is required for **amendments** and for **insignificant (staff) changes**. 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 Commission's Docket in accordance with Title 20, California Code of Regulations, section 1209. The criteria that determine which type of change process applies are explained below.

AMENDMENT

A proposed change will be processed as an amendment if it involves a change to the requirement or protocol (and in some cases the verification) portion of a condition of certification, an ownership or operator change, or a potential significant environmental impact.

INSIGNIFICANT STAFF CHANGE

The proposed change will be processed as an insignificant staff change if it does not require changing the language in a condition of certification, does not have a potential significant environmental impact, and will not cause the project to violate laws, ordinances, regulations or standards.

VERIFICATION CHANGE

The proposed change will be processed as a verification change if it involves only the language in the verification portion of the condition of certification. This procedure can only be used to change verification requirements that are of an administrative nature, usually the timing of a required action. In the unlikely event that verification language contains technical requirements, the proposed change must be processed as an amendment.

KEY EVENT LIST

PROJECT _____ DATE ENTERED _____

DOCKET # _____ PROJECT MANAGER _____

EVENT DESCRIPTION	***DATE ASSIGNED***
Date of Certification	
Start of Construction	
Completion of Construction	
Start of Operation (1st Turbine Roll)	
Start of Rainy Season	
End of Rainy Season	
Start T/L Construction	
Complete T/L Construction	
Start Fuel Supply Line Construction	
Complete Fuel Supply Line Construction	
Start Rough Grading	
Complete Rough Grading	
Start of Water Supply Line Construction	
Complete Water Supply Line Construction	
Start Implementing Erosion Control Measures	
Complete Implementing Erosion Control Measures	

GLOSSARY OF TERMS AND ACRONYMS

A

A	Ampere
AAL	All aluminum (electricity conductor)
AADT	Annual Average Daily Traffic
AAQS	Ambient Air Quality Standards
AC	Alternating Current
ACEC	Area of Critical Environmental Concern
ACGIH	American Conference of Government and Industrial Hygienists
ACE	(U.S.) Army Corps of Engineers
ACSR	Aluminum Covered Steel Reinforced (electricity conductor)
AERA	
AFC	Application for Certification
AFY	acre-feet per year
AHM	Acutely Hazardous Materials
AIHA	American Industrial Hygienists Association
ANSI	American National Standards Institute
APCD	Air Pollution Control District
APCO	Air Pollution Control Officer
AQMP	Air Quality Management Plan
ARB	Air Resources Board
ARCO	Atlantic Richfield Company
ASAE	American Society of Architectural Engineers
ASHRAE	American Society of Heating Refrigeration & Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ATC	Authority to Construct
AWS	American Welding Society

B

BACT	Best Available Control Technology
BARCT	Best Available Retrofit Control Technology
bbl	barrel
BCF	billion cubic feet
Bcfd	billion cubic feet per day
b/d	barrels per day
BO	Biological Opinion
BLM	(U.S.) Bureau of Land Management
BR	Biennial Report
BRMIMP	Biological Resources Mitigation and Monitoring Plan
Btu	British thermal unit

C

CAA	(U.S.) Clean Air Act

CAAQS	California Ambient Air Quality Standards
CalEPA	California Environmental Protection Agency
Cal-OSHA	California Occupational Safety and Health Administration
Cal-PX	California Power Exchange
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CATEF	California Toxic Emissions Factors
CBC	California Building Code
CBO	Chief Building Official
CCAA	California Clean Air Act
CCR	California Code of Regulations
CDF	California Department of Forestry
CDFG	California Department of Fish and Game
CEERT	Coalition for Energy Efficiency and Renewable Technologies
CEM	Continuous Emissions Monitoring
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CESA	California Endangered Species Act
CFB	Circulating Fluidized Bed
CFCs	Chloro-fluorocarbons
cfm	cubic feet per minute
CFR	Code of Federal Regulations
cfs	cubic feet per second
CLUP	Comprehensive Land Use Plan
CNEL	Community Noise Equivalent Level
CNLM	Center for Natural Lands Management
CO	Carbon Monoxide
CO2	Carbon Dioxide
COC	Condition of Certification
CPM	Compliance Project Manager
CPUC	California Public Utilities Commission
CRTR	Cultural Resources Technical Report
CT	Combustion Turbine Current Transformer
CTG	Combustion Turbine Generator
CUPA	Certified Unified Program Agency
CURE	California Unions for Reliable Energy

D

dB	decibel

dB(A)	decibel on the A scale
DC	Direct Current
DCS	Distributed Control System
DCTL	Double Circuit Transmission Line
DEIR	Draft Environmental Impact Report
DEIS	Draft Environmental Impact Statement
DHS	(California) Department of Health Services
DISCO	Distribution Company
DOC	Determination of Compliance
DOE	(U.S.) Department of Energy
DOG	(California) Department of Oil and Gas
DSM	Demand Side Management
DTC	Desert Tortoise Council
DTSC	(CalEPA) Department of Toxic Substances Control
DWR	(California) Department of Water Resources

E

EA	Environmental Assessment
EDF	Environmental Defense Fund
EDR	Energy Development Report
EEGL	Emergency Response Planning Guidelines
EFS&EPD	Energy Facilities Siting and Environmental Protection Division
EIA	(U.S.) Energy Information Agency
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EJ	Environmental Justice
ELFIN	Electric Utility Financial and Production Simulation Model
EMF	Electromagnetic Field
EPA	(U.S.) Environmental Protection Agency
EPA-ARI	(U.S.) Environmental Protection Agency-Accidental Release Information Program
EPRI	Electric Power Research Institute
ER	Electricity Report
ERC	Emission Reduction Credit {offset}
ERNS	Emergency Response Notification System
ERPG	Emergency Response Planning Guidelines
ESA	Endangered Species Act (Federal) Environmental Site Assessment
ETSR	Energy Technologies Status Report

F

FAA	(U.S.) Federal Aviation Administration
FBE	Functional Basis Earthquake
FCAA	Federal Clean Air Act
FCC	Federal Communications Commission
FE	Federally (listed) Endangered
FEIR	Final Environmental Impact Report
FERC	Federal Energy Regulatory Commission
FIP	Federal Implementation Plan
FLPMA	Federal Land Policy Management Act
FONSI	Finding of No Significant Impact
FP	(State) Fully Protected
FSA	Final Staff Assessment
FT	Federally (listed) Threatened

G

GE	General Electric
GEP	Good Engineering Practice
GIS	Gas Insulated Switchgear Geographic Information System
gpd	gallons per day
gpm	gallons per minute
GW	gigawatt
GWh	gigawatt hour

H

H_2S	Hydrogen Sulfide
HCP	Habitat Conservation Plan
HHV	Higher Heating Value
HRA	Health Risk Assessment
HRSG	Heat Recovery Steam Generator
HV	High Voltage
HVAC	Heating, Ventilation and Air Conditioning

I

IAR	Issues and Alternatives Report
IDLH	Immediately Dangerous to Life and Health Level
IEA	International Energy Agency
IEEE	Institute of Electrical & Electronics Engineers
IIPP	Injury and Illness Prevention Program
IIR	Issues Identification Report
IMPLAN	Impact Analysis for Planning
IOU	Investor-Owned Utility
IS	Initial Study
ISO	Independent System Operator
ISCST3	Industrial Source Complex Short-Term model, Version 3

J

K

KCFD	Kern County Fire Department

KCM	thousand circular mils (also KCmil) (electricity conductor)
km	kilometer
KOP	Key Observation Point
kV	kilovolt
KVAR	kilovolt-ampere reactive
kW	kilowatt
kWe	kilowatt, electric
kWh	kilowatt hour
kWp	peak kilowatt

L

LAER	Lowest Achievable Emission Rate
lbs	pounds
lbs/hr	pounds per hour
lbs/MMBtu	Pounds Per Million British Thermal Units
LORS	Laws, Ordinances, Regulations and Standards
LOS	Level of Service

M

m (M)	meter, million, mega, milli or thousand
MCE	Maximum Credible Earthquake
MCF	thousand cubic feet
MCL	Maximum Containment Level
MCM	thousand circular mil (electricity conductor)
$\mu g/m^3$	micro grams (10-6 grams) per cubic meter
MG	milli gauss
mgd	million gallons per day
MOU	Memorandum of Understanding
MPE	Maximum Probable Earthquake
m/s	meters per second
MS	Mail Station
MVAR	megavolt-ampere reactive
MW	megawatt (million watts)
MWh	megawatt hour
MWp	peak megawatt

N

N-1	One transmission circuit out
N-2	Two transmission circuits out
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Council
NCR	Non-Conformance Report
NEC	National Electrical Code
NEPA	National Energy Policy Act National Environmental Policy Act
NERC	National Electric Reliability Council

NESHAPS National Emission Standards for Hazardous Air Pollutants

NIOSH National Institute of Occupational Health and Safety

NMHC nonmethane hydrocarbons

NO nitrogen oxide

NOI Notice of Intention

NO_x nitrogen oxides

NO2 nitrogen dioxide

NOP Notice of Preparation (of EIR)

NOV Notice of Violation

NRC National Research Council
National Response Center

NRDC Natural Resources Defense Council

NSPS New Source Performance Standards

NSR New Source Review

O

O_3 Ozone

OASIS Open Access Same-Time Information System

OCB Oil Circuit Breaker

OCSG Operating Capability Study Group

O&M Operation and Maintenance

OLM Ozone Limiting Method

OSHA Occupational Safety and Health Administration (or Act)

P

PAH Polycyclic Aromatic Hydrocarbons

PG&E Pacific Gas & Electric Company

PHC(S) Prehearing Conference (Statement)

PIFUA Federal Powerplant & Industrial Fuel Use Act of 1978

PM Project Manager
particulate matter

PMPD Presiding Member's Proposed Decision

PM_{10} Particulate matter 10 microns and smaller in diameter

$PM_{2.5}$ Particulate matter 2.5 microns and smaller in diameter

PPE Personal Protective Equipment

ppb parts per billion

ppm parts per million

ppmvd parts per million by volume, dry

ppt parts per thousand

PSA Preliminary Staff Assessment

PRC (California) Public Resources Code

PSD Prevention of Significant Deterioration

PT Potential Transformer

PTO	Permit to Operate Participating Transmission Owner
PU	per unit
PURPA	Federal Public Utilities Regulatory Policy Act of 1978
PV	photovoltaic
PX	Power Exchange

Q

QA/QC	Quality Assurance/Quality Control
QF	Qualifying Facility

R

RACT	Reasonably Available Control Technology
RCRA	Resource Conservation and Recovery Act
RDF	Refuse Derived Fuel
RE	Resident Engineer
RMP	Risk Management Plan
ROC	Report of Conversation Reactive Organic Compounds
ROG	Reactive Organic Gas
ROW	Right-of-Way
RWQCB	Regional Water Quality Control Board

S

SARA	Superfund Amendments and Reauthorization Act of 1986
SB	Senate Bill
SCFM	standard cubic feet per minute
SCH	State Clearing House
SCR	Selective Catalytic Reduction
SCTL	Single Circuit Transmission Line
SE	State (listed) Endangered
SHPO	State Office of Historic Preservation
SIC	Standard industrial classification
SIP	State Implementation Plan
SJVAB	San Joaquin Valley Air Basin
SJVUAPCD	San Joaquin Valley Unified Air Pollution Control District
SMP	Safety Management Plan
SNCR	Selective Noncatalytic Reduction
SNG	Synthetic Natural Gas
SO_2	Sulfur Dioxide
SO_x	Oxides of Sulfur
SO_4	Sulfates
SSC	Species of Special Concern
ST	State (listed) Threatened
STEL	Short Term Exposure Limit
STPEL	Short Term Public Emergency Limit(s)
STIG	Steam Injected Gas Turbine

SWP	State Water Project
SWRCB	State Water Resources Control Board
T	
TAC	Toxic Air Contaminant
Tbtu	trillion Btu
TCF	trillion cubic feet
TCM	Transportation Control Measure
TDS	Total Dissolved Solids
TE	Transmission Engineering
TEOR	Thermally Enhanced Oil Recovery
TL	Transmission Line (or lines)
T-Line	Transmission Line
TLV	Threshold Limit Value
TOG	Total Organic Gases
TPD	tons per day
TPY	tons per year
TS&N	Transmission Safety and Nuisance
TSE	Transmission System Engineering
TSIN	Transmission Services Information Network
TSP	Total Suspended Particulate Matter
U	
UBC	Uniform Building Code
UDC	Utility Displacement Credits
UDF	Utility Displacement Factor
UEG	Utility Electric Generator
UFC	Uniform Fire Code
USC	United States Code
USC(A)	United States Code (Annotated)
USCOE	U.S. (Army) Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
V	
VISCREEN	
VOC	Volatile Organic Compound(s)
VRM	Visual Resource Management
W	
W	Watt
WAA	Warren-Alquist Act
WEPEX	Western Energy Power Exchange
WHO	World Health Organization
WICF	Western Interconnection Forum
WIEB	Western Interstate Energy Board
WPLT	Western Pluvial Lakes Tradition

WRTA	Western Region Transmission Association
WSCC	Western System Coordination Council
WSPP	Western System Power Pool

PREPARATION TEAM

Executive Summary……Marc S. Pryor

Introduction ..... ……Marc S. Pryor

Project Description..... ……Marc S. Pryor

Need Conformance ..... Kerry Willis

Air Quality ..... Joe Loyer

Public Health..... Obed Odoemelam

Worker Safety and Fire Protection .....Chris Tooker

Transmission Line Safety and Nuisance..... Obed Odoemelam

Hazardous Materials ..... Joe Loyer

Waste Management..... Michael Ringer

Land Use ..... Amanda Stennick

Traffic and Transportation.....Eric Knight

Noise..... Kisabuli/Steve Baker

Visual Resources..... David Flores

Cultural Resources ..... Roberta Greenwood

Socioeconomics..... Joe Diamond

Biology ..... Linda Spiegel

Geology ..... Robert Anderson

Facility Design .....M. Kisabuli, Steve Baker and Al McCuen

Reliability .....Steve Baker

Efficiency .....Steve Baker

Transmission System Engineering ..... Mark Hesters and Al McCuen

Alternatives ..... Marc S. Pryor

Compliance Monitoring Plan and General Conditions ..... Nancy Tronaas

Glossary of Terms and Acronyms .....Bert Fegg

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