STAFF REPORT

Final Staff Assessment/
Draft Environmental Impact Statement
Filed Jointly by the California Energy Commission
and Western Area Power Administration

SUTTER POWER PROJECT

Application for Certification (97-AFC-2)
Sutter County, California

OCTOBER 1998

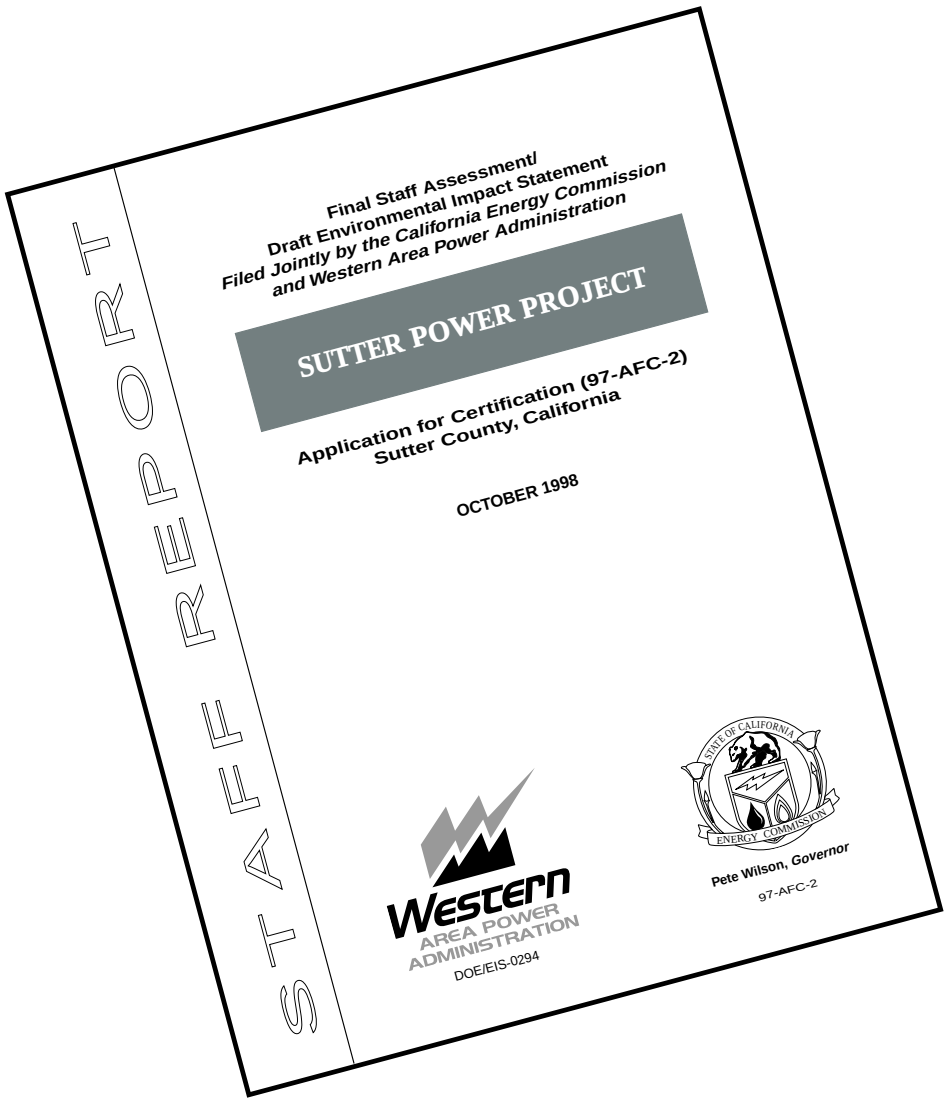
Western
AREA POWER
ADMINISTRATION

DOE/EIS-0294

STATE OF CALIFORNIA
ENERGY COMMISSION

Pete Wilson, *Governor*

97-AFC-2



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COVER SHEET

Project Title: Sutter Power Plant Project, Draft Environmental Impact Statement
Sutter County, California

Federal Lead Agency: Western Area Power Administration, US Department of Energy

Joint-State Lead Agency: California Energy Commission

Related Actions: Sutter County General Plan Amendment and a Planned Development Rezone
Western's Sutter Power Plant -- Interconnection Feasibility Study
Calpine Corporation's Application for Certification for Sutter Power Plant Project

Technical Assistance: Foster Wheeler Environmental Corporation
CH2MHill

ABSTRACT

Western Area Power Administration operates and maintains a high-voltage electric transmission system in California to deliver power to qualified customers. Calpine Corporation has requested that Western study and consider the feasibility of an interconnection with Western's Keswick-Elverta and Olinda-Elverta 230-kilovolt (kV) transmission lines. Calpine is proposing the construction and operation of the Sutter Power Plant project. The project, as proposed, would include a 500 megawatt (MW) natural gas fueled, combined cycle, electric generation facility; a new 5.7 mile 230-kV generation tie-line; a transmission line switching station; and a 12-mile (16 inch) natural gas pipeline to connect with Pacific Gas and Electric's Line 302. The siting of the project's generation facility is proposed on a portion of a 77 acre parcel of land owned by Calpine, adjacent to Calpine's existing Greenleaf 1 cogeneration power plant in Sutter County, approximately 7 miles south of Yuba City and 36 miles northwest of Sacramento. Calpine's stated objective for developing the Sutter Power Plant is to sell power to a mix of retail and wholesale customers in the newly deregulated electricity market. As a "merchant plant," Calpine intends to sell power on a short and mid-term basis to customers, and on the spot market. On July 29, 1998, Western issued a Sutter Power Plant Interconnection Feasibility Study. The study results indicate that the output from the proposed Sutter Power Plant Project will improve system reliability in the generation deficient Sacramento area. Based on Western's interest in improving system reliability and as the owner of the transmission lines for the proposed project interconnection, Western is the lead federal agency responsible for the project's National Environmental Policy Act compliance. The California Energy Commission has the statutory authority to license thermal powerplants of 50 MW or greater. The Energy Commission's siting facility certification process has responsibilities that are functionally equivalent to those of a lead agency under the California Environmental Quality Act. Because of these similar agency responsibilities to examine environmental impacts, Western and the Energy Commission are joint-lead agencies for this project's environmental review.

Comments on this Draft EIS/Final Staff Assessment must be received by December 14, 1998.

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EXECUTIVE SUMMARY

This document, the Final Staff Assessment (FSA)/Draft Environmental Impact Statement (Draft EIS) presents the California Energy Commission and Western Area Power Administration (Western) staff's independent assessment of Calpine Corporation's Application for Certification (AFC) of the Sutter Power Plant Project (SPP). The SPP project is briefly described as follows: Calpine Corporation (Calpine) proposes to construct, own and operate the SPP, a 500 megawatt (MW) natural gas fueled, combined cycle, electric generation facility. The SPP is proposed to be located adjacent to Calpine's existing Greenleaf Unit 1, a 49 MW natural gas fueled cogeneration power plant. The site is located approximately seven miles southwest of Yuba City, on South Township Road near the intersection with Best Road. The land dedicated for the facility will comprise approximately 16 acres of Calpine's existing 77-acre parcel.

Additional project facilities include a 5.7 mile, 230 kilovolt (kV), overhead electric transmission line that would be built from the plant to a new switching station and a new 14.9 mile natural gas pipeline that will be constructed to provide fuel for the project. The 16 inch gas pipeline will connect to Pacific Gas and Electric's (PG&E) Line 302, an interstate natural gas supply line located to the west of the SPP site, in Sutter County. Potable water and cooling water is proposed to be provided by an on-site well system that will be developed as part of the project. Sanitary waste will be treated by an on-site sewage treatment system. All other waste water generated in the operation of the plant and the treated effluent will be discharged to the existing surface drainage system requiring a National Pollutant Discharge Elimination System (NPDES) Permit.

The SPP and related facilities such as the electric transmission line, switching station and natural gas line are under the Energy Commission jurisdiction (Pub. Resources Code (PRC) §§ 25500 *et seq*.). When issuing a license, the Energy Commission acts as lead state agency (PRC § 25519(c)) under the California Environmental Quality Act (PRC §§ 21000 *et seq*.), and its process is functionally equivalent to the preparation of an environmental impact report (PRC § 21080.5). Staff's primary responsibility is to provide an assessment of the project's potentially significant effects on the environment, the public's health and safety, conformance with all applicable laws, ordinances, regulations and standards (LORS), and measures to mitigate any identified potential effects.

The project is also under the jurisdiction of Western as it will interconnect with Western's transmission system. Western, established in 1977 under Section 302 of the Department of Energy Organization Act, markets and transmits electric power. Western operates and maintains an extensive, integrated and complex high-voltage power transmission system to deliver reliable electric power to most of the western half of the United States. Western is the lead federal agency for the project.

To streamline the process and eliminate overlap and duplication between the state and federal processes, this joint Energy Commission/Western FSA/Draft EIS contains the evaluation of the project by the staffs of the California Energy Commission and Western. This document will be the basis for the decisions of both the Energy Commission and Western. This analysis includes both the construction and operation of the proposed facility. The analyses contained in this FSA/Draft EIS were prepared in accordance with PRC Sections 25500 *et seq*.; the California Code of Regulations (CCR) Title 20, Sections 12001 *et seq*.; the California Environmental Quality Act (PRC §§ 21000 *et seq*.) and its guidelines (CCR title 14 §§ 15000 *et seq.*); and the National Environmental Policy Act (NEPA) (42 U.S.C. 4371 *et seq*.) and its implementing regulations (40 C.F.R. §§ 1500 *et seq*.); and the Department of Energy NEPA Implementing Procedures and Guidelines (10 CFR 1021).

On December 15, 1997, Calpine filed the AFC with the Energy Commission, and on January 21, 1998, the Commission found the AFC data adequate and accepted the document. The analyses contained in this document are based upon information from the AFC and subsequent revisions; responses to data requests; supplemental information from local, state and federal agencies, local citizens and interested parties; existing documents and publications; and independent field study. The FSA/Draft EIS presents preliminary conclusions and conditions of certification for the design, construction, operation and closure of the facility.

If the project is approved, construction is expected to take 22 to 24 months. Construction is expected to begin in early 1999 and be completed late in the year 2000. Full scale commercial operation is expected by the end of 2000 or early 2001. Calpine expects a peak work force of approximately 256 craft laborers, supervisory, support and construction management personnel on the site during construction. The average work force over the entire construction period is estimated to be about 150 personnel. The total construction payroll is estimated at $20 million. Calpine will employ 20 full-time plant operators and technicians once the plant is complete. The capital cost of the project is estimated at about $250 to $285 million.

Calpine's stated objective for developing the Sutter Power Project is to sell electric power to a mix of retail and wholesale customers in the newly deregulated electricity market (Calpine 1997, AFC pages 1-1, 1-5 and 5-1).

SUTTER COUNTY AND FEDERAL, STATE, LOCAL AGENCY COORDINATION

Calpine has applied for a General Plan Amendment and a zoning change with Sutter County for the entire 77-acre parcel as the land is currently zoned for agricultural uses. Energy Commission staff has been working closely with Sutter County throughout the process. Sutter County plans to use the environmental review and analyses from the Energy Commission's process for its final decisions regarding the rezone and general plan amendment. Sutter County staff and officials have participated in all workshops and hearings.

In addition to the above noted coordination with Western and Sutter County, Energy Commission staff have closely coordinated the review and analysis of the project with U.S. Fish and Wildlife Service, Department of Fish and Game, Department of Water Resources, U.S. Army Corp of Engineers, Sutter National Wildlife Refuge, National Marine Fisheries Service, Central Valley Regional Water Quality Board, Yuba City, California Urban Water Agency, Contra Costa Water District, Sacramento Municipal Utility District (SMUD), California Public Utilities Commission (CPUC), California Independent System Operator, Pacific Gas and Electric (PG&E), City of Roseville, City of Lodi, Electricity Oversight Board, Northern California Power Agency, California Unions for Reliable Energy, the U.S. Environmental Protection Agency, California Air Resources Board, Feather River Air Quality Management District, the Native American Heritage Commission, the State Historic Preservation Office and the residents of the community.

FINDINGS AND RECOMMENDATIONS

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

In our review of the project, the following potential impacts were identified in the Preliminary Staff Assessment:

- there is the potential for significant visual impacts caused by the proposed transmission line, the proposed power plant and cooling tower vapor plume;
- there is the potential for significant environmental impacts to biological resources due to increased water temperature and exceedances of aquatic biota standards; and
- there is the potential for significant environmental impacts to water resources and flooding due to the inefficient use of groundwater for cooling, exceedances of water quality standards, potential draw down and contamination of nearby wells and inadequately sized drainage ditches and pumps.

In October 1998, Calpine submitted a mitigation package of measures that address many of these findings and potential environmental impacts. They are briefly summarized as follows:

1) The Sutter Power Plant will utilize a 100% dry cooling design that will reduce groundwater use by over 95% from the original proposal of 3,000 gallons per minute to a revised annual average of less than 140 gallons per minute.

2) The dry cooled plant will be a zero effluent discharge facility and will not discharge any process fluids into drainage canals in the area.

3) Calpine is prepared to change the transmission line route to proceed south along South Township and then west on O'Banion Road to a new switching station site on the south side of O'Banion Road near the Sutter Bypass. This route is about 4.0 miles long.

4) Calpine proposes to further reduce emissions from the plant to 2.5 parts per million (ppm) nitrogen oxide (NO_x).

These mitigation measures address many of the concerns raised in the case. These mitigation measures effectively reduce the above identified potential significant impacts to a level of insignificance, except for visual resources and storm water runoff. Proposed mitigation measures and recommended conditions of certification under which the project should be constructed and operated, if it is approved, have been mostly agreed to by Calpine and staff.

We further find the project to be in conformance with all Laws, Ordinances, Regulations and Standards (LORS) with the exception of Sutter County land use zoning and general plan conformity. Sutter County is in the process of reviewing Calpine's request for a rezone and General Plan Amendment. If Calpine's request is granted by Sutter County Board of Supervisors, the project will be in conformance with Sutter County land use LORS.

The Energy Commission staff recommends:

1. A project alternatives analysis was performed in which eleven sites were initially reviewed. Applying a first level screening criterion to these eleven sites, seven sites were eliminated from further study. Staff conducted additional analysis on the four remaining. Each of the four sites had both advantages and disadvantages, but no site was without major defect, either the potential for significant environmental impacts or were potentially infeasible due to transmission interconnection problems. Without extensive additional analysis on these alternative sites, we do not recommend an alternative site to the SPP site proposed by Calpine.

2. The use of dry cooling in place of water cooling will eliminate the visual impacts created by the vapor plume and re-routing the transmission line down O'Banion Road will eliminate the visual impacts of the transmission line south of O'Banion Road. However, two potential significant visual impacts remain. The proposed power plant as well as the proposed transmission line along South Township Road would continue to have the potential to cause significant visual impacts. To mitigate the impacts created by the transmission line, staff recommends consideration of another alternative transmission line route. This route would proceed west from the plant along a dirt road to PG&E's 500 kV line which it would then parallel south to the O'Banion Road switching station.

3. The analysis of the various technical areas include proposed conditions of certification under which the project should be constructed and operated, if it is approved. These proposed conditions are necessary to ensure that project specific impacts are reduced to a level of insignificance.

In conclusion, the Energy Commission staff recommends approval of the SPP project provided the proposed mitigation measures, contained in the proposed conditions of certification, are adopted by the Energy Commission. Without these mitigation measures, the project has the potential to create significant environmental impacts.

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INTRODUCTION

The Final Staff Assessment (FSA)/Draft Environmental Impact Statement (Draft EIS) presents the California Energy Commission and Western Area Power Administration (Western) staff's independent assessment of Calpine Corporation's Application for Certification of the Sutter Power Plant Project(SPP). Because the SPP project will interconnect with Western's high voltage transmission system, the environmental review and analysis has been completed jointly by the Energy Commission, the state lead agency, and Western, the lead federal agency, for this project. To streamline the review process and eliminate overlap and duplication between the state and federal governments, this joint California Environmental Quality Act (CEQA)/National Environmental Policy Act (NEPA) document will be the basis for both the Energy Commission's decision as well as for Western's decisions.

This document was prepared primarily by Commission staff with input from Western's staff. Western provided more input on certain technical areas where Western has considerable expertise. Where the document mentions staff considerations, the reader should assume that staff refers to both Commission staff and Western staff, unless specifically mentioned otherwise.

Evidentiary hearings will be jointly conducted by the California Energy Commission and Western. These will be scheduled for the fall 1998 and will be publicly noticed at least 15 days in advance. This report is prepared pursuant to Title 20, California Code of Regulations, Sections 1742.5, 1743 and 1744; and the National Environmental Policy Act (42 U.S.C. §§ 4371 *et seq*.) and its implementing regulations (40 C.F.R. §§ 1500 *et seq*.)

PURPOSE OF THIS REPORT

The report describes the following:

a. the project and the existing environmental setting;

b. whether the facilities can be constructed and operated safely and reliably in accordance with applicable laws, ordinances, regulations and standards;

c. the environmental consequences of the project using mitigation measures proposed by Calpine, Energy Commission staff, Western, Sutter County and other interested agencies;

d. the proposed conditions under which the project should operate if it is certified; and

e. project alternatives.

The assessment contained in this document is based upon information from the SPP Application for Certification (Docket 97-AFC-2) filed on December 15, 1997, supplemental information filed by Calpine, Calpine's responses to Energy Commission data requests, Calpine's mitigation measures filed in October 1998, information from local, state and federal agencies, interested individuals, intervenors, existing documents and publications and independent field studies and research. The FSA/Draft EIS presents conclusions and proposed conditions that apply to both the construction and operation of the project.

ORGANIZATION OF THE REPORT

The FSA/Draft EIS contains an Executive Summary, Introduction, Project Description, Western's Statement of Need and Purpose, Project Alternatives and Energy Commission findings of Need Conformance. The SPP project is analyzed in the 19 technical area chapters contained in this document: air quality, public health, worker safety and fire protection, transmission line safety, hazardous material management, waste management, land use, traffic and transportation, noise, visual resources, cultural resources, socioeconomics, biological resources, water resources, paleontologic resources, facility design, power plant reliability, power plant efficiency and transmission system engineering. These major technical areas are followed by a discussion of facility closure, project construction and operation compliance monitoring plan, witness qualifications, glossary of terms and a list of staff that assisted in preparing this report.

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

a. laws, ordinances, regulations and standards (LORS);

b. the regional and site-specific setting;

c. project specific and cumulative impacts;

d. mitigation measures;

e. conclusions and recommendations; and

f. conditions of certification (if applicable)

FEDERAL, STATE AND LOCAL AGENCY COORDINATION

Since the SPP site is currently zoned for agricultural uses, a change in zoning and a general plan amendment for the entire 77-acre parcel will be required of Sutter County. Calpine has applied to Sutter County for these changes. Energy Commission staff have been working closely with Sutter County throughout the process. Sutter County plans to use the environmental review and analyses from the Energy Commission/Western joint process on which to base their decisions regarding

the rezone and general plan amendment. Sutter County staff and officials have participated in all workshops and hearings to date.

In addition to the above agency coordination efforts, Energy Commission staff have closely coordinated the review and analysis of the SPP with U.S. Fish and Wildlife Service, Department of Fish and Game, Department of Water Resources, U.S. Army Corp of Engineers, Sacramento Wildlife Refuge, National Marine Fisheries Service, Central Valley Regional Water Quality Board, Yuba City, California Urban Water Agency, Contra Costa Water District, Sacramento Municipal Utility District (SMUD), California Public Utilities Commission (CPUC), California Independent System Operator, Pacific Gas and Electric (PG&E), City of Roseville, City of Lodi, Electricity Oversight Board, Northern California Power Agency, California Unions for Reliable Energy, the U.S. Environmental Protection Agency, California Air Resources Board, Feather River Air Quality Management District and the residents of the community.

CONCERNS OF THE LOCAL CITIZENS

In addition to the Informational and Project Scoping Hearing conducted by the Commission's Sutter Power Project Siting Committee and Western, staff conducted a total of eight workshops in Yuba City. These workshops focused on the various issues of concern raised by the public at the March 3, 1998 Informational Hearing/Scoping Meeting, issues contained in the Issues Identification Report and the Preliminary Staff Assessment. Three workshops were held on March 25, March 31, and June 3, 1998, in preparation of the Preliminary Staff Assessment. After competition of the Preliminary Staff Assessment, five additional workshops were held to take comments on the analysis. These workshops were held on July 14, August 4, 6 and 12, and September 15 and were well attended by local citizens plus representatives from Sutter County, Yuba City, California Urban Water Agency, California Unions for Reliable Energy, California Air Resources Board, Feather River Air Quality Management District, the Central Valley Region California Regional Water Quality Control Board, Department of Fish and Game and others.

The issues of primary interest to the public included: impacts to nearby wells, flooding and drainage, noise, visual aspects of the power plant and transmission lines, impact of the transmission lines on agricultural operations including aerial spraying and seeding. We appreciate the comments and participation of the public in these workshops and have attempted to include these concerns in the document. Further input from the public is encouraged during the evidentiary hearings that will follow.

PROJECT DESCRIPTION

The Calpine Corporation (Calpine) proposes to construct and operate the Sutter Power Project (SPP), a 500 megawatt (MW) natural gas fueled, combined cycle, electric generation facility. The SPP is proposed to be located adjacent to Calpine's Greenleaf 1, a 49 MW natural gas fueled cogeneration power plant, approximately seven miles southwest of Yuba City, on South Township Road near the intersection with Best Road. The land dedicated for the facility will comprise approximately 16 acres of Calpine's existing 77-acre parcel (Sutter County Assessor's Parcel Number 21-230-25).

Calpine's stated objective for developing the Sutter Power Project is to sell electric power to a mix of retail and wholesale customers in the newly deregulated electricity market. (Calpine 1997, AFC pages 1-1, 1-5 and 5-1).

PROJECT DESCRIPTION

The proposed 500 MW combined cycle facility will use two 170 MW gas turbine/generators exhausting into two heat recovery steam generators (HRSG). Steam generated in the two HRSGs will power a 160 MW steam turbine/generator. Air pollutants in the gas turbine exhaust will be controlled using selective catalytic reduction (SCR) technology. Nitrogen oxide (NOx) emissions from the combustion process will be controlled to 3.5 parts per million[1].

A new 5.7 mile 230-kilovolt (kV) overhead electric transmission line is proposed to be built to a new switching station which will interconnect to the Western Area Power Administration's (Western) 230-kV electric transmission system. The new transmission line is planned to be routed south along South Township Road, past O'Banion Road, to the southern end of South Township Road. At this point, Calpine has proposed two route alternatives. The route would continue south across open fields, or alternatively, it would (at the southern end of South Township) jog west on Tudor Road and then south along Murray Road to a point of interconnection with Western's system. A new switching station will be constructed to interconnect with Western's system[1].

A new 14.9 mile natural gas pipeline is proposed for construction to provide fuel for the project. The 16 inch gas pipeline will connect to Pacific Gas and Electric's (PG&E) Line 302, an interstate natural gas supply line located to the west of the SPP site, in Sutter County. The interconnection will occur at the existing Sacramento River drip station. The Sacramento River drip station will be expanded by about 5,000 square feet to accomodate a new dehydrator. Across the Sacramento River in Colusa County, approximately 8,000 feet of four inch line will be added along with a new dehydrator which will be installed at the Poundstone drip station on Line 302. As a

[1] This feature of the project has been changed by mitigation measures proposed by Calpine and filed on October 8, 1998. These measures are briefly discussed on the following page.

result of these changes in the gas collection and distribution system, the dehydrator at Oswald Road will be removed and the site restored and returned to the landowner.

Potable water and cooling water will be provided by an on-site well system that will be developed as part of the project. Sanitary waste will be treated by an on-site sewage treatment system. All other waste water generated in the operation of the plant and the treated effluent will be discharged to the existing surface drainage system requiring a National Pollutant Discharge Elimination System (NPDES) Permit[1].

CONSTRUCTION AND OPERATION

Construction of the SPP, from site preparation to commercial operation is expected to take 22 to 24 months. Construction is expected to begin in early 1999 and be completed late in the year 2000. Full scale commercial operation is expected by the end of 2000 or early 2001. There will be a peak work force of approximately 256 craft laborers, supervisory, support and construction management personnel on-site during construction. The average work force over the entire construction period is estimated to be about 150 personnel. The total construction payroll is estimated at $20 million. Calpine will employee 20 full-time plant operators and technicians once the plant is complete. The capital cost of the project is estimated at about $250 to $285 million.

CALPINE'S PROPOSED MITIGATION MEASURES

As a result of the findings in the Preliminary Staff Assessment and the concerns raised by the public, Sutter County staff, U.S. Fish and Wildlife Service and other interested parties; Calpine has proposed a mitigation package that would address many of these concerns and potential environmental impacts. The mitigation measures have been addressed by staff in this Final Staff Assessment. The following summarizes the proposed mitigation measures.

1) The Sutter Power Plant will utilize a 100% dry cooling design that will reduce groundwater use by over 95% from the original proposal of 3,000 gallons per minute to a revised annual average of less than 140 gallons per minute.

2) The dry cooled plant will be a zero effluent discharge facility and not discharge any process fluids into drainage canals in the area.

3) Calpine is prepared to change the transmission line route to proceed south along South Township and then west on O'Banion Road to a new switching station site on the south side of O'Banion Road near the Sutter Bypass. This route is about 4.0 miles long.

4) Calpine proposes to further reduce emissions from the plant to 2.5 parts per million (ppm) nitrogen oxide (NO_x).

PROJECT DESCRIPTION Figure 1
Regional Setting

PROJECT DESCRIPTION Figure 2
Local Setting

PROJECT DESCRIPTION Figure 3
Artist Rendering of the Sutter Power Plant

PROJECT DESCRIPTION Figure 4
Proposed Transmission Tower

WESTERN'S STATEMENT OF PURPOSE AND NEED

NEED FOR THE PROPOSED ACTION

Calpine Corporation contacted Western and requested interconnection of their proposed Sutter Power Plant project to Western's Keswick-Elverta and Olinda-Elverta Double-Circuit 230-kV transmission line for generation in the fourth quarter of the year 2000. This project will help to support and improve area transmission reliability by increasing voltage support for the Sacramento region. The proposed project conforms to the requirements of the California Energy Commission's 1996 Electricity Report, whose goal is to ensure that California's electricity system is as economically efficient as possible and that the state's public policies are achieved.

Western, as a major transmission owner, provides access to its transmission system when feasible, providing there is sufficient capacity. As part of the California Energy Commission's permitting process, Calpine submitted an Application for Certification which contains the results of an interconnection feasibility study. This study indicates that Western would need to make certain system additions in order to accommodate this interconnection and the proposed project.

PURPOSE OF THE PROPOSED ACTION

The purpose of this action is to respond to Calpine's request for an interconnection with Western's transmission system and to address: (1) the environmental impact of the proposed project; (2) any adverse environmental affects that cannot be avoided should the proposal be implemented; (3) alternatives to the proposed project; (4) the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; and (5) any irreversible and irretrievable commitment of resources that would be involved in the proposed project should it be implemented.

ALTERNATIVES

Testimony of
Marc S. Pryor, CEC
Loreen McMahon and Nick Chevance, Western

INTRODUCTION

This analysis presents the Energy Commission's Final Staff Assessment/Draft Environmental Impact Statement (FSA/Draft EIS) of alternatives to Calpine Corporation's (Calpine) Sutter Power Project (SPP). Calpine proposes to interconnect with the Western Area Power Administration's (Western) Keswick-Elverta/Olinda-Elverta double-circuit 230-kV transmission line. Therefore, Western is the federal lead agency for the project and is responsible for the National Environmental Policy Act (NEPA) analysis.

Energy Commission staff is required by Title 20, California Code of Regulations Section 1765 of the Energy Commission's siting regulations to examine the "feasibility of available site and facility alternatives to the applicant's proposal which substantially lessen the significant adverse impacts of the proposal on the environment". The "Guidelines for Implementation of the California Environmental Quality Act" (CEQA), Title 14, California Code of Regulations Section 15112(d), provides further 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 of the project."

The National Environmental Policy Act requires that Western "...explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated" Title 40, Code of Federal Regulations Section 1502.12(a). The California Energy Commission and Western have operated jointly in the design and production of this combined CEQA/NEPA analysis; this siting alternatives analysis is intended to function as the alternatives analysis for both CEQA and NEPA purposes.

WESTERN'S NEED AND PURPOSE STATEMENTS

The heart of the environmental analysis for NEPA is the analysis of alternatives, which are differing ways of satisfying the need and purpose for the project analysis. As previously presented in this document, the need and purpose states: 1) "[t]his project will help to support and improve area transmission reliability by increasing voltage support for the Sacramento region"; 2) the results of an interconnection study submitted as part of Calpine's AFC "indicates that Western would need to make certain system additions in order to accommodate this interconnection and the proposed project; and 3) the "purpose of this action is to respond to Calpine's request for an interconnection with Western's transmission system and to address the potential environmental consequences associated with this proposed project".

PROJECT'S BASIC OBJECTIVES

After studying the SPP 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 Sutter County region in order to generate and sell electric power in the newly deregulated power market.

DETERMINING THE SCOPE OF THE ALTERNATIVES ANALYSIS[2]

The purpose of staff's alternatives analysis is to provide the Energy Commission with a reasonable range of feasible alternative sites 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 site alternatives which are capable of reducing or avoiding significant impacts.

This section presents staff's analysis of alternatives to siting the SPP at the location described in the project description. These are siting alternatives developed in response to public and other staff inputs, and to those alternatives originally provided by Calpine. In considering locational alternatives, the staff had to determine a reasonable geographical area. Since alternatives must consider the underlying objectives of the proposed project, staff confined the geographic area for locational alternatives to the Sutter County region. Locational alternatives beyond this region would be inconsistent with the project objectives, and would be so broad that it would undermine a useful locational alternatives analysis.

The public should take note that these siting alternatives assume that the proposed SPP site is unmitigated; these alternative sites were not compared to the SPP after the proposed mitigation that is presented for each technical issue. The public should also note that none of these alternative sites have been subjected to an in-depth analysis similar to that conducted for the SPP site.

The public should also note that the Commission is required by CEQA to declare an environmentally preferred alternative, which is presented at the end of this chapter. The concept of an environmentally preferred alternative in CEQA is interpreted differently than in NEPA. Under NEPA, Western is required to identify an "environmentally preferred alternative" at the time of the Record of Decision, which is the alternative that best promotes the goals of NEPA. This is usually the alternative

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[2] This analysis does not discuss alternatives such as, but not limited to, equipment and procedures. Each of the individual technical sections of this FSA contain their respective analyses. Furthermore, this analysis does not consider components of electrical supply and demand. Energy efficiency efforts, otherwise referred to as demand-side management (DSM), are already included in the Energy Commission's projections of electricity supply and demand contained in the California Energy Commission's Electricity Report 96, November 1997, as required by Public Resources Code § 25308.

that causes the least damage to the physical and biological environment; the one that "...best protects, preserves, and enhances historic, cultural, and natural resources" (CEQ 1981).

It is premature to consider the environmentally preferred alternative presented at the end of this chapter as Western's environmentally preferred alternative; Western will wait until all information from the public and interested parties is received and analyzed prior to announcing its selection. The alternative presented at the end of the chapter is the one that the Commission staff believes is the least damaging but, as stated above, it does not factor in any of the mitigation at the proposed site that may reduce impacts to less than significant.

POTENTIAL SIGNIFICANT ADVERSE IMPACTS

The following is a list of technical areas in which staff has identified potential significant impacts resulting from the project, if left unmitigated:

- Air quality
- Hazardous materials
- Land use
- Visual resources
- Biological resources
- Water resources

REASONABLE RANGE OF ALTERNATIVES[3]

The range of alternatives is governed by the "rule of reason" which requires the environmental document to "set forth only those alternatives necessary to permit a reasoned choice" (Title 14, California Code of Regulations Section 15126(d)(5)). The key issue is whether the selection and discussion of alternatives fosters informed decision-making and public participation. An environmental document need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative. (Title 14, California Code of Regulations Section 15125(d)(5). NEPA also requires that all reasonable alternatives must be examined, even those beyond the jurisdiction or capability of the Federal agency (40 CFR 1502.14).

Staff analyzed the "no project" (NEPA "no action") alternative and various alternative sites. The "no project" alternative analysis is presented first in the analysis part of this FSA/Draft EIS section. This analysis satisfies the requirement under NEPA to include an alternative of no action [40 CFR 1502-14(d)].

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[3] Unless otherwise indicated, all citations are to the CEQA Guidelines, Title 14, California Code of Regulations Section 15043.

Alternative sites were identified from a prior local siting case, Sacramento Ethanol and Power Cogeneration Project (SEPCO), and from discussions with Sutter County staff, the public and Energy Commission staff. The eleven sites identified were then subjected to a four step process. First, a set of screening criteria were used to narrow the range of possible alternative sites. The second step addressed Calpine's ability to gain site access and control. Third, technical staff from each discipline (e.g., biology, air quality, etc.) was presented with the task of comparing each site against the unmitigated proposed project site. Comparisons were based on whether an alternative site and its related linear facilities were better, the same or worse than the proposed project, in terms of each technical discipline. The fourth step was to use the comparison values obtained to address only those technical areas in which staff has identified potential significant impacts resulting from the project (air quality, hazardous materials, land use, visual, biological and water resources).

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

National Environmental Policy Act

The National Environmental Policy Act is the national charter for the protection of the environment. It established environmental protection as a policy, and provides a means for carrying out the policy. The Act requires that Federal agencies consider the effects of their actions on the human environment in planning their activities, and it provides for procedures that agencies must follow to achieve the goals of the Act. Primary in NEPA analysis is that the public and the decision maker is fully informed of the impacts associated with the proposed activity. The intent is to make good decisions based on an understanding of the environmental consequences, and to take actions to protect, restore, and enhance the environment. In order to achieve this, the agency is required to rigorously explore all reasonable alternatives to the proposed action. Western is the lead Federal agency with these responsibilities.

40 CFR 1500-1508

These regulations implement the procedural provisions of NEPA. They establish both the process that must be followed in order to comply with the Act, as well as the requirements that documents must satisfy.

10 CFR 1021

These are the specific regulations of the Department of Energy that provide procedures for all organizational elements of the Department, including Western, in complying with the provisions of NEPA.

STATE

California Environmental Quality Act (CEQA)

Similar to NEPA, CEQA requires a lead agency to prepare either a Negative Declaration or an Environmental Impact Report (EIR) that reviews a project's potential environmental effects. The California Energy Commission's certification process does not result in the issuance of an EIR. Instead, the Energy Commission's review process has been deemed functionally equivalent to CEQA by the Secretary of Resources. An alternatives analysis is an integral part of this environmental analysis as well.

CEQA Guidelines, California Code of Regulations, Title 14, § 15043

Provides guidelines for the preparation of an environmental (i.e., CEQA) analysis.

Warren-Alquist State Energy Resources and Development Act, Public Resources Code § 25000 et seq.

Legislation that created the California Energy Commission. Public Resources Code § 25500 et seq. pertains to power facility and site certification.

LOCAL

County of Sutter/County of Sacramento General Plans, Land Use Elements

A General Plan (GP) provides long range planning policy. It is developed, adopted and implemented by local planning bodies (city councils and county Boards of Supervisors). One of seven mandatory elements of a GP, the land use element, addresses the general nature and distribution of land uses. General Plan land use designations are not as specific as zoning classifications and do not allow either "by-right" or conditional uses pertaining to specific parcels. Rather, they reflect planning objectives that are meant to guide future policy-making and land use decisions.

An example is the GP land use designation of the South Sutter County Industrial/Commercial Area as Industrial/Commercial. Many, if not most, assessor parcels in this area "carry" agricultural zoning classifications. Any change in zoning classification would have to be consistent with the GP. Thus, a zoning change from AG-80 (or agriculture with a minimum 80 acres parcel size) to RD-5 (single-family residential, five dwelling units per acre) would not be consistent with the GP policy of directing use to Industrial/Commercial uses. Such a project would either be disapproved based upon GP inconsistency, or the GP plan would have to be amended.

County of Sutter/County of Sacramento Zoning Codes

Zoning codes provide for the classification of individual assessor's parcels, or portions thereof, into different land use categories (e.g., industrial, residential, open space and agricultural) and for further divisions of such uses (e.g., light industrial and heavy industrial). Each classification allows for "by-right" or conditional permitting of only certain types of land uses.

SETTING

REGIONAL DESCRIPTION

The County of Sutter is located in south central Sacramento Valley and is bounded by the Counties of Colusa and Yolo on the west (as delineated by the Sacramento River); the County of Butte on the north; the Counties of Yuba and Placer on the east (partially delineated by the Feather River); and the County of Sacramento on the south. Except for the small Sutter Buttes range in the extreme northwest portion of Sutter County, the region's terrain is relatively flat.

The primary land use of the Sutter County region is agriculture, with rice cultivation, orchard crops and cattle grazing being the three predominant activities. Cities and towns are few and small in geographic extent, with the exception of the Sacramento metropolitan area which is approximately 14 miles due south of the southern boundary of Sutter County. The county seat of Sutter County is located in Yuba City in the northeastern portion of the county. Yuba City is immediately adjacent to the city of Marysville, which is to the east in Yuba County. These two cities are separated by the Feather River, and together form the cultural and political hub of the local area.

ANALYSIS

THE "NO PROJECT" ALTERNATIVE

CEQA Guidelines and Energy Commission regulations, as well as NEPA and its regulations, require consideration of the "no project" (NEPA "no action") alternative. This alternative assumes that the project is not constructed. In the Energy Commission's analysis, it is compared to the proposed project and determined to be superior, equivalent or inferior to it. In NEPA, the "no action" alternative is typically used as a benchmark of existing conditions by which the public and the decisionmakers can compare the environmental effects of the proposed action and the alternatives.

In the SPP Application for Certification (AFC), Calpine presented the "no project" alternative as not feasible and provided three supporting arguments for their conclusion (SPP 1997, AFC page 5-1). The first is that the "no project" alternative does not meet Calpine's business plans and the purpose of a merchant power plant. Second, Calpine argues that the no project alternative would likely result in greater

fuel consumption and air pollution in the state since the SPP will displace production from older, less efficient, higher air emission utility-owned plants. The third argument is that the project will add stability to the Sacramento area transmission network.

The first argument addresses the desirability, and not the feasibility, of the "no project" alternative. Following this argument, any project proponent could dismiss a "no project" alternative simply because it does not satisfy the proponent's goals and objectives.

Without supporting documentation the second argument may appear to be too speculative. However, based on work done in previous Electricity Reports, the SPP will likely displace less economic and dirtier facilities, although the location or quantification of such benefits is unknown. However, the air quality improvement argument is insufficient because it ignores other potentially significant environmental impacts. Staff believes that, in this case, air quality impacts should not be assigned overriding importance to the exclusion of other environmental resources, such as biological, visual and water resources.

The third argument predates the Sacramento Area Transmission Planners Group's (SATPG) opinion that, even with the SPP, the system would require additional support within six years of completion of the project (SATPG, 1998). However, construction of the SPP power plant would delay the environmental impacts created by additional transmission lines. This delay period may allow for transmission line plans that would have fewer environmental impacts than would otherwise be created.In their August 14, 1998 letter to the Energy Commission staff (Richins, 1998), Calpine expressed their opinion that the SPP would: lower electricity prices for California consumers; provide "badly needed" voltage support and reliability for the Sacramento/Sutter County region; generate tax revenues and local economic benefits for Sutter County; provide local construction and operational jobs; enhance the County's emergency response capabilities; and provide for "substantial" road improvements within Sutter County. These points are well taken and the consideration of one or more of them may lead the Energy Commission, and any other decision-making body involved in the matter, to conclude that the benefits derived by the construction and operation of the SPP would outweigh the benefits of not certifying the proposed project.

However, from an environmental standpoint, not constructing and operating the proposed SPP project would avoid the one environmental impact created by the project that does not seem to be mitigable, the visual impact. Therefore, the "no project" alternative would seem to be slightly superior to the (unmitigated) proposed project in terms of environmental effects. Because of this determination, staff analyzed alternative sites that would reduce or avoid one or more of the six potential significant environmental impacts from the proposed SPP project.

ANALYSIS OF THE ALTERNATIVE SITES

Environmental issues identified in the AFC consisted of impacts to air quality, biology, visual and water resources. Additional potential environmental issues were identified during the informational hearing and three public workshops which were held during the period between the filing of the AFC and the preparation of the Preliminary Staff Assessment. These include the potential impacts of the proposed transmission line routing on aerial applicator operations; losses of arable land use due to power poles; power pole and power line visual impacts; effluent drainage; traffic; lighting and noise.

General public and Energy Commission staff input, as well as an examination of the Sacramento Ethanol Partners Cogeneration project's records, resulted in the identification of a total of eleven potential alternative sites. To create a list of siting alternatives that staff believed 1) avoided or substantially reduced any of the unmitigated significant effects of the proposed project, 2) were feasible, and 3) attained most of the objectives of the project, a four step process was used. The first step was a comparison of all eleven sites to specific screening criteria. An alternative sites was not retained for further analysis if it did not meet all the criteria[4]. The second step addressed Calpine's feasibility to gain site control of the remaining sites. The third step was a comparison, by technical staff, of the remaining sites (and projected related linear facilities) to those of the proposed project. Steps one and three allowed for the elimination of any alternative site that contained one or more "fatal flaws", but none were found.

Full descriptions of the proposed Sutter Power Project site and related linear facilities routes may be found in the Project Description of this FSA. Appendix B of this analysis presents a short discussion of Calpine's alternative sites and their respective related linear facilities. Step two below presents short descriptions of staff's eleven alternative sites (see ALTERNATIVES Figure 1).

Step One - Comparison of Eleven Alternative Sites[5]

Criteria

To be carried forward in the alternative site analysis, a site had to:

- be within 20 miles (routing distance) of a natural gas supply (roughly equivalent to the proposed project's natural gas supply line routing distance),

[4] The O'Banion Road site was retained because this site was identified by the public during workshops.

[5] Another site in the general area of the Sutter Bypass near Sacramento Avenue was mentioned by at least one member of the general public late in the review process (late July, 1998). This area was examined and found to be currently under rice cultivation throughout. Cursory examination indicated probable visual and water resources impacts. Therefore, this site was not considered further.

- be within five miles (routing distance) of Western's Keswick-Elverta/Olinda Elverta double-circuit 230-kV transmission line (roughly equivalent to the proposed project's transmission line routing distance)[6],

- have a transmission line route that avoids medium- to high-density residential areas (density greater than five dwelling units per acre),

- either be zoned for power plant use; or if not, then the site should have a reasonable possibility of being rezoned (e.g., not currently be under cultivation).

[6] Western's Cottonwood-Roseville-Folsom 230-kV transmission line is at 95% capacity and would be unable to accommodate SPP's output without prohibitively expensive upgrading. (Shah, 1998.)

ALTERNATIVES Figure 1
Alternative Site Locations

Maxwell (Colusa County), SEPCO site S7 (Sutter County), Williams (Colusa County), Catlett (Sutter County) and Everglade Road (Sutter County)

The Maxwell, SEPCO S7, Williams and Catlett sites were siting alternatives in the SEPCO project. They were selected for inclusion in this case because of their location within the Sutter County region, and their proximities to natural gas supplies and Western's Keswick-Elverta/Olinda-Elverta double-circuit 230-kV transmission line. The Everglade Road site was suggested by a member of the general public during a public workshop.

The first four sites were each known to be near rail and agricultural-related industrial-type facilities (e.g., grain elevators) and had the potential for industrial development. However, staff determined that these sites were both zoned for agricultural uses and under cultivation, and they were removed from further consideration.

The Everglade Road site is located about six miles south of the proposed SPP site. It is adjacent to the Sutter Bypass and Western's Keswick-Elverta/Olinda-Elverta double-circuit 230-kV transmission line. This site's agricultural cultivation status was not determinable during a staff visit, but appeared to be lying fallow. Subsequently, staff queried the property owner and determined that the land is actively farmed (Richins 1998a). Therefore, this site was removed as well.

Pearson (Yuba County) and Yuba City (Sutter County)

The Pearson site was also a SEPCO project alternative site. It is located in Yuba County in an industrial area near the Marysville Airport and is about 20 miles routing from Western's Keswick-Elverta/Olinda-Elverta double-circuit 230-kV transmission line. The transmission line routing would require crossing the Feather River and would pass immediately adjacent to medium- to high-density residential areas.

The Yuba City site was mentioned by members of the public during an informational hearing. An industrial site, it is located in the incorporated city of Yuba City near a water reclamation plant. To the east is the Feather River, and to the north, west and south are other industrial uses and residential dwellings. The distance to Western's Keswick-Elverta/Olinda-Elverta double-circuit 230-kV transmission line is approximately 15 route miles. As with the Pearson site, transmission lines would be immediately adjacent to medium- to high-density residential areas. Interconnection with Western's Cottonwood-Elverta-Roseville 230-kV line, about ten miles to the east of the both sites, was considered infeasible due a lack of capacity (Shah, K. 1998). In addition, a sixty foot height restriction at the Yuba City industrial area would prohibit the two 185 feet high stacks required for the SPP project.

Both sites were dropped from further consideration because they did not meet the third criteria, avoidance of medium- to high-density residential areas. In addition, the height restriction would preclude further analysis of the Yuba City site.

SEPCO sites SAC1 (Sacramento County), S1 (Sutter County) and Sutter Buttes Industrial Area (Sutter County)

Staff's SAC1 alternative site is only one of the four parcels that, together, comprised the proposed SEPCO SAC1 project site that was before the California Energy Commission in 1994. The SEPCO project has not been built and is not expected to proceed. Located approximately 12 miles north of the City of Sacramento and about one mile east of Highway 99/70, the site is located in the Rio Linda/Elverta area of northwestern Sacramento County. The site is about 15 miles from a natural gas supply line. Western's Elverta substation (the terminus of the Keswick-Elverta/Olinda Elverta transmission line) is about 4,000 feet from the SAC1 site, and a transmission line to the substation would avoid residential areas. The industrial zoning classification at this site allows for power plants and the site's current use is for grazing. This site met all four criteria and was retained.

Calpine identified the South Sutter County Industrial/Commercial Area (SSCICA) in its entirety as an alternative site. Energy Commission staff identified one particular parcel, known in the SEPCO case as site S1, for consideration as a specific alternative site. Located about 28 miles south of Yuba City and two miles east of Highway 99/70, this site is bounded on the west by Union Pacific Railroad tracks and on the north by Sankey Road. The site is about 20 miles from the same natural gas supply line that would be used for SAC1. The site is adjacent to Western's Keswick-Elverta/Olinda Elverta transmission line, thus a transmission line would be unnecessary. Zoning is agricultural and the site is currently used for grazing. This site met all four step one criteria and was retained.

Calpine also identified the entire Sutter Buttes Industrial Area (SBIA) in the Application for Certification AFC as an alternative site. Energy Commission staff has identified one particular parcel, the Sutter Buttes site (known in the SEPCO case as site alternative East Sutter 4) as being the best part of the SBIA to be considered as a specific alternative site. This alternative site is located in northern Sutter County approximately six miles west of Yuba City. Natural gas could be supplied from the Grimes station about 20 miles away. Western's Keswick-Elverta/Olinda Elverta transmission line is about five miles to the southwest, and would have a transmission line that would avoid medium- to high-density residential areas. A separate switching station would be required at the point of interconnection, similar to the proposed SPP project's switching station. This site is zoned industrial and did not, at the time of a site visit, appear to be used for cultivation. This site was retained as well.

O'Banion Road (Sutter County)

The O'Banion Road site was suggested by members of the public and staff. Inconsistency with both the General Plan and Zoning Code, and the active rice cultivation occuring on this site, would have precluded further analysis past the first screening level. However, due to the significant public interest in the site, it was retained and carried forward.

This 56 acre site is in the same general area of Sutter County as the proposed SPP site. Located at the west end of O'Banion Road and on the south side of the road between the Sutter Bypass levee and Gilsizer Slough drain, the site is about four miles from the proposed SPP site and is crossed, north to south by both the Sutter Bypass and Western's Keswick-Elverta/Olinda-Elverta transmission line. Natural gas would be supplied as in the proposed SPP project, but would be routed down Boulton Road. The natural gas supply routing distance would be about 16 miles.

In addition to being under active rice cultivation, this site is the location of a duck club. The site features a main structure that appears to be a clubhouse, two small outbuildings, and various trailers that are in various stages of disrepair. In addition, the site has a barn and farming implements. According to Paul Russell, no one lives at the site, and the site may be available for acquisition (Richins, 1998b).

Summary of the Results of Step One (ALTERNATIVES Table 1)

Four of the eleven alternative sites met the three screening criteria and were carried forward to the second step of analysis. They were the SAC1 (assessor's parcel number (APN) 202-0090-033), S1 (APN 35-170-004), Sutter Buttes (APN 13-270-086) and O'Banion Road (APN 21-240-018) sites. Six of the other alternative sites, Maxwell, Pearson, S7, Williams, Catlett and Everglade Road, did not meet the criteria of not being currently under agricultural use. The Maxwell, S7, Williams, Catlett and Everglade Road sites also are not zoned for power plant usage, nor were they deemed to have reasonable possibilities of being acquired and rezoned.

The Yuba City site was rejected for three reasons: 1) the distance to Western's Keswick-Elverta/Olinda-Elverta double-circuit 230-kV transmission line, 2) existence of medium- to low-density residential areas adjacent to the route of the transmission line to Western's system, and 3) an existing sixty foot height restriction.

ALTERNATIVES Table 1
Comparison of Eleven Alternative Sites
to the Step One Criteria

SITE	Natural Gas Supply within 20 miles (routing distance)?	Western's Keswick-Elverta/Olinda-Elverta 230-kV Transmission Line within 5 miles (routing distance)?	Transmission Route Avoids Medium- to High-density (5 d.u./acre or more) Residential Areas?	Either Zoned for Power Plant Use, or if not, Rezone is a Reasonable Possibility?
Maxwell	Yes[1]	Yes	Yes	No
Pearson	Yes[1]	No	No	Yes
S7	Yes[1]	Yes	Yes	No
Williams	Yes[1]	Yes	Yes	No
Catlett	Yes[1]	Yes	Yes	No
Everglade Road	Yes	Yes	Yes	No
Yuba City	Yes	No	No	Yes
SAC1	Yes[1]	Yes	Yes	Yes
S1	Yes[1]	Yes	Yes	Yes
Sutter Buttes	Yes[1]	Yes	Yes	Yes
O'Banion Road	Yes	Yes	Yes	Yes

[1] Information obtained from the Sacramento Ethanol and Power Cogeneration Project (SEPCO) Final Staff Analysis (FSA), 92-AFC-2, and the associated Cogeneration Pipeline Project FSA, 92-AFC-2P.

Step Two - Feasibility for Site Control

In step two, consideration was given to Calpine's feasibility to reasonably acquire, control or otherwise have access to each of the four remaining alternative sites. Both the SAC1 and Sutter Buttes sites are zoned industrial and are vacant, but a determination of availability could not be made. The S1 site is not zoned for industrial use, but is vacant. Its availability could not be determined. The O'Banion Road site may be available (as noted above) but acquisition costs would have to be negotiated

and may be infeasible. Therefore, Calpine's feasibility to reasonably acquire, control or otherwise gain access to any of the four sites could not be determined.

Step Three - Comparisons of Remaining Sites to the Proposed Project Site

The third step of the analysis was a comparison of the four remaining alternative sites to the applicant's proposed site. Technical staff was presented with descriptions and maps of the alternative sites and the prospective related linear facility routings of each. Alternative sites were determined by staff to be better, the same or worse in comparison to the proposed project for each staff member's own technical areas. (ATTACHMENT A - STAFF COMPARISONS presents a more detailed analyses and descriptions of the four remaining sites.) Responses for each technical area were then listed by area and an overall comparison rating was derived by converting the better, same and worse comparisons to the numerical values of 1, 0 and -1, respectively (ALTERNATIVES Table 2).

SAC1

The SAC1 site was determined to be better overall than the proposed SPP site because it is zoned for power plant usage, would have better and closer fire protection services, avoids conflicts with aerial applicators, has less impact on water resources, and is much closer to the Elverta substation. Closer proximity to the Elverta substation is beneficial from the standpoint of reliability, i.e., a short transmission line reduces the likelihood that physical damage may occur.

Factors that made SAC1 worse in comparison are primarily due to its close proximity to a much greater number of residential areas (less than 1/2 mile). These areas create concerns for hazardous materials incident consequences, impacts on traffic and resources impacts would be worse than at the SPP site due to the routing of the natural gas supply line.

S1

The disadvantages of this site include the close proximity of sensitive receptors relative to hazardous materials incidents and noise, fire protection concerns, potential land use conflicts, and impacts on visual and biological resources. Close proximity to the Keswick-Elverta 230-kV transmission line is a positive factor.

Sutter Buttes

The Sutter Buttes site was found to be the same as the proposed SPP project for overall environmental impacts. Factors that made this site better were the site's faster fire service response time and its existing zoning for industrial use. Factors deemed worse were the proximity to the unincorporated community of Sutter (for

ALTERNATIVES Table 2

Screening Level Two

Site	SAC1	S1	S. B.	O'Banion
Technical Area				
Air Quality	S (0)	S (0)	S (0)	S (0)
Public Health	S (0)	S (0)	S (0)	S (0)
Hazardous Materials	W (-1)	W (-1)	W (-1)	B (1)
Industrial Safety and Fire Protection	B (1)	W (-1)	B (1)	S (0)
Transmission Line Safety and Nuisance	B (1)	B (1)	W (-1)	B (1)
Land Use	B (1)	B (1)	B (1)	S (0)
Traffic and Transportation	S (0)	S (0)	S (0)	S (0)
Noise	S (0)	W (-1)	S (0)	S (0)
Visual Resources	W (-1)	W (-1)	W (-1)	B (1)
Cultural Resources	W (-1)	W (-1)	B (1)	B (1)
Socioeconomics	B (1)	S (0)	S (0)	S (0)
Waste Management	S (0)	S (0)	S (0)	S (0)
Biology	W (-1)	W (-1)	S (0)	S (0)
Water Resources	B (1)	S (0)	W (-1)	W (-1)
Soil Resources	S (0)	S (0)	S (0)	S (0)
Paleontological Resources	W (-1)	W (-1)	B (1)	B (1)
Facility Design and Geological Hazards	S (0)	S (0)	S (0)	S (0)
Reliability	S (0)	S (0)	S (0)	S (0)
Efficiency	S (0)	S (0)	S (0)	S (0)
Transmission System Engineering	B (1)	B (1)	S (0)	B (1)
Facility Closure	S (0)	S (0)	S (0)	S (0)
Aggregate	B (1)	W (-4)	S (0)	B (5)

S (0) = same as the proposed SPP project; B (1) = better than; W (-1) = worse than.

hazardous materials impacts), impacts on the views of the Sutter Buttes range, and water resources impacts due to expected limitations on groundwater availability in the immediate area.

O'Banion Road

As shown in ALTERNATIVES Table 4, the O'Banion Road site appears to be the better overall site among the alternative sites reviewed. Because there are fewer close residents, the effects of potential hazardous materials incidents would be reduced. Visual impacts due to the power plant's buildings, stacks and steam plumes would be reduced by the physical location of the site away from residences and roads. Also, visual impacts posed by an interconnecting transmission line would be avoided altogether because such a line would be unnecessary.

The U. S. Fish and Wildlife Service has expressed a concern that views from the Sutter National Wildlife Refuge would be impacted, particularly from proposed public access points (Wolder, M. 1998). Current access is limited to hunters during hunting seasons. The proposed public access points are believed by Energy Commission staff to be speculative because the USF&WS has not cited a timeframe for implementation.

This same factor of no transmission line would avoid impacts on agricultural land uses, would be better from a transmission system engineering aspect, and would avoid impacts to migrating waterfowl. Although the applicant believes that the existence of PG&E's transmission lines between this site and Western's system may be problematic, staff believes that a routing under PG&E's line is practical and feasible if placed adjacent to a tower or underground (McCuen, 1998).

This site would be the same for biological resources effects. As noted above, the elimination of the long transmission line would avoid impacts to migrating waterfowl. In addition, impacts on the Giant Garter Snake would either be reduced or avoided, and there are no wetlands associated with the O'Banion Road site. However, because effluent water temperatures would be higher, fish would be impacted.

Although groundwater pumping effects on local wells would be less, water quality would be worse due to effluent drainage into the main drain. Effluent temperature reduction and dilution would not be as great at the O'Banion Road site as at the proposed SPP site. In addition, detrimental effects upon the Gilsizer drain and Gilsizer Slough during flood events would be increased. Therefore, the overall effects on water resources would be worse than at the SPP site.

One technical area, noise, was deemed to be worse in the Preliminary Staff Assessment (PSA) due to a structure that was thought to be an occupied residential dwelling existing at the immediate northwest corner of the this site. After the publishing of the PSA, it was found not to be occupied, thus changing the site's status to be the same for noise effects as at the SPP site.

Step 4 - Comparisons for the Six Identified Potential Significant Impacts

To bring this analysis full circle back to those technical areas in which staff has identified potential significant impacts resulting from the project, step four considered only those areas and their numerical values as given in ALTERNATIVES Table 2. Areas identified were air quality, hazardous materials, land use, visual, biological and water resources. ALTERNATIVES Table 3 presents these areas as extracted from ALTERNATIVES Table 2 and shows a separate aggregate value.

CONCLUSIONS AND RECOMMENDATIONS[7]

Because the "no project" alternative was found to be, environmentally, slightly superior to the proposed project, CEQA requires a determination of an environmentally preferred siting alternative. (Note: this is not a requirement of NEPA.) This was done by assigning numerical values of (1) to comparison ratings of "Better" than the proposed project, (0) to those rated the "Same" and (-1) to ratings of "Worse". The numerical values for each technical area were added together and the one with the highest number became the leading candidate for the preferred environmental alternative (ALTERNATIVES Table 2). The numerical aggregate values obtained were (1) for SAC1, (-4) for S1, (0) for Sutter Buttes, and (5) for the O'Banion Road site, making O'Banion Road the leading candidate. The remaining sites in order of best to worst are SAC1, Sutter Buttes and S1.

When comparison values are limited to the list of six potential significant adverse impacts identified with the proposed project (i.e., air quality, hazardous materials, land use, visual, biological and water resources) a slightly different result is obtained. The results are O'Banion Road site with a value of (1), SAC1 with (-1), and both the S1 and Sutter Buttes at (-2) (ALTERNATIVES Table 3). The O'Banion Road siting alternative was found to be the better of the alternative sites, both in terms of all technical areas and when compared to the identified six potential significant adverse impacts.

If the environmental impacts created by the proposed project are mitigable to less than significant levels, no further consideration of alternatives sites is required. In the event that one or more significant impacts cannot be mitigated or avoided, the Commission may still decide that certification of the project is warranted with findings of overriding considerations.

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[7] Basic technological alternatives that were reviewed and rejected by staff are oil, coal, nuclear, solar, hydroelectric, ocean energy, biomass, fuel cells, municipal solid waste and geothermal. Rejection was based on one or more of the following: incapable of reducing or avoiding potential impacts, or infeasible due to cost, location limitations or regulatory reasons.

ALTERNATIVES Table 3
Comparison Values for the List of Six
Potential Significant Environmental Impacts

Site	SAC1	S1	S. B.	O'Banion
Technical Area				
Air Quality	S (0)	S (0)	S (0)	S (0)
Hazardous Materials	W (-1)	W (-1)	W (-1)	B (1)
Land Use	B (1)	B (1)	B (1)	S (0)
Visual Resources	W (-1)	W (-1)	W (-1)	B (1)
Biological Resources	W (-1)	W (-1)	S (0)	S (0)
Water Resources	B (1)	S (0)	W (-1)	W (-1)
Aggregate	W (-1)	W (-2)	W (-2)	B (1)

S (0) = same as the proposed SPP project; B (1) = better than; W (-1) = worse than.

Of the alternatives studied, the O'Banion Road site appears to be environmentally preferable, as indicated in ALTERNATIVES Table 2. However, ALTERNATIVES Table 2 represents a very general evaluation. It indicates the environmental areas where each alternative is better, the same, or worse, overall, to the proposed project. The degree of superiority/inferiority, and its level of overall importance, is not evaluated. For instance, ALTERNATIVES Table 2 does not indicate the relative importance of various impacts, such as visual impacts vs. biological impacts. The "weighting" of such impacts, while highly subjective, can be critical to determining which alternative is preferred, and how strong that preference may be.

With regard to the six impacts compared in ALTERNATIVES Table 3, the O'Banion Road site appears to be somewhat better than the SPP proposed site. Use of the O'Banion Road site would eliminate the significant visual impact caused by the use of the proposed site because it would require a minimal transmission line connection, and it is farther removed from residences and through roads. There are many uncertainties with regard to the feasibility and environmental impact of the O'Banion Road site, including water quality and supply, drainage/flooding, biological resource impacts, transmission interconnection, and the ability of Calpine to acquire the site. However, staff has not determined that any unmitigable significant environmental impacts would result from use of the site.

Even if it should prove feasible as an alternative, a detailed environmental analysis could indicate that the O'Banion Road alternative has equal or greater overall environmental impacts as the proposed site. Therefore, although staff has identified the O'Banion Road site as environmentally preferable among the studied alternatives,

staff does not have sufficient basis to conclude that the O'Banion Road site is environmentally preferable to the SPP project site.

REFERENCES

Calpine. 1997. Application for certification, Calpine Corporation Sutter Power Project (97-AFC-2). Submitted to the California Energy Commission, December 15.

CEC (California Energy Commission). 1997. Electricity Report. Sacramento, Ca.

Remy, M, et al. 1996. Guide to the California Environmental Quality Act (CEQA), Ninth Edition. Point Arena, Ca. Solano Press Books.

CEQ (Council on Environmental Quality). 1981. 48 Federal Register 18026.

SATPG (Sacramento Area Transportation Planning Group). 1998. Sacramento Area Transmission Planning Study. Sacramento, Ca.

Richins, P. 1998a. Energy Commission Project Manager for the SPP. Discussion with property owner at a public workshop in Yuba City on June 7.

Shah, K. 1998. Engineer, Western Area Power Administration. Telephone conversation with Marc Pryor (California Energy Commission), March 30.

SEPCO (Sacramento Ethanol and Power Cogeneration Project). 1992. Application for certification, (92-AFC-2). Submitted to the California Energy Commission, received November, 1993.

SEPCO (Sacramento Ethanol and Power Cogeneration Project, Cogeneration Pipeline Project). 1992. Application for certification, (92-AFC-2P). Submitted to the California Energy Commission, received December 1993.

Wolder, M. 1998. Letter of August 10, 1998, to Energy Commission biologist, Linda Spiegel.

McCuen, A. 1998. Staff engineer's opinion of the practicality and feasiblility to underbuild a transmission line under PG&E's 500 kV transmission line to interconnect with Western's system.

ATTACHMENT A - STAFF COMPARISONS

PURPOSE OF THE ANALYSIS

The purpose of these analyses was to compare unmitigated environmental impacts posed by the Sacramento Ethanol Partners Cogeneration (SEPCO) SAC1, S1, the Sutter Buttes and the O'Banion Road alternative sites (and related linear facilities of each) to those posed by the applicant's proposed Sutter Power Project (SPP). Comparison values are in terms of an alternative site being either Better, the Same or Worse than the SPP site. (Note: the ALTERNATIVES Table 2 referred to in the following analyses is that found in the main part of this Alternatives Section.)

PROJECT AND ALTERNATIVE SITES EVALUATION

Staff evaluated four alternative sites for the proposed project. Two of the sites identified by the applicant in its Application for Certification (AFC) are large industrial areas, the Sutter's Buttes Industrial Area (SBIA) and the South Sutter County Industrial/Commercial Area (SSCICA). Staff selected one specific assessor's parcel within each of these two general areas for evaluation, both of which were alternative sites originally evaluated in the Sacramento Ethanol Power Cogeneration (SEPCO) case. The SBIA parcel is the Sutter Buttes site, referred to in this case as the Sutter Buttes site, and the SSCICA parcel is the SEPCO S1 site. A third SEPCO site was mentioned to the applicant during prefiling activities and was included in the AFC as well. This is the SEPCO SAC1 site in the County of Sacramento. The fourth site was suggested by members of the general public during an SPP workshop and is referred to as the O'Banion Road site.

Each site would require at least one linear facility, i.e., a transmission line, natural gas supply line, water supply and/or water discharge routes. The sites and their possible associated linear facilities are described in more detail in the Alternatives section of the Preliminary Staff Assessment (PSA). Routings of linear facilities given for alternative sites are "best estimates" made by project management staff, and may not depict actual routes that would be selected if the alternative sites were built.

Facilities and routes were determined through consultation with County of Sutter and County of Sacramento officials, as well as by studying previous siting case records for Sacramento Municipal Utilities District's (SMUD) Sacramento Ethanol and Power Cogeneration Project's (SEPCO) power plant case (92-AFC-2), and the associated Cogeneration Pipeline Project (92-AFC-2P).

In summary, the alternative sites are:

- SEPCO SAC1 (Sacramento County), approximately twelve miles north of the City of Sacramento, and about one mile east of Highway 99/70 between Elverta Road and Elkhorn Boulevard (ALTERNATIVES Figures 1 and 2). The site is one of four parcels that comprised the entire 1992 SEPCO site. The parcel is zoned

Heavy Industrial with a Flood combining zone applied to about half of the site (M-2F). Water would supplied from the Sacramento River and discharged via canals to the Natomas East Main Drain, where it would flow back into the Sacramento River (ALTERNATIVES Figure 3). Natural Gas would be supplied by PG&E via a route from the Davis area (ALTERNATIVES Figure 4). A short transmission line would be routed from the site north about 4,000 feet to the existing Western Area Power Administration's Elverta substation. (All three routings would be as proposed under the SEPCO 92-AFC-1 and 92-AFC-1A projects.) A separate switching station would not be required.

- SEPCO S1 (Sutter County) in the SSCICA, approximately 28 miles south of Yuba City, and about two miles east of Highway 99/70 on the south side of Sankey Road (ALTERNATIVES Figure 1). The site is zoned General Agriculture, but is within the South Sutter County Industrial/Commercial Area that has a Industrial/Commercial General Plan designation. Water would be supplied by on-site wells and discharged via canals, as with the SAC1 site. Natural gas would be supplied as with the SAC1, but would require an extension of about four miles from the SAC1 site to S1 (ALTERNATIVES Figure 4). Neither a transmission line nor a separate switching station would be needed. Western's 230-kV Keswick-Elverta line is adjacent to the site and the requirement for a transmission line would be eliminated.

- Sutter Buttes (Sutter County) in the SBIA, approximately six miles west of Yuba City on the north side of Highway 20, and about one mile south of the unincorporated area of Sutter (ALTERNATIVES Figures 1 and 5). This site is within the Sutter Buttes Industrial Area and is zoned Industrial (M-2). Water would be supplied by on-site wells and discharged to the Sutter Bypass via Wadsworth Canal. Natural gas would be supplied from the same PG&E line at Grimes as would supply the proposed SPP site. However, the (approximately) 20 mile routing would be much different and would require three bores; the first under the Sacramento River, the second under the Sutter Bypass, and the third under state Highway 20. A transmission line, approximately five miles long, would be needed to interconnect with Western's Keswick-Elverta line at the Sutter Bypass at the end of Wadsworth Canal. A separate switching station would be needed.

- O'Banion Road (Sutter County), approximately ten miles south-southwest of Yuba City, about four roadway miles from the proposed SPP site, and located on the south side of O'Banion Road at the Sutter Bypass (ALTERNATIVES Figures 1 and 5). Water would be supplied by on-site wells and discharged a short distance (about 500 feet or less) into the Sutter Bypass via drainage canals. Natural gas would be supplied as for the proposed SPP site, but the route would turn south along Boulton Road to the O'Banion Road site instead

ALTERNATIVES Figure 2
SEPCO SAC1 Site

ALTERNATIVES Figure 3
SEPCO SAC1 Water Supply Route

ALTERNATIVES Figure 4
Natural Gas Supply Routes
for SEPCO SAC1 and S1

ALTERNATIVES Figure 5
Sutter Buttes Natural Gas Supply,
Transmission Line and Drainage Routes; and
the O'Banion Road Site Natural Gas Supply Route

of going to the SPP site. As at the S1 site, neither a transmission line nor a separate switching station would be needed; the plant would be adjacent to Western's 230-kV Keswick-Elverta line would eliminate the requirement for a transmission line. The Sutter Power Project's potential impacts for the proposed SPP site are discussed in the respective technical area sections of the PSA. The purpose of this discussion is to evaluate potential impacts associated with the alternative sites and their possible associated linear facilities, i.e., transmission line, natural gas supply line and water supply/discharge routes. Note: the routings of the linear facilities are "best estimates" made by project management staff and may not be the actual routes that would be used.

AIR QUALITY

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Federal and State

With respect to air quality, the same federal, state LORS apply to the four alternative sites.

Local

The S1, Sutter Buttes, and O'Banion Road sites are located in the Feather River AQMD. The SAC1 site is located in the Sacramento Metropolitan AQMD. The New Source Review rule requirements that would apply to the proposed project in either the Feather River AQMD or the Sacramento Metropolitan AMQD are very similar, with two exceptions: 1) For Feather River, only those emissions in excess of 25 tons per year would need to be offset; for Sacramento, all emission increases would need to be offset; 2) the distance-based offset ratios for Sacramento are, in some cases, higher than those for Feather River.

AIR QUALITY IMPACTS

The four alternative sites are all located in areas of flat terrain similar to the SPP site. The ambient air quality conditions at all four sites are very similar. Therefore, the construction and operating emission impacts of the proposed project on ambient air quality would be similar at all five sites, proposed and alternative (ALTERNATIVES Table 1).

AIR QUALITY REGULATORY REQUIREMENTS

Although there are some differences in the regulatory requirements of the Feather River and Sacramento AQMDs, as described above, the ultimate regulatory requirements would be very similar at all five sites for the following reasons: The U.S. EPA, in issuing its federal Title V operating permit on the project, will likely require that all emissions be offset. Given the likely location of the potential offset sources, which,

in general, are in or closer to the Sacramento District, the quantity of offsets provided for each of the four sites would be similar. Based on these assumptions, there is likely to be no significant difference in the outcome of the regulatory process which the project would have to undergo at each of the four alternative sites or the proposed site (ALTERNATIVES Table 2).

AIR QUALITY CONCLUSIONS

As discussed above, the air quality impacts and the ultimate air quality regulatory requirements at the proposed site and each of the four alternative sites are likely to be the same.

PUBLIC HEALTH

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

With respect to public health, the same federal, state and local LORS apply to the four alternative sites.

SEPCO S1

ALTERNATIVES Table 2 shows the SEPCO S1 alternative site to be the same, for public health impacts, when compared with the SPP site. The reasons applied to the SEPCO SAC1 alternative site also apply to the SEPCO S1 alternative site.

Sutter Buttes

ALTERNATIVES Table 2 shows the Sutter Buttes alternative site to be the same, for public health impacts, when compared with the SPP site. The reasons applied to the SEPCO SAC1 alternative site also apply to the Sutter Buttes alternative site.

O'BANION ROAD

ALTERNATIVES Table 2 shows the O'Banion Road alternative site to be the same, for public health impacts, when compared with the SPP site. The reasons applied to the SEPCO SAC1 alternative site also apply to the O'Banion Road alternative site.

PUBLIC HEALTH CONCLUSIONS

Both construction and operational impacts for the each alternative site are the same as for the proposed SPP site, absent more detailed sampling and data gathering. As such activities exceed the levels required for this analysis of alternative sites, all four alternative sites have been determined to be the same in comparison to the proposed SPP project site, for public health impacts.

HAZARDOUS MATERIALS MANAGEMENT

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

With respect to hazardous materials management, the same federal, state and local LORS apply to the four alternative sites as described in staff's PSA.

SEPCO SAC1

The primary criteria used to compare the suitability of the sites is the proximity of the site to potential public receptors who could be exposed to hazards in the event of a accidental release and the existence of external hazards such as high earthquake potential, close proximity to large quantities of explosive or flammable materials, or close proximity to aircraft runways.

The SAC1 site has more residential receptors in close proximity to the site when compared to the proposed site. As shown in ALTERNATIVES Table 2, this site would be worse than the proposed SPP site. No specific extraordinary external hazards were identified at the site.

SEPCO S1

The S1 site has more residential receptors in close proximity to the site. No special site specific external hazards were identified. This site would be worse than the SPP site.

Sutter Buttes

The East Sutter site has more residential receptors in close proximity to the site than are present at the proposed site, and would be worse.

O'BANION ROAD

The O'Banion Road site is slightly more desirable than the proposed site. There is only one residence which could be seriously impacted by an accidental ammonia release as apposed to 9 at the proposed site. This residence is also located in the direction opposite from dominate wind patterns.

HAZARDOUS MATERIALS MANAGEMENT CONCLUSIONS

As shown in ALTERNATIVES Table 2 above all of the alternative sites except the O'Banion Road sites are worse than the proposed site for hazardous materials management impacts. The O'Banion and Everglade Road site is better than the proposed site, if the site's impacts were left unmitigated.

INDUSTRIAL SAFETY AND FIRE PROTECTION

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

With respect to industrial safety and fire protection, the same federal, state and local LORS apply to the four alternative sites. The same apply to industry standards.

With respect to industrial safety and fire protection, the same federal and state LORS apply to the four alternative sites.

Federal

- 20 USC Section 651, et seq. (Occupational Safety and Health Act of 1970).
- 20 CFR Sections 1910 - 1950 (Occupational Safety and Health Administration Safety and Health regulations).
- 29 CFR Sections 1952.170 - 1952.175 (approval of California's plan for enforcement of its own Safety and Health regulations, in lieu of most of the federal requirements found in 20 CFR § 1910).

State

- Labor Code Section 142.3 (authorizes the Occupational Safety and Health Board to establish safety and health standards).
- Labor Code Section 6300 et seq. (establishes the responsibilities of the Division of Occupational Safety and Health).
- Title 8, California Code of Regulations, 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).

Industry standards

- Uniform Fire Code (UFC) contains provisions necessary for fire prevention and information about fire safety, special occupancy uses, special processes, and
- Uniform Fire Code Standards is a companion publication to the UFC and contains standards of the American Society for Testing and Materials, and of the National Fire Protection Association.
- California Building Code (Title 24, California Code of Regulations, Section 501 et seq.) 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 of buildings.

SEPCO SAC1

ALTERNATIVES Table 2 shows the SEPCO SAC1 site to be better for industrial safety and fire protection impacts when compared with the proposed SPP site. The fire protection services available to the SAC1 site are closer and have a larger, more varied complement of equipment and personnel. The local fire protection district, American River, can rely upon both the County and City of Sacramento to provide mutual aid in response to a large event. In addition, these two departments are staffed with personnel who possess the training, experience and equipment for industrial incident response activities, such as confined space entry, hazardous materials incident response and high angle operations.

SEPCO S1

ALTERNATIVES Table 2 shows the SEPCO S1 alternative site to be worse for industrial safety and fire protection impacts than the proposed SPP site. There are no professional fire fighters stationed near this location. There are only ten volunteer fire fighters in the area, and the fire engine that the volunteers use is old and out-dated.

Sutter Buttes

ALTERNATIVES Table 2 shows the Sutter Buttes alternative site to be better than the proposed SPP site for industrial safety and fire protection impacts. Although this site would use the same fire protection resources as the SPP site, response times would be enhanced due state Highway 20 providing a better and faster route for responders.

O'BANION ROAD

ALTERNATIVES Table 2 shows the O'Banion Road site to be the same as the proposed SPP site for industrial safety and fire protection impacts. Both sites would be reached by almost identical routes. Response times for O'Banion Road may be longer, but not significantly so.

INDUSTRIAL SAFETY AND FIRE PROTECTION CONCLUSIONS

In terms of industrial safety and fire protection, the SAC1 and Sutter Buttes sites would be better than the proposed SPP site. SAC1 would provide greater numbers better trained and equipped fire fighters. Sutter Buttes would provide better and faster response routes. The S1 site would be worse due to inferior fire protection capabilities. The O'Banion Road site would be about the same, because fire protection assets would be the same responders with comparable response times.

TRANSMISSION LINE SAFETY AND NUISANCE

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

With respect to transmission line safety and nuisance, the same federal and state LORS would apply to the four alternative sites. No design-related LORS are applicable to the proposed project at the local level.

SEPCO SAC1

ALTERNATIVES Table 2 shows the SEPCO SAC1 site to be better with regard to transmission line safety and nuisance impacts, when compared with the SPP site. The reasons are: a much shorter transmission line; routing within an existing corridor; greater distances from residences; and, as noted in the Land Use Section, a general lack of aviation-related conflicts.

SEPCO S1

ALTERNATIVES Table 2 shows the SEPCO S1 alternative site to be better than the proposed site with regard to possible transmission line safety and nuisance impacts, when compared with the SPP site. The reasons are: a shorter transmission line; a routing within an existing transmission line corridor; greater distances from residences; and, a general lack of aviation-related conflicts.

Sutter Buttes

ALTERNATIVES Table 2 compares the alternative sites to the applicant's proposed project. It shows the Sutter Buttes alternative site to be worse with regard to transmission line safety and nuisance impacts, when compared with the SPP site. The reasons are that the transmission line would be longer, closer to residences and would cross a major highway. Also, the northeast to southwest section adjacent to Wadsworth Canal would create a greater hazard potential to aerial applicators. This is due to the oblique angles between the transmission line and the north-south and east-west spraying patterns, making height and distance estimations by pilots more difficult than those posed by the SPP transmission line routing.

O'BANION ROAD

ALTERNATIVES Table 2 shows the O'Banion Road site to be better with regard to transmission line safety and nuisance impacts, when compared with the SPP site. The lack of a transmission line would eliminate all impacts created by the SPP alternative.

TRANSMISSION LINE SAFETY AND NUISANCE CONCLUSIONS

Given the present lack of established electric and magnetic field effects, the most significant safety and nuisance impacts posed by the transmission line as proposed for the SPP is the hazard posed to aerial applicators. The SPP transmission line routing, distance and pole heights would conflict with the spraying patterns necessary. In addition, use of two airstrips used by applicators would require, if still usable, steep angles of ascent and decent to clear the power lines.

Three alternatives site are better overall in comparison to the SPP. They are the SEPCO SAC1 and S1, and the O'Banion Road sites. The much shorter transmission line distance of the SAC1 alternative (4,000 feet compared to 4 miles) and the greater distances from residences, would reduce the impacts to generally acceptable levels. All impacts would be avoided for the S1 and O'Banion Road alternatives since no transmission lines would be required. The fourth alternative, Sutter Buttes, would be would be worse than the proposed SPP site because of the possible impacts on aerial applicators, highway operations and residences.

LAND USE

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Federal and State

With respect to Land Use, the same federal and state LORS apply to the four alternative sites.

Local

County of Sutter

Sutter County General Plan and Zoning Code

County of Sacramento

Sacramento County General Plan and Zoning Code; Rio Linda Community Plan

SEPCO SAC1

ALTERNATIVES Table 2 show the SEPCO SAC1 site to be comparatively better for Land Use impacts, when compared with the SPP site. The reasons are: the project would require no zone change or general plan amendment; greater distances from residences; and a general lack of aviation-related conflicts.

SEPCO S1

ALTERNATIVES Table 2 show the SEPCO S1 alternative site to be comparatively better than the SPP site from the perspective of land use. The reasons are: the project would not require a general plan amendment (but would require a zoning change from AG to M-2); would have fewer land use conflicts because there is a greater distance from residences to the site; and fewer aviation-related conflicts.

Sutter Buttes

ALTERNATIVES Table 2 shows this alternative site to be comparatively better than the proposed SPP site because neither a general plan amendment nor a zoning change would be necessary.

O'BANION ROAD

The O'Banion Road alternative would be the same as the SPP site from the perspective of land use because it too would require both a general plan amendment and a zoning change (ALTERNATIVES Table 2).

LAND USE CONCLUSIONS

The most significant impact to Land Use for the SPP at the proposed site is that in order to comply with applicable LORS, it would require a general plan amendment and zone change. Calpine will have to obtain approval from the Sutter County Board of Supervisors for a rezone of the property and a general plan amendment from AG to M-2 PD (General Industrial Combining Planned Development District) and from Agriculture 80-acre minimum to Industrial, respectively.

Three alternatives are better overall in comparison to the SPP. They are the SEPCO SAC1, SEPCO S1, and the Sutter Buttes alternative sites. The reasons are that for the SEPCO SAC1, and Sutter Buttes, no general plan amendment and zone change would be required. The SEPCO S1 site would only require a zone change. The O'Banion Road site land use impacts would be the same as the proposed site.

TRAFFIC AND TRANSPORTATION

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

County of Sutter

With respect to Traffic and Transportation the same federal, state and local LORS apply to the alternative sites located in Sutter County.

County of Sacramento

The Circulation Element of Sacramento County's General Plan establishes policies and implementation programs for the county's transportation system.

SEPCO SAC1

ALTERNATIVES Table 2 shows the SEPCO SAC1 site to be essentially the same for traffic and transportation impacts, when compared with the SPP site. Using similar peak workforce numbers from the SEPCO project, 241 to 250 workers, the SAC1 site would produce no change in the level of service for local and regional roadways. There would be localized adverse congestion impacts, limited in duration to the peak of construction period. As with the proposed project, truck traffic would need to be limited to certain routes. The transportation of hazardous materials would be in compliance with applicable federal and state laws.

SEPCO S1

ALTERNATIVES Table 2 shows the SEPCO S1 alternative site to be the same for traffic and transportation impacts, when compared with the SPP site. The nature of impact would be essentially the same as described for the SAC1 site and in turn, the same as the proposed project from a traffic and transportation perspective.

Sutter Buttes

ALTERNATIVES Table 2 compares the alternative sites to the applicant's proposed project. It shows the Sutter Buttes alternative site to be at minimum the same and arguably better for traffic and transportation impacts, when compared with the SPP site. Due to its location adjacent to Highway 20, the key improvement is that the impact to local roadways from commute and truck traffic would be less than the proposed project. However, without detailed traffic and transportation analysis for Highways 20, 99 and 65, particularly those portions which pass through the Marysville-Yuba City area, it cannot be demonstrated that no adverse congestion impacts during the peak construction workforce period would occur. Therefore staff has identified the impact as being essentially the same as the proposed project.

O'BANION ROAD

ALTERNATIVES Table 2 shows the O'Banion Road site to be the same for traffic and transportation impacts, when compared with the SPP site. While there would be a slight variance in local routes used, the difference would not be sufficient to significantly alter any of traffic and transportation impacts attributable to the proposed project.

TRAFFIC AND TRANSPORTATION CONCLUSIONS

The major traffic and transportation impact posed by the project as proposed for the SPP is localized congestion during the peak construction workforce period. Transportation of hazardous materials will be in compliance with federal and state laws and truck traffic will be limited to certain roadways. All of the alternatives result in similar impacts as the proposed project.

NOISE

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Federal and State

With respect to noise, the same federal and state LORS apply to the four alternative sites as to the proposed site.

Local

County of Sutter

Three of the alternative sites, SEPCO S1, Sutter Buttes, and O'Banion Road fall under the same Sutter County noise LORS that govern the proposed project.

County of Sacramento

The remaining alternative site, SEPCO SAC1, lies in Sacramento County, and is governed by Sacramento County noise LORS. These LORS can be summarized thus:

ALTERNATIVES Table 4
Sacramento County Noise Level Standards
New Non-Transportation Noise Sources

Noise Level Descriptor	Daytime	Nighttime
Hourly L_{50}, dB	50	45
Maximum level L_{max}, dB	70	65

Source: Draft Noise Element, Sacramento County General Plan (1990)

The power plant can be expected to operate day and night. Therefore, the most stringent noise limitation, the nighttime level, will govern project design and operation (see the Noise section of the Preliminary Staff Assessment (PSA)). The most stringent Sacramento County LORS, as seen in ALTERNATIVES Table 4 and ALTERNATIVES Table 5 above, is the 45 dB nighttime noise level standard in the

General Plan Noise Element. This figure is identical to the Sutter County nighttime limit. Thus, staff concludes that the noise LORS governing the SEPCO SAC1 site are identical to those governing the proposed project and the remaining three alternative sites.

ALTERNATIVES Table 5
Sacramento County Noise Ordinance

Allowed Exceedance (minutes per hour)	Daytime Maximum level, dB	Nighttime Maximum level, dB
30	55	50
15	60	55
5	65	60
1	70	65
Instantaneous	75	70

Source: Sacramento County Code No. 254, Chapter 6.68 "Noise Control"

SEPCO SAC1

ALTERNATIVES Table 2 compares the alternative sites to the applicant's proposed project. It shows the SEPCO SAC1 site to be the same for noise impacts when compared with the SPP site. Sensitive noise receptors at the SEPCO SAC1 site consist of numerous residences located approximately 1/2 mile east of the site, and a single residence farther away to the southwest, across the railroad tracks. These nearest receptors are marginally farther from the site than the nearest receptors at the proposed site; the nearest residence there is 4/10 mile away. This would allow slightly more leeway in designing noise attenuation features to limit noise impacts on these residences, at some cost savings to the project developer. Due to the small difference in distance to the nearest receptors, however, any such savings would likely be minimal. Since noise control technology is readily available to meet the more stringent requirements of the proposed site, and since benefits to the developer would be small, staff does not regard the SEPCO SAC1 site as significantly better from a noise standpoint.

The linear facilities associated with the project are not expected to present significant noise impacts (see the Noise section of the PSA). Therefore, these facilities do not figure into this alternatives analysis.

SEPCO S1

ALTERNATIVES Table 2 shows the SEPCO S1 alternative site to be worse for noise impacts when compared with the SPP site. While the nearest residence to the

proposed site is 4/10 mile distant, the nearest residence to the SEPCO S1 site lies adjacent to the northeast corner of the site, within a few hundred feet of the likely power plant location. Designing and constructing the project to meet existing noise limits at a receptor this close would likely be very costly, perhaps prohibitively so. For this reason, the SEPCO S1 site appears less desirable than the proposed site from a noise standpoint.

Sutter Buttes

ALTERNATIVES Table 2 shows the Sutter Buttes alternative site to be the same for noise impacts, when compared with the SPP site. Where the nearest sensitive noise receptors, several residences, lie approximately 1/2 mile north of the Sutter Buttes site, this is only marginally farther than the 4/10 mile that separates the proposed project from its nearest residence. As for the SEPCO SAC1 site above, staff expects this difference to have negligible impact on project design and operation. Therefore, the Sutter Buttes site is regarded as being the same as the proposed site, from the standpoint of noise.

O'BANION ROAD

ALTERNATIVES Table 2 shows the O'Banion Road site to be the same for noise impacts when compared with the SPP site. While the nearest residence to the proposed site is 4/10 mile distant, the nearest occupied residence to the O'Banion Road site lies slightly less than 1/2 mile to the northeast of the site. The O'Banion Road site appears equivalent to the proposed site from a noise standpoint.

NOISE CONCLUSIONS

The salient factor in comparing the alternative sites, from the standpoint of noise, is the noise levels to which the nearest sensitive receptors are subjected. In all these cases, those receptors are residences. Since noise LORS are identical for all the sites, the same limits apply to the noise levels to which these residences may be exposed. Thus, the determining factor becomes the distance from the project to the nearest residence. The nearer this residence, the more difficult, and more costly, will be the task of designing, constructing and operating the power plant to maintain noise levels at the receptor within permissible limits.

Three alternatives, the SEPCO SAC1, Sutter Buttes and O'Banion Road sites offer no advantages over the proposed site, nor does the proposed site appear better than these, since distance to the nearest residences is nearly identical. One alternative, the SEPCO S1 site, features residences significantly nearer than to the proposed site, rendering them less desirable from the standpoint of achieving the required low noise levels.

VISUAL RESOURCES

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

With respect to visual resources, the same federal and state LORS apply to the four alternative sites.

County of Sutter

General Plan

The land use element of the Sutter County General Plan (November 1996) sets forth visual and scenic resources policies that are applicable to the project. They are as follows:

- The county shall require that new development be designed to use vegetation for screening structures and parking areas.

- The county shall require that design and development standards be applied to all industrial and commercial areas to improve the aesthetic appearance of those developments (Sutter County 1996a, p.17).

Zoning Code

Chapter 15 of the Sutter County Zoning Code sets forth landscaping and height requirements (Sutter County 1996b, Division 55 (PD District), pp. 41, 44, 62, and 63).

County of Sacramento County 1993 General Plan

Visual resources are recognized in several places in the plan:

Section III. Land Use Strategies and Policies - Urban Growth Management Strategy - Visual Quality - This section addresses glare from surface building materials and exterior lighting.

Policies:

LU-22.Exterior building materials on nonresidential structures shall be composed of a minimum of 50 percent low-reflectance, non-polished finishes.

LU-23.Bare metallic surfaces such as pipes, flashing, vents, and light standards on new construction shall be painted so as to minimize reflectance.

LU-24.Require overhead light fixtures to be shaded and directed away from adjacent residential areas.

LU-25.Require exterior lighting to be low-intensity and only used where necessary for safety and security purposes.

The Scenic Highway Element of the General Plan presents the background for the identification and designation of Scenic Highways and offers general goals and objectives.

Sacramento County Code

The Sacramento County Zoning Code and Sacramento County Code require that landscaping shall conform to Sacramento County requirements as set forth in section 325-03 of the Sacramento Zoning Code and Chapter 14.10, Section 14,10,010 et seq. of Title 14 of the Sacramento County Code. Normally these codes require conformance prior to receipt of a building permit.

VISUAL RESOURCES CONCLUSIONS

The significant visual resources impacts posed by the proposed SPP project site are those to the view of the Sutter Buttes range. The SPP stack height and transmission line poles/wires would impact some residents' viewsheds.

Three alternatives are worse overall in comparison to the proposed SPP. They are the SEPCO SAC, SEPCO S1, and Sutter Buttes alternatives. Both the SAC1 and S1 sites would impact views of the Sierra and Coast ranges for a greater number of people than would be affected by the SPP's impacts on the views of the Sutter Buttes.

The O'Banion Road site would affect fewer residences' viewsheds than the proposed SPP. This is due not only to the site locations, but the fact that a transmission line, with its poles and wires, would not be necessary. Thus, this site would be better in comparison to the proposed SPP site in terms of visual resources impacts.

CULTURAL RESOURCES

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Federal and State

With respect to cultural resources, the same federal and state LORS apply to the four alternative sites.

Local

County of Sutter

The Sutter County General Plan (and associated Environmental Impact Report) sets forth goals, policies, implementation programs and mitigation measures relative to protection of historic and cultural resources.

County of Sacramento

Section VI of the Conservation Element of Sacramento County's General Plan establishes policies and implementation programs for the protection of historic and cultural resources.

ANALYSIS

Most of the Sacramento Valley was inhabited by Native American peoples long before contact and settlement by Euro-Americans. Rivers and marshes provided a wide range of food and material resources used to sustain and maintain prehistoric cultures. Due to active rivers and periodic flooding, settlements tended to be located on higher ground but near to water sources and food supplies. Incoming settlers tended to choose places to live and to develop for resources using criteria similar to the native peoples. Thus, some locations might have a prehistoric as well as an historic component.

Cultural resources may be found on the surface or they may be present at varying depths below the surface. Often the potential for encountering cultural resources during project construction remains uncertain until excavation of sub-surface soils takes place. It is also often difficult to predict just where and what type of cultural resources may be discovered. While power plant sites tend to produce similar impacts, construction of an electric transmission line tends to disturb lesser amounts of ground than an excavation of trenches for pipelines.

SEPCO SAC1

ALTERNATIVES Table 2 shows the SEPCO SAC1 site to be potentially worse for cultural resource impacts, when compared with the SPP site. This preliminary conclusion is based on the assumption that a larger amount of surface area would be disturbed for construction of linear facilities. While only 4,000 feet of transmission line would be required to serve the SEPCO SAC1 site, 5.7 miles would be needed to serve the SPP site. But there are an estimated 24 miles of water and gas pipeline required to serve the SEPCO SAC1 site, compared to only 13.5 miles for the SPP site. Pipeline construction requires excavation of trenches for the entire distance of the route which increases the potential for cultural resources to be encountered.

SEPCO S1

Table 1 shows the SEPCO S1 alternative site to be potentially worse for cultural resource impacts, when compared with the SPP site. This preliminary conclusion is based on the assumption that a larger amount of surface area would be disturbed for construction of linear facilities. A simple loop-in transmission line would be required to serve the SEPCO S1 site, while 5.7 miles would be needed to serve the SPP site. But there are an estimated 20 miles of gas pipeline required to serve the SEPCO S1 site, compared to only 13.5 miles for the SPP site.

Sutter Buttes

ALTERNATIVES Table 2 compares the alternative sites to the applicant's proposed project. It shows the Sutter Buttes alternative site to be potentially better for cultural resource impacts, when compared with the SPP site. This preliminary conclusion is based on the assumption that a lesser amount of surface area would be disturbed for construction of linear facilities. A 4-mile transmission line would be required to serve the Sutter Buttes site, while 5.7 miles would be needed to serve the SPP site. There also are an estimated 12 miles of gas pipeline required to serve the Sutter Buttes site, compared to the 13.5 miles for the SPP site.

O'BANION ROAD

ALTERNATIVES Table 2 shows the O'Banion Road site to be potentially better for cultural resource impacts, when compared with the SPP site. This preliminary conclusion is based on the assumption that a lesser amount of surface area would be disturbed for construction of linear facilities. A simple loop-in transmission line would be required to serve the O'Banion Road 4 site, while 5.7 miles would be needed to serve the SPP site. But there are an estimated 15 miles of gas pipeline required to serve the O'Banion site, compared to only 13.5 miles for the SPP site. These impacts may be off-set to some degree by having very little disturbance from the transmission loop-in when compared to the 5.7 miles of transmission line for the SPP project.

CULTURAL RESOURCES CONCLUSIONS

The potential for project impacts to cultural resources is directly related to the amount of surface and sub-surface disturbance of the ground under the project site and the project-related facilities. The potential for project impacts to these resources is also directly related to the likelihood they are present in (or under) areas that would be affected by project construction.

Power plant construction is usually confined to the project site and typically requires some degree of grading and excavation during construction. Construction of electric transmission lines requires excavation of soils for tower or pole footings. Construction of water, wastewater, and natural gas pipelines requires excavation and trenching to varying depths for placement of the pipe. Pipelines may also require horizontal drilling

or boring to go under certain surface features. The greater the area of surface and sub-surface disturbance, the greater the potential for impacts to cultural resources.

The Sutter Buttes and the O'Banion Road alternatives are potentially better when compared to the SPP project. The transmission line route for Sutter Buttes is about 1.7 miles shorter than that for the SPP and the gas pipeline route is about 1.5 miles shorter. The transmission line route for the O'Banion Road site is a simple loop-in, compared to the 5.7 miles needed for the SPP but the gas pipeline route is about 1.5 miles longer. The additional 1.5 miles of pipeline construction for the O'Banion Road site may off-set to some degree the 5.7 miles of transmission line needed for the SPP. The SEPCO SAC1 and S1 alternatives are potentially worse when compared to the SPP project. The transmission line route for the SEPCO SAC1 alternative is 5 miles shorter than that for the SPP but the water and gas pipeline routes are 10.5 miles longer. The transmission line route for the SEPCO S1 site is a simple loop-in, compared to the 5.7 miles needed for the SPP but the gas pipeline route is about 7 miles longer. Since pipeline construction requires excavation of trenches for the entire distance of the route,the potential for cultural resources to be encountered is greatly increased.

SOCIOECONOMIC RESOURCES

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Federal and State

With respect to socioeconomic resources, the same federal and state LORS apply to the four alternative sites. An environmental justice analysis would be required for all alternative sites.

Local

County of Sutter

Sutter County Ordinance 1248 regarding development impact fees applies to the project. Section 1360-050 of Sutter County Ordinance 1248 establishes development impact fees on the issuance of all building permits for new construction in Sutter County. These fees would be paid by Calpine to Sutter County prior to issuance of a Certificate of Occupancy and would contribute towards funding public improvements, infrastructure and services within the county. Development impact fees for industrial projects are set at $0.37 per square foot.

County of Sacramento

Several ordinances regarding fees for industrial development would apply to the project. They include the following: building permit fees, transportation development fees, low-income housing fees, school district development fees, drainage fees and sewer impact fees. These fees would be paid by Calpine to Sacramento County prior to issuance of a Building Permit and would contribute towards funding public improvements, infrastructure and services within the county. Fees for the above vary according to the project and not all are determined by the project's square footage.

SEPCO SAC1

ALTERNATIVES Table 2 shows the SEPCO SAC1 site to be the comparatively better for socioeconomic resources impacts when compared with the SPP site. Staff reviewed the 1992 Socioeconomic Resources Final Staff Assessment (FSA) for the SEPCO project and discovered there were no impacts to socioeconomic resources and no mitigation was proposed. In 1998, there are some unknowns about the Sacramento County site. In 1992, there was no requirement to consider environmental justice. Without doing an environmental justice analysis, staff cannot determine if there are any potential issues.

Without contacting local schools, medical and protective services, public utilities and other public services, and the county regarding their fiscal and physical capability to meet the needs of project-related changes in population, staff cannot determine if the 1992 levels of service in the county have changed significantly so that a new project would have significant impacts to county services. Given the project-related impacts on fire protection in Sutter County are yet to be resolved, the Sacramento County site could be seen as relatively better, even though Sacramento County has more rigorous developer fees assessed on industrial projects. For these reasons, staff has determined the site to be better.

SEPCO S1

ALTERNATIVES Table 2 shows the SEPCO S1 alternative site to be the same for socioeconomic resources impacts when compared with the proposed SPP site, because they both located in Sutter County.

Sutter Buttes

ALTERNATIVES Table 2 shows the Sutter Buttes alternative site to be the same for socioeconomic resources impacts when compared with the proposed SPP site, because they both located in Sutter County.

O'BANION ROAD

ALTERNATIVES Table 2 shows the O'Banion Road alternative site to be the same for socioeconomic resources impacts when compared with the proposed SPP site, because they both located in Sutter County.

SOCIOECONOMIC RESOURCES CONCLUSIONS

No differences exist between all the Sutter County alternative sites when compared to the proposed SPP site. Because a socioeconomic impact analysis evaluates environmental justice and the effects of project-related population changes on a regional basis, all Sutter County sites would result in the same impacts regardless of location.

The 1992 Socioeconomic Resources FSA for the SEPCO project (Sacramento County) concluded there were no impacts to socioeconomic resources and no mitigation was proposed. However, at present, several unknown factors about the SAC1 site exist. Nonetheless, given the unresolved project-related impacts on fire protection services in Sutter County, the Sacramento County site could be seen as better, even with the more rigorous developer fees assessed by Sacramento County on industrial projects. For these reasons, staff has determined the SAC1 alternative site to be better than the proposes SPP site.

WASTE MANAGEMENT

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

With respect to waste management, the same federal, state and local LORS apply to the four alternative sites.

SEPCO SAC1

ALTERNATIVES Table 2 shows the SEPCO SAC1 alternative site to be the same, for waste management impacts, when compared with the SPP site. Conclusions regarding the existence of contamination cannot be made in the absence of site-specific sampling and analysis data. Such sampling and data collection exceeds the level of analysis necessary for this alternatives comparison. In addition, since the design and function of the facility design would be the same, nonhazardous wastes generated by the operation of a facility would be the same. From this regard, the SEPCO SAC1 site must be deemed the same in comparison to the proposes SPP site.

SEPCO S1

ALTERNATIVES Table 2 shows the SEPCO S1 alternative site to be the same, for waste management impacts, when compared with the SPP site. The reasons applied to the SEPCO SAC1 alternative site also apply to the SEPCO S1 alternative site.

Sutter Buttes

ALTERNATIVES Table 2 shows the Sutter Buttes alternative site to be the same, for waste management impacts, when compared with the SPP site. The reasons applied to the SEPCO SAC1 alternative site also apply to the Sutter Buttes alternative site.

O'BANION ROAD

ALTERNATIVES Table 2 shows the O'Banion Road alternative site to be the same, for waste management impacts, when compared with the SPP site. The reasons applied to the SEPCO SAC1 alternative site also apply to the O'Banion Road alternative site.

WASTE MANAGEMENT CONCLUSIONS

Both construction and operational impacts for the each alternative site are the same as for the proposed SPP site, absent more detailed sampling and data gathering. As such activities exceed the levels required for this analysis of alternative sites, all four alternative sites have been determined to be the same in comparison to the proposed SPP project site, for waste management impacts.

BIOLOGICAL RESOURCES

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

With respect to biological resources, the same federal, state LORS apply to the four alternative sites. There are no local jurisdictional LORS that apply.

SEPCO SAC1

ALTERNATIVES Table 2 shows the SEPCO SAC1 site to be worse for biological resource impacts when compared with the SPP site. The reasons are: the site and associated linear facilities support vernal pools and listed species of fairy shrimp, diversion of surface water from the Sacramento River will require fish screening devices to prevent entrainment of chinook salmon, and several special status species and jurisdictional wetlands would be impacted by the construction of the 14-mile natural gas pipeline (ALTERNATIVES Table 6).

SEPCO S1

ALTERNATIVES Table 2 shows the SEPCO S1 alternative site to be worse for biological resource impacts when compared with the SPP site. The reasons are: the site and associated linear facilities support vernal pools and listed species of fairy shrimp, and several special status species and jurisdictional wetlands would be impacted by the construction of the 20-mile natural gas pipeline (ALTERNATIVES Table 6).

Sutter Buttes

ALTERNATIVES Table 2 shows the Sutter Buttes alternative site to be the same for biological resource impacts when compared with the SPP site. ALTER- NATIVES Table 6 shows the special status species and jurisdictional wetlands associated with the this site are similar to those associated with the applicant's preferred site.

O'BANION ROAD

ALTERNATIVES Table 2 shows the O'Banion Road site to be the same for biological resource impacts, when compared with the SPP site. There are no wetlands on the power plant site and, due to it's proximity to Western's Keswick-Elverta transmission line, no impacts associated with a transmission line (ALTERNATIVES Table 6). However, water quality impacts in the form of higher concentrations of total dissolved solids and effluent water temperatures would be worse. Mitigation measures, such as water treatment, may be required.

BIOLOGICAL RESOURCES CONCLUSIONS

The most significant biological resource impacts posed by the proposed SPP project are loss of wetlands, loss of giant garter snake and Swainson's hawk habitat; potential for increased risk of avian collisions; potential impacts to chinook salmon from waste water discharge; and temporary impacts to giant garter snake during construction. Biological resources present at the site and along the linear facilities of the proposed Sutter Buttes alternative appear to be similar. Therefore, potential impacts are likely to be the same as the SPP project. The O'Banion Road alternative is the same as the proposed project. This is because the positive aspects of the site (the lack of wetlands and no requirements for a transmission line) would be offset by negative impacts posed by water quality concerns.

Both the SAC1 and S1 alternatives are worse than the proposed project. In addition to wetland, Swainson's hawk and giant garter snake impacts, the plant sites support vernal pools and listed fairy shrimp. The 14- to 20-mile pipeline associated with the SAC1 and S1 alternatives will cause impacts to jurisdictional wetlands and several special status species listed in Table 2. The SAC1 water supply will require fish screening devices to reduce impacts to chinook salmon. Depending upon the quality

ALTERNATIVES Table 6
Biological Resources

	Wetland	Vernal Pool	Fairy Shrimp	Garter Snake	SWHA	Salmon	VELB	Rare Plants	Avian Collision
SPP									
Plant Site	X	X		X	X				
Water				X		X			
T-line				X	X				X
P-Line	X			X					
SAC 1									
Plant Site	X	X	X	X	X				
Water	X	X	X	X		X			
T-line									
P-Line	X	X	X	X	X	X	X	X	
S 1									
Plant Site		X			X				
Water	X	X		X		X			
T-line									
P-Line	X	X	X	X	X	X	X	X	
E Sutter									
Plant Site	X			X	X				
Water				X		X			
T-line				X	X				X
P-Line	X			X					
O'Ban									
Plant Site				X	X				
Water				X		X			
T-line									
P-Line	X			X					

SWHA: Swainson's Hawk T-line: Transmission line
VELP: Valley elderberry longhorn beetle P-line: Gas pipeline
Water: Supply, discharge

of the well water, the S1 water discharge into the Natomas East Main Drainage Canal could impact vernal pools and waterfowl.

WATER RESOURCES

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

With respect to water resources, the same federal and state LORS apply to the four alternative sites.

Local

County of Sutter

Sutter County General Plan Policy 3.D-1: The County shall continue to require that all new development outside the Special Flood Hazard Area as defined by the Federal Emergency Management Agency (FEMA) be protected from a 50 year storm event (Sutter County 1996). FEMA (1996) defines Special Flood Hazard Areas as those areas subject to inundation by a 100-year flood.

County of Sacramento

No applicable LORS exist for Sacramento County.

SEPCO SAC1

ALTERNATIVES Table 2 shows the SEPCO SAC1 site to be better for water resources impacts, when compared with the SPP site. The SAC1 alternative would, by using Sacramento River water, avoid the ground water impacts associated with the proposed SPP site. Both sites would utilize surface drainage, but the SAC1 site would avoid roadway and property flooding that may exist at the proposed SPP site (if left unmitigated).

SEPCO S1

ALTERNATIVES Table 2 shows the SEPCO S1 alternative site to be the same for water resources impacts, when compared with the proposed SPP site. Both sites would use comparable sources of water (ground water) and comparable methods of drainage (canals). Ground water extraction at the SEPCO S1 site may result in worse impacts to the localized supply. On the other hand, SEPCO S1 would utilize the same drainage system as the SEPCO SAC1 site, and would be better than the proposed SPP site in this regard. Overall, the S1 would seem to be the same in water resources impacts as the proposed SPP site.

Sutter Buttes

ALTERNATIVES Table 2 compares the alternative sites to the applicant's proposed project. It shows the Sutter Buttes alternative site to be worse than the proposed SPP project site for water resources impacts. The Sutter's Buttes area is already in a condition of ground water supply overdraft. Water volumes required for the proposed project would only exacerbate the problem. Drainage would be comparable.

O'BANION ROAD

ALTERNATIVES Table 2 shows the O'Banion Road site to be the worse than the proposed SPP site for water resources impacts. Although this site would not affect local area ground water supplies and well depths, and would create less potential for drainage flooding, the much shorter drainage canal route that would not allow for the extent of cooling and dilution that the proposed project would provide. In addition, during flooding episodes, drainage effects upon Gilsizer Slough would be detrimental to the water quality of that system.

WATER RESOURCES CONCLUSIONS

In terms of water resources impacts, one alternative, the SEPCO SAC1 site is better in comparison to the proposed SPP. The SAC1 site would benefit from both the use of Sacramento River water and drainage that would avoid the flooding potential of an unmitigated SPP. The SEPCO S1 site is overall the same as the proposed SPP site impact levels. The SEPCO East Sutter sites would be worse than the proposed SPP site because of the impacts to the local ground water supply. The O'Banion Road site would be worse due to higher effluent water temperature and total dissolved solids concentrations.

SOIL RESOURCES

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

With respect to water resources, the same federal and state LORS apply to the four alternative sites.

Local

County of Sutter

Sutter County General Plan Policy 3.D-1. The County shall continue to require that all new development outside the Special Flood Hazard Area as defined by the Federal Emergency Management Agency (FEMA) be protected from a 50 year storm event (Sutter County 1996). FEMA (1996) defines Special Flood Hazard Areas as those areas subject to inundation by a 100-year flood.

County of Sacramento

No applicable LORS exist for Sacramento County.

SEPCO S1

ALTERNATIVES Table 2 shows the SEPCO S1 alternative site to be the same for soil resources impacts when compared with the proposed SPP site.

Sutter Buttes

ALTERNATIVES Table 2 compares the alternative sites to the applicant's proposed project. It shows the Sutter Buttes alternative site to be the same as the proposed SPP project site for soil resources impacts.

O'Banion Road

ALTERNATIVES Table 2 shows the O'Banion Road site to be the same as the proposed SPP site for soil resources impacts.

SOIL RESOURCES CONCLUSION

In terms of soil resources impacts, all four alternative sites are the same in comparison to the proposed SPP.

PALEONTOLOGICAL RESOURCES

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Federal and state

With respect to paleontological resources, the same federal and state LORS apply to the four alternative sites.

Local

County of Sutter

No applicable LORS exist for Sutter County.

County of Sacramento

No applicable LORS exist for Sacramento County.

ANALYSIS

Most of the Sacramento Valley is underlain by sedimentary deposits that may be more than a thousand feet thick in some areas. Due to active rivers and periodic flooding, the depth of sediments is continuing to increase, while it is also getting re-arranged and inter-mixed. Beneath the very recent alluvial deposits are older sediments that are known to contain significant fossil resources. The sub-surface depth of these fossil-bearing sediments is variable and often the potential for encountering fossil materials during project construction remains uncertain until excavation of sub-surface soils takes place. It is also often difficult to predict just where and what type of fossils may be discovered.

SEPCO SAC1

ALTERNATIVES Table 2 shows the SEPCO SAC1 site to be potentially worse for paleontologic resource impacts, when compared with the SPP site. This preliminary conclusion is based on the assumption that a larger amount of surface area would be disturbed for construction of linear facilities. While only 4,000 feet of transmission line would be required to serve the SEPCO SAC1 site, 5.7 miles would be needed to serve the SPP site. But there are an estimated 24 miles of water and gas pipeline required to serve the SEPCO SAC1 site, compared to only 13.5 miles for the SPP site. Pipeline construction requires excavation of trenches for the entire distance of the route which increases the potential for paleontologic resources to be encountered.

SEPCO S1

ALTERNATIVES Table 2 shows the SEPCO S1 alternative site to be potentially worse for paleontologic resource impacts, when compared with the SPP site. This preliminary conclusion is based on the assumption that a larger amount of surface area would be disturbed for construction of linear facilities. A simple loop-in transmission line would be required to serve the SEPCO S1 site, while 5.7 miles would be needed to serve the SPP site. But there are an estimated 20 miles of gas pipeline required to serve the SEPCO S1 site, compared to only 13.5 miles for the SPP site.

Sutter Buttes

ALTERNATIVES Table 2 compares the alternative sites to the applicant's proposed project. It shows the Sutter Buttes alternative site to be potentially better for paleontologic resource impacts, when compared with the SPP site. This preliminary conclusion is based on the assumption that a lesser amount of surface area would be disturbed for construction of linear facilities. A 4-mile transmission line would be required to serve the Sutter Buttes site, while 5.7 miles would be needed to serve the SPP site. There also are an estimated 12 miles of gas pipeline required to serve the Sutter Buttes site, compared to the 13.5 miles for the SPP site.

O'BANION ROAD

ALTERNATIVES Table 2 shows the O'Banion Road site to be potentially better for paleontologic resource impacts, when compared with the SPP site. This preliminary conclusion is based on the assumption that a lesser amount of surface area would be disturbed for construction of linear facilities. A simple loop-in transmission line would be required to serve the O'Banion Road site, while 5.7 miles would be needed to serve the SPP site. But there are an estimated 15 miles of gas pipeline required to serve the O'Banion Road site, compared to only 13.5 miles for the SPP site. This may be off-set to some degree by having very little disturbance from the transmission loop-in when compared to the 5.7 miles of transmission line for the SPP project.

PALEONTOLOGICAL RESOURCES CONCLUSIONS

The potential for project impacts to paleontologic resources is directly related to the amount of surface and sub-surface disturbance of the ground under the project site and the project-related facilities. The potential for project impacts to these resources is also directly related to the likelihood they are present in (or under) areas that would be affected by project construction.

Power plant construction is usually confined to the project site and typically requires some degree of grading and excavation during construction. Construction of electric transmission lines requires excavation of soils for tower or pole footings. Construction of water, wastewater, and natural gas pipelines requires excavation and trenching to varying depths for placement of the pipe. Pipelines may also require horizontal drilling or boring to go under certain surface features. The greater the area of surface and sub-surface disturbance, the greater the potential for impacts to paleontologic resources.

The Sutter Buttes and the O'Banion Road alternatives are potentially better when compared to the SPP project. The transmission line route for Sutter Buttes is about 1.7 miles shorter than that for the SPP and the gas pipeline route is about 1.5 miles shorter. The transmission line route for the O'Banion Road site is a simple loop-in, compared to the 5.7 miles needed for the SPP but the gas pipeline route is about 1.5 miles longer. The additional 1.5 miles of pipeline construction for the O'Banion Road site may off-set to some degree the 5.7 miles of transmission line needed for the SPP.

The SEPCO SAC1 and S1 sites are potentially worse when compared to the SPP project. The transmission line route for the SEPCO SAC1 alternative is 5 miles shorter than that for the SPP but the water and gas pipeline routes are 10.5 miles longer. The transmission line route for the SEPCO S1 site is a simple loop-in, compared to the 5.7 miles needed for the SPP but the gas pipeline route is about 7 miles longer.

FACILITY DESIGN AND GEOLOGIC HAZARDS

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

With respect to facility design and geologic hazards, the same federal, state and local LORS apply to the four alternative sites.

ALTERNATIVE SITES EVALUATION

Staff's analysis of the four alternative sites was based on geologic hazards impacts, or constraints, as shown on the Fault Activity Map of California and Adjacent Areas, Geologic Maps of the Chico and Sacramento Quadrangles, 1:250,000 series, and staff's personal knowledge of the geology of the area. The result of the analyses was then compared to the SPP site. These geologic hazard impacts include foundation conditions and earthquake potential of the four alternative sites (see results of comparison in ALTERNATIVES Table 2).

RELIABILITY

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

No LORS apply to the subject of Power Plant Reliability.

POTENTIAL IMPACTS ON POWER PLANT RELIABILITY

The power plant's reliability will not likely create any significant impacts upon the environment (see the Power Plant Reliability section of the PSA). The project's location, however, could impact power plant reliability in three ways:

- The reliability of the fuel supply could differ from one site to the next.
- The reliability of water supply could differ from one site to the next.
- The project's exposure to natural hazards, such as earthquake and flood, could differ from one site to the next.

Reliability of Fuel Supply

All the alternative sites lie relatively near one another. The fuel source for the project (AFC, § 1.1, § 2.4.3, § 9.2.1) will remain unchanged, regardless which site is selected. While there may be minor differences in the specific pipeline facilities conducting the fuel to the project, there is no reason to believe that any of these pipelines would not be built to the same level of reliability as the others.

Reliability of Water Supply

As detailed in the Descriptions of Alternative Sites section, water for the SEPCO SAC1 alternative site would come from the Sacramento River. All other projects, including the proposed project, would utilize water from groundwater wells. These water sources all appear feasible, and all are likely to exhibit a similar level of reliability. It is impossible to differentiate among them.

Exposure to Natural Hazards

Due to the proximity of all the sites, the geology underlying all the alternative sites is relatively similar to that of the proposed site. Exposure to earthquake hazard is equally low for all the sites.

All the sites lie in the Sacramento Valley, near the Sacramento River. While there may be small differences in flood hazard at specific sites, such differences appear insignificant. Flooding is a potential problem for all the sites, in equal measure.

FACILITY DESIGN AND GEOLOGIC HAZARDS CONCLUSIONS

For the area of Facility Design analysis, geologic constraints for the SPP proposed site and the four alternatives are virtually the same.

EFFICIENCY

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

With respect to Power Plant Efficiency, the same state LORS apply to the four alternative sites. There are no applicable federal or local LORS.

SITE SPECIFIC IMPACTS

The subject area of Power Plant Efficiency is rather insensitive to site specific factors. Differing project sites hold the potential to affect project efficiency in two ways:

- If the natural gas fuel were obtained from a source different from that delineated in the AFC, the impacts on energy resources could be different.

- If climatic conditions at an alternative site were sufficiently different from the proposed site, project fuel efficiency could be affected.

Impacts on Energy Resources

As stated above, the alternative sites all lie within 35 to 40 miles of one another. A project at any one of these sites would obtain its natural gas fuel from the same ultimate source (AFC, § 1.1, § 2.4.3, § 9.2.1). While there might be minor differences

in the specific pipeline facilities conducting the fuel to the project, none of the alternative sites would impose any differing impacts on the energy source.

Climatic Conditions

The fuel efficiency of a combined cycle power plant such as the Sutter Power Project can be influenced by the climatic conditions under which it operates. Extremely high temperatures can reduce the efficiency of the gas turbine and require the addition of more fuel in the duct burner to supply the requisite steam to the steam turbine. Further, cooling of the steam turbine's condenser is less effective at high temperatures. Since all the alternative sites lie so near each other, in essentially the same climatic conditions, none of the alternative sites would impose any differing climate-related impacts on project fuel efficiency.

EFFICIENCY CONCLUSIONS

If any of the alternative sites were sufficiently distant from the proposed site, fuel might be obtained from a different source, potentially altering the impact on energy resources. Further, if any of the alternative sites were exposed to a climate sufficiently different from the proposed site, project fuel efficiency could be altered. Since all the alternative sites lie so near one another, and all enjoy an essentially identical climate, no impacts on energy resources or project fuel efficiency are likely. From the standpoint of Power Plant Efficiency, all four alternative sites are identical to the proposed site.

TRANSMISSION SYSTEM ENGINEERING

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

With respect to transmission system engineering, the same federal, state LORS apply to the four alternative sites as described in staff's PSA.

State

California Public Utilities Commission General Order 95

California Public Utilities Commission Rule 21

SEPCO SAC1

ALTERNATIVES Table 2 show the SEPCO SAC1 site to be better for transmission system engineering impacts when compared with the proposed SPP site. The SAC1 alternative would benefit from its close proximity to the Western Area Power Administration's (Western) Elverta substation, and the much shorter transmission line associated with interconnection to Western's system. The SAC1 alternative would provide a reliable supply of 525 Megawatts to the Sacramento Municipal Utilities

District (SMUD), the Western and Pacific Gas and Electric (PG&E) system, rather than 125 MW at the proposed SPP site. Also, the SAC1 site would not need a separately located switching station.

SEPCO S1

ALTERNATIVES Table 2 shows the SEPCO S1 alternative site to be better for transmission system engineering impacts when compared with the proposed SPP site. The S1 alternative would take advantage of the ability to loop Western's 230-kV transmission line through an on-site switching station that could be co-located with the site's switchyard. This would result in no transmission facility costs.

Sutter Buttes

ALTERNATIVES Table 2 shows the Sutter Buttes site to be the same as the proposed SPP site for transmission system engineering impacts. The Sutter Buttes site would require a transmission line of comparable length as well as a comparable switching station.

O'BANION ROAD

ALTERNATIVES Table 2 shows the O'Banion Road site to be better for transmission system engineering impacts when compared with the proposed SPP site. This alternative would take advantage of the ability to loop Western's 230-kV transmission line through a switching station co-located with the on-site switchyard.

TRANSMISSION SYSTEM ENGINEERING CONCLUSIONS

In terms of transmission system engineering impacts, three alternative sites would be better than the proposed SPP site. The SEPCO SAC1 site would need a much shorter transmission line, would avoid the need for a separate switching station, and would provide a reliable 525 MW generating source to the electrical system. The S1, and O'Banion Road sites would avoid both the transmission line and separate switching station requirements. The Sutter Buttes site would require a transmission line and switching station comparable to the proposed SPP project.

FACILITY CLOSURE

APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

The same federal and state LORS apply to all four sites.

County of Sutter

For the three sites which are in the jurisdiction of Sutter County, the Energy Commission will cooperate with Sutter County in assessing the need for any conditions of closure for the project.

County of Sacramento

For the one site within the jurisdiction of Sacramento County, the Energy Commission will cooperate with Sacramento County in assessing the need for any conditions of closure for the project.

SEPCO SAC1

ALTERNATIVES Table 2 shows the SEPCO SAC1 alternative site to be the same for facility closure impacts when compared with the SPP site.

SEPCO S1

ALTERNATIVES Table 2 shows the SEPCO S1 alternative site to be the same for facility closure impacts when compared with the SPP site.

Sutter Buttes

ALTERNATIVES Table 2 shows the Sutter Buttes alternative site to be the same for facility closure impacts when compared with the SPP site.

O'BANION ROAD

ALTERNATIVES Table 2 shows the O'Banion Road alternative site to be the same for facility closure impacts when compared with the SPP site.

FACILITY CLOSURE CONCLUSIONS

Facility closure issues are the same for all four alternative sites.

ATTACHMENT B - CALPINE'S ALTERNATIVES

SITING ALTERNATIVES

In the AFC, Calpine identified and discussed four alternative sites: 1) the Sutter Buttes Industrial Area (SBIA), 2) the South Sutter County Industrial/Commercial Area (SSCICA), 3) SEPCO site S7 and 4) SEPCO site SAC1 (Calpine 1997, Section 5.2, page 5-1 et seq). The first three are in Sutter County and the fourth is in Sacramento County. (Note: Calpine 1997, AFC Figure 5.2-1, p. 5-2 erroneously shows SEPCO site S7 in Placer County. It is actually located in south Sutter County, east of the SSCICA.) Both the SBIA and SSCICA are general areas without individual parcels specified by Calpine. Also, Calpine considered the entire four parcel SAC1 site, whereas Energy Commission staff only considered one. The S7 site is the same specific parcel for both Calpine and staff.

SUTTER BUTTES INDUSTRIAL AREA

The Sutter Buttes Industrial Area is located in northern Sutter County between state Highway 20 and the Sutter Buttes range. The unincorporated community of Sutter is located on the northeast of the SBIA. Very few industrial uses exist in the SBIA; most uses appear to be either agricultural, agricultural-related or residential. The SBIA was determined by Calpine to have possible access to Western's 230-kV system with a connecting transmission line distance approximately equal to the SPP site's distance. However, specific routing was not provided in the AFC. Calpine also assumed that this site could be served by the same Pacific Gas and Electric Company (PG&E) gas supply line as the SPP site, but again, did not specify any particular routing.

SOUTH SUTTER COUNTY INDUSTRIAL/COMMERCIAL AREA

The South Sutter County Industrial/Commercial Area contains a large section of south Sutter County. Most existing uses are either agricultural or agricultural-related. Few, if any, true industrial use exist in the SSCICA. In the AFC, Calpine assumed that the SSCICA alternative site would connect with Western's 230-kV transmission line, but no routing was given. The same PG&E natural gas supply assumed in the SBIA would be utilized. Still no routing was given, other than a general western orientation.

SEPCO S7

This site was referred to Calpine by staff during prefiling workshops. It is in the southeastern area of Sutter County, outside of the SSCICA. The site is currently used for rice cultivation. Instead of connecting with Western's 230-kV transmission line, the AFC assumed that the SEPCO S7 site would require a four mile long transmission line to interconnect with Western's Elverta substation. This site would

require 29 miles of natural gas line be installed connecting with the PG&E L-400/401 interstate pipeline in Yolo County.

SEPCO SAC1

Calpine considered all four parcels of this site. As with the S7 site, the SAC1 alternative would interconnect directly with Western's Elverta substation and PG&E's L-400/401 pipeline. The latter connection would be only 25 miles in length however.

RELATED LINEAR FACILITIES ROUTE ALTERNATIVES

The AFC contains numerous transmission line and natural gas line routings for the SPP site. Energy Commission staff believes the discussion in the AFC presents these alternatives well and provides the following descriptions for the convenience of the reader, who is referred to the AFC for more information.

TRANSMISSION LINE

Calpine evaluated both a double circuit 115 kV and a single circuit, two conductor per phase 230-kV lines to tie into PG&E's Rio Oso bus. Calpine rejected these based on PG&E and Western's opinions that this system was already heavily loaded, and was not feasible (Calpine 1997, AFC § 6.3.1, page 6-21).

A third electrical transmission alternative, interconnection with Western's 230-kV transmission line, was selected as Calpine's proposed method. This method was itself analyzed using three routing alternatives. The South Township/O'Banion Road routing (Alternative 3C) was initially selected by Calpine as proposed routing (Calpine 1997, AFC § 6.3.1, page 6-22). On May 13, 1998, Calpine filed a supplement to its AFC that describes a new preferred transmission line routing from the proposed project site south to a switching station south of Everglade Road and adjacent to the Sutter Bypass. This route would be about six miles long.

NATURAL GAS SUPPLY

Two natural gas supply routing alternatives to the SPP site were presented in the AFC (Calpine 1997, AFC § 7.5, page 7-7). The 31 mile long Franklin Road alternative was dismissed due to costs judged by Calpine to be about double those of the proposed routing. A Yuba City routing, a 44 mile run, was dismissed due to estimated costs being about double that of the proposed route.

NEED CONFORMANCE

Testimony of Jim Hoffsis/Connie Leni

Under state law, the Energy Commission cannot certify a proposed electric generating facility unless it finds that the project conforms with the Integrated Assessment of Need contained in the Energy Commission's most recent ***Electricity Report***. This analysis examines whether the Sutter Power Plant (SPP) conforms to the Energy Commission's Integrated Assessment of Need.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

STATE

California Code of Regulations

California Code of Regulations states "The presiding member's proposed decision shall contain the presiding member's recommendation on whether the application shall be approved, and proposed findings and conclusions on each of the following: (a) Whether and the circumstances under which the proposed facilities are in conformance with the 12-year forecast for statewide and service area electric power demands adopted pursuant to Section 25309(b) of the Public Resources Code." (Cal. Code of Regs., tit. 20, § 1752 (a)).

Public Resources Code

Public Resources Code Section 25523 (f) states "Findings regarding the conformity of the proposed facility with the integrated assessment of need for new resource additions determined pursuant to subdivisions (a) to (f), inclusive, of Section 25305 and adopted pursuant to Section 25308 or, where applicable, findings pursuant to Section 25523.5 regarding the conformity of a competitive solicitation for new resource additions determined pursuant to subdivisions (a) to (f), inclusive, of Section 25305 and adopted pursuant to Section 25308 that was in effect at the time that the solicitation was developed."

Need Conformance Criteria

In order to obtain a license from the Energy Commission, a proposed power plant must be found to be in conformance with the Integrated Assessment of Need. The criteria governing this determination are contained in the 1996 Electricity Report (***ER 96***), and are most succinctly described on page 72 of that document:

> "In sum, the ***ER 96*** need criterion is this: during the period when ***ER 96*** is applicable, proposed power plants shall be found in conformance with the Integrated Assessment of Need (IAN) as long as the total number of megawatts permitted does not exceed 6,737."

CONCLUSIONS AND RECOMMENDATIONS

ER 96 was adopted by the Commission on November 5, 1997. Sutter Power Project was found data adequate on January 21, 1998. Therefore, ***ER 96*** is the ***Electricity Report*** adopted most recently prior to the project being found data adequate. Staff evaluated the project based on ***ER 96*** Need Conformance Criteria.

Staff finds that the Sutter Power Plant meets the need conformance criteria contained in ***ER 96.*** The certification of the project would not cause the number of megawatts permitted in this case, and any others previously approved by the Commission under ***ER 96,*** to exceed 6,737. Therefore, the Sutter Power Plant is in conformance with the Integrated Assessment of Need.

AIR QUALITY

Testimony of Magdy Badr

INTRODUCTION

This analysis addresses the potential air quality impacts resulting from criteria air pollutant emissions created by the construction and operation of the Sutter Power Plant Project (SPP). Criteria air pollutants are those for which a state or federal standard has been established. They include nitrogen dioxide (NO2), sulfur dioxide (SO2), carbon monoxide (CO), ozone (O3) and its precursors (NOx and VOC), volatile organic compounds (VOC), particulate matter less than 10 microns in diameter (PM10) and its precursors: NOx, VOC, SOx, and lead (Pb).

In carrying out its analysis, the California Energy Commission staff identifies the potential air quality impacts associated with the SPP, evaluates the project's conformance with all applicable air quality laws, ordinances, regulations and standards (LORS), evaluates the adequacy of proposed mitigation measures and the need for alternative or additional mitigation measures, and proposes specific conditions of certification, including those recommended by the local air pollution control district (California Code Regs., Title 20, Section 1742(b), 1742.5(b), and 1744(b)).

Staff addresses the following questions:

- whether the project is likely to conform with applicable air quality laws, ordinances, regulations and standards,
- whether the process equipment and the pollution control devices are properly sized and will perform their functions as expected,
- whether the project is likely to cause significant adverse environmental effects, including new violations or contributions to existing violations of the applicable ambient air quality standards,
- whether any identified air quality impacts are adequately mitigated, and
- whether any specific project configurations, gas turbines, or control devices, alone or in combination, will result in lesser impacts to the environment, and thus can be considered as potential mitigation measures for air quality impacts.

The air quality regulatory agencies involved in the review of the SPP, including the Feather River Air Quality Management District (District), the California Air Resources Board (CARB), and the U.S. Environmental Protection Agency (EPA), Region IX, and the commission staff, have participated in resolving all of the potential air quality issues associated with the project. The District has issued its Final Determination of Compliance on the project and staff has finalized their recommendations.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

FEDERAL

The federal New Source Review (NSR) program, which is administered by the District requires the SPP to comply with the Lowest Achievable Emission Rate (LAER) for NOx, VOC and CO and to provide offsets for emissions of these pollutants. In addition, Calpine must certify that all facilities they own and operate comply with applicable requirements contained in the State Implementation Plan. The Environmental Protection Agency (EPA) has revoked the one hour ozone standard for the northern portion of Sutter County in which the SPP will be located, as of July 1998, and it has been replaced by the new 8-hour ozone standard. However, the existing District NSR rules will remain in effect until rules based on the new 8-hour ozone standard are developed and adopted. Therefore, the Calpine project must still comply with all existing Federal NSR rules.

The SPP facility is located in an attainment area for NO2, SO2 and CO, and is subject to the Prevention of Significant Deterioration (PSD) review for those air contaminants. In general, the project must comply with Best Available Control Technology (BACT) for NO2, SO2 and CO and demonstrate that its emission impacts will not significantly degrade the existing ambient air quality in the region. EPA Region IX retains PSD review authority. The PSD trigger levels are 40 tons per year for NOx, CO, VOC and SO2 and 15 tons for PM10. The SPP is subject to PSD review for NOx, CO and PM10 since the annual emission levels are higher than the PSD trigger levels.

The power plant's gas turbines are also subject to the federal New Source Performance Standards (NSPS). These standards include a NOx emissions of no more than 75 ppm at 15 percent excess oxygen (ppm@15%O2), and a SOx emissions of no more than 150 ppm@15%O2.

States are required by Title V of the Federal Clean Air Act (FCAA) to implement and administer the operating permit programs with the goal of ensuring that large sources are in compliance with all applicable requirements. These requirements are contained in Title 40 CFR, part 70. To comply with Title V, the District has the authority to administer the federal operating permit program and has adopted Regulation X, Rule 10.3. The Acid Rain Provisions of the FCAA establish an emission allowance/tracking program and impose monitoring of SO2 and NOx emissions. All electrical generating facilities labeled as "affected units" are subject to acid rain regulations. The SPP is subject to acid rain regulations and must comply with all requirements. Calpine will estimate SO2 emissions using the approved emission factors and measured heat input rate. The CO2 emissions are estimated using a carbon balance for natural gas and measured heat input. The heat input will be monitored on a continuous basis with an accuracy of $\pm$ 2 percent. The heat content of the natural gas will be measured or certified monthly by the natural gas distributor. Furthermore, the SPP will be required to install, operate and certify NOx continuous emission monitoring systems (CEMS). All calculation methodologies and CEMS must be installed and certified within 90 days following the commencement of the operation of the power plant. However, since the

SPP will utilize natural gas in its operation, the project is exempted from the installation of CEMS for SO2, CO2 and volumetric flow rate. The following AIR QUALITY Table 1 summarizes the federal and state ambient air quality standards and the averaging time for each 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 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

The following is a concise summary of the major applicable District Rules and Regulations:

Regulation III, Rule 3.0	Prohibits a person from discharging visible emissions greater than Ringleman No. 2, which is equivalent to 40 percent opacity.
Regulation III, Rule 3.2	Prohibits a person from discharging particulate matter in concentrations greater than 0.3 grains per cubic foot of gas at standard conditions.
Regulation III, Rule 3.10	Prohibits a person from discharging sulfur oxides in excess of 0.2 percent by volume (2,000 ppm), collectively calculated as SO2.
Regulation III, Rule 3.16	Regulates operations which periodically may cause fugitive dust emissions into the atmosphere.
Regulation IV	Defines the authority to construct and permit to operate processes associated with stationary emission sources.
Regulation X, Rule 10.1	Defines the New Source Review process, including best available control technology (BACT) requirements, and ambient air quality impact assessment and emission reduction credit requirements.

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 $\mu g/m^3$)
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 $\mu g/m^3$)
Suspended 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 $\mu g/m^3$	---
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 coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.

Regulation X, Rule 10.3 Requires the preparation and submittal of Title V operating permit and acid rain permit applications. Applications for new sources are due within 12 months of initial operation of the source.

Regulation XI, Rule 11.3 Restricts the use of hexavalent chromium water treatment chemicals in cooling towers. Limits hexavalent chromium emissions to existing cooling towers.

SETTING

METEOROLOGY AND CLIMATE

The SPP will be located in Sutter County, approximately seven miles southwest of Yuba City, California. It will be constructed on a twelve acre parcel adjacent to the Greenleaf Unit 1 cogeneration facility. The area surrounding the project site is flat. The Sutter Buttes is the nearest elevated terrain, which is located nine miles northeast of the project site.

Sutter County is part of the Sacramento Valley Air Basin, which is surrounded by the Coastal Mountain Range to the west, the Sierra Nevada to the east, the Cascade Range to the north and the San Joaquin Valley Air Basin to the south. The Sacramento Valley has a moderate mediterranean climate, which is characterized by hot, dry summers and cool, rainy winters. The annual average rainfall is approximately 17 inches. The majority of the rain falls from October to April. The North Pacific storm track intermittently dominates the Valley weather, with periods of dense and persistent low-level fog often occurring between storms. The frequency and persistence of heavy fog in the Valley diminishes with the approach of spring, when the days lengthen and the intensity of the sun increases.

During the summer, the Pacific storm track is usually north of the Sacramento Valley, the afternoon temperatures are warm to hot, while nights are usually mild due to cool marine air intrusion from the San Francisco Bay Area. Meteorological data collected at the Sacramento Executive Airport (which is over 30 miles away from the project site) indicate that July is usually the warmest month of the year, with a normal daily maximum temperature of 93^{O}F, and a normal daily minimum of 59^{O}F. In the fall and spring, the afternoon temperatures are mild, in the 60's and 70's, while nights are cool, in the 40's and 50's. In the winter, temperatures are cool in the afternoon and crisp at night. The coldest month is usually January, with a normal daily maximum of 53^{O}F and a normal daily minimum of 38^{O}F. The recorded high temperature is 115^{O}F and the recorded low temperature is 18^{O}F.

The prevailing wind is southerly during most of the year. However, in November and December, a large north to south pressure gradient develops over Northern California and northerly winds prevail. Wind directions are often influenced by the topography of the Central Sacramento Valley and the surface pressure gradient between the coast and the Valley. Figures 1 through 5 show the annual and quarterly Windroses

AIR QUALITY Figure 1
Windrose Annual

AIR QUALITY Figure 2
Windrose Q1

AIR QUALITY Figure 3
Windrose Q2

AIR QUALITY Figure 4
Windrose Q3

AIR QUALITY Figure 5
Windrose Q4

reported (as reported by Calpine in December 1997 submittal) from the closest meteorological monitoring station at Beale Air Force Base which is located 15 miles east of the project.

EXISTING AMBIENT AIR QUALITY

Ambient air quality monitoring data collected in the Sutter area between 1993 and 1996 are shown in AIR QUALITY Table 2. Staff evaluated the data collected from the Sutter County air monitoring stations, which are located at Sutter Buttes, Yuba City and Pleasant Grove. As can be seen in AIR QUALITY Table 2, based on the magnitude of the pollutant concentrations and the numbers of days with violations of the California Ambient Air Quality Standards (CAAQS), ozone and PM10 are the air pollutants of the greatest concern in the Sutter County area. The highest one hour ozone concentrations exceed the CAAQS during all four years. The highest twenty four hour concentrations for PM10 also exceeds the CAAQS during all four years. But the highest annual pollutant concentrations in 1995 and 1996 are below the CAAQS standards. The data also show no violations of the one hour or the 8-hour state and federal CO standards. No violations of the one hour or the annual concentrations of the NO2 CAAQS and National Ambient Air Quality standards (NAAQS). There was no data available for SO2 from the Sutter County air monitoring stations. All PM10, NO2 and CO data presented in AIR QUALITY Table 2 were collected at the Yuba City monitoring station.

AIR QUALITY Tables 3 and 4 provide a summary of the PM10 and ozone ambient air quality monitoring data collected between 1991 and 1996 from air monitoring stations located in Sutter County and Colusa County. It is clear from Table 3 that the number of days in violation of the state 24-hour average concentration of PM10 standard varies from 1991 through 1996. However, there is no clear trend or indication that PM10 air quality is improving, but the data suggest that most of the violations occur during the fall season. However, the data collected in the Sutter County area are limited to the two air monitoring stations located in Yuba City and Colusa. AIR QUALITY Table 4 presents the highest one hour average ozone concentrations, number of days of violations of the state ozone standard and the months in which the violations occurred. It is clear that the state ozone standard is violated mostly during the summer months.

AIR QUALITY Table 2
Sutter Area Ambient Air Quality Monitoring Data

Pollutant		1996	1995	1994	1993	Most restrictive Ambient Air Quality Standard
Ozone	Highest 1-hr concen. (ppm)	0.12[S]	0.13[P]	0.12[S]	0.14[P]	0.09 (CAAQS)[E]
	# of days with violations of CAAQS	22	16	23	4	---
PM10	Highest 24-hr concentrations ($\mu g/m^3$)	82[Y]	128[Y]	154[Y]	78[Y]	50 (CAAQS)
	# of days with violations of CAAQS	5	16	7	11	---
	Highest annual concentrations ($\mu g/m^3$)	25.5	29.5	31.1	32.3	30 (CAAQS)
NO_2	Highest 1-hr concen.(ppm)	.07[Y]	0.07[Y]	0.08[Y]	0.09[Y]	0.25 (CAAQS)
	Highest annual concen.(ppm)	0.013	0.014	0.016	0.017	0.053 (NAAQS)[F]
CO	Highest 1-hr concen.(ppm)	8.0[Y]	8[Y]	9[Y]	10[Y]	20.0 (CAAQS)
	Highest 8-hr concen.(ppm)	4.9	4.8	6.3	7.3	9.0 (CAAQS)
SO_2	Highest 1-hr concen.(ppm)	NA	NA	NA	NA	0.25 (CAAQS)
	Highest 24-hr concen.(ppm)	NA	NA	NA	NA	0.05 (CAAQS)
	Annual Avg. (ppm)	NA	NA	NA	NA	0.003

Y Ambient data collected at Yuba City monitoring station.
S Ambient data collected at Sutter Buttes monitoring station.
P Ambient data collected at Pleasant Grove monitoring station.
F National Ambient Air Quality Standard.
E California Ambient Air Quality Standard.

Source: CARB. 1988-1991 "California Air Quality Data".

AIR QUALITY Table 3
PM10 Air Quality Summary 1991-1996
Maximum 24-hour Average Concentration (µg/m3)

Year	Yuba City - Almond St				Colusa - 100 Sunrise			
	Highest 24-hour Average (µg/m3)	Days above state std.	% of Annual Violations †	Months violations occurred	Highest 24-hour Average (µg/m3)	Days above state std.	% of Annual Violations †	Months violations occurred
1991	108	22	32%	J, O, N, D	102	19	31%	J, O, N, D
1992	79	13	18%	J, Au, S, O, N	84	8	11%	Au, S, O
1993	78	11	15%	S, O, N	70	4	6%	S, N
1994	154	7	11%	J, Au, S, O	57	5	8%	S, O
1995	128	16	24%	F, O, N	93	18	25%	S, O, N
1996	82	5	8%	J *	57	3	5%	My *
California Ambient Air Quality Standard: 50 µg/m^3 (24-hour average) National Ambient Air Quality Standard: 150 µg/m^3 (24-hour average)								

Source: CARB. 1991-1996 "California Air Quality Data".

† The percent of annual violations is the number of days above the CAAQS compared to the total number of measurements annually. Measurements usually occur every sixth day.

* The reported data for 1996 is limited to the months of January to June.

Month abbreviations: J-January, F-February, M-March, Ap-April, My-May, Ju-June, Jl-July, Au-August, S-September, O-October, N-November, D-December

AIR QUALITY Table 4
Ozone Air Quality Summary, 1991-1996

Year	Pleasant Grove			Sutter Buttes			Yuba City - Almond ST		
	Highest 1-hr. Avg. (ppm)	Days above state std.	Months violations occurred	Highest 1-hr. Avg. (ppm)	Days above state std.	Months violations occurred	Highest 1-hr. Avg. (ppm)	Days above state std.	Months violations occurred
1991	0.10	7	Jl, S, O	NA*	NA*	NA*	0.11	5	F, Jl, S, O
1992	0.12	12	My, Ju, Jl, Au, S	NA*	NA*	NA*	0.12	23	My, Ju, Jl, Au, S, O
1993	0.14	4	My, Ju, Au	0.12	11	Jl, Au, S, O	0.10	1	Jl
1994	0.10	1	Au	0.12	23	My, Ju, Jl, Au, S, O	0.11	12	Jl, Au, S, O
1995	0.13	11	Jn, Jl, Au, S	0.11	16	Ju, Jl, Au, S, O	0.11	8	Jl, Au, S
1996	0.10	7	Ju, Jl, Au	0.12	22	Ju, Jl, Au, S, O	0.11	11	Ju, Jl, Au, S, O
California Ambient Air Quality Standard: 0.09 ppm (1-hour average) National Ambient Air Quality Standard: 0.12 ppm (1-hour average)									

Source: CARB. 1991-1996 "California Air Quality Data".*
Data are Not Available (NA).

Month abbreviations: J-January, F-February, M-March, Ap-April, My-May, Ju-June, Jl-July, Au-August, S-September, O-October, N-November, D-December

ATTAINMENT STATUS

Sutter County is divided into north and south air quality regions with a dividing line at Subaco Road, approximately 7.1 miles south of the SPP site. For air quality planning purposes and based on the populations in the area, the U.S. EPA established that the southern portion of Sutter County is part of the Sacramento Air Quality Maintenance Area (SAQMA). The attainment status of Sutter County for different air pollutants is presented in AIR QUALITY Table 5.

AIR QUALITY Table 5
Attainment Status Of Sutter County

Pollutant	Federal Attainment Status	California Attainment Status
NOx	Attainment/Unclassified	Attainment/Unclassified
CO	Attainment/Unclassified	Attainment/Unclassified
SO2	Attainment/Unclassified	Attainment/Unclassified
Ozone-Northern Portion	No Status	Nonattainment
Ozone-Southern Portion	Serious Nonattainment	Serious Nonattainment
PM10	Attainment	Moderate Nonattainment
Lead	Attainment/Unclassified	Attainment/Unclassified

Source: Calpine (Calpine Corporation). 1997. Page 8.1-12.

PROJECT DESCRIPTION

This section describes the project design and criteria pollutant control devices as presented in the SPP's application and subsequent data responses filed since December 1997.

PROPOSED EQUIPMENT

The major equipment proposed in the SPP application includes the following:

- Two Westinghouse 501FC combustion turbine generators with a gross capacity of 170 MW of electricity each;
- One steam turbine generator with a gross capacity of 160 MW;

- Two heat recovery steam generators (HRSG) with a capacity of 463,769 lb/hr of high pressure steam;

- Two duct burners, each with a firing capacity of 170 MMBtu/hr high heating value (HHV);

- Dry cooling tower;

- Continuous emission monitoring system (CEMS) for NOx, oxygen (O2) or CO2 and exhaust flow rate;

- Emission control systems include:
    - dry low-NOx combustors;
    - selective catalytic reduction (SCR) to control NOx;
    - oxidation catalyst to control CO and VOC.

COMBINED CYCLE FACILITY OPERATION

Calpine is proposing to construct and operate a combined cycle facility using two combustion turbines, which will each exhaust into a HRSG. Each HRSG is also equipped with supplemental duct firing to be used to produce steam for the steam turbine. It is expected that each duct burner would operate 5,460 hours/year.

The inlet air will flow through the inlet air filter/evaporative coolers and air inlet ductwork of the CTGs. It will be compressed to increase its pressure, then flow to the combustion section of the turbine. Natural gas fuel will be injected at the appropriate pressure into the combustion section and ignited. The hot combustion gases will expand though the turbine section of the CTGs, causing the turbine blades to rotate and drive the electrical generators and compression sections. The hot combustion gases will exit the turbine sections into the HRSG where water will be heated. The water will be converted to superheated steam and delivered to the steam turbine. The steam turbine will drive the electrical generator to produce additional electrical capacity. The steam will exit the low pressure side of the steam turbine and pass through a surface condenser, which will give up heat to cooling water that will be condensed to a liquid.

The cooling water will cycle through a dry cooling tower where the heat will be rejected to the atmosphere. The project is expected to have an availability factor of over 90 percent. The CTGs will produce, each, approximately 170 MW of electrical power at an average ambient temperature of 61^{O}F.

The primary fuel used in the CTGs and the duct burner is pipeline quality natural gas. No other back-up fuel will be used in the project. The SPP project will require a new gas pipeline with two dehydrator units. These dehydrator units will remove water and condensable hydrocarbons from the natural gas. Glycol solution will be used in the condensation process to cool the natural gas. A natural gas boiler will be used to

regenerate the glycol solution by heating it to approximately 375 ^{o}F. These boilers are rated at a maximum heat input of 1,000,000 Btu per hour (HHV).

Air Pollution Control Equipment

The CTGs will employ dry low NOx combustors and good combustion design to control CO and NOx emissions. NOx emissions from the combustion turbines into the HRSGs will be controlled to 25 ppm. It will be controlled further by a SCR unit located in the HRSG which will reduce the NO_x level to 2.5 ppm (15 percent O_2), averaged over one hour, as measured at the stack. The SCR unit will use anhydrous ammonia. The ammonia slip (ammonia emissions in the exhaust) will be limited to 10 ppm measured at the stack.

Particulate emissions from the CTGs will be controlled by inlet air filtration, the use of filtered natural gas as the sole source of fuel, and the use of dry low NO_x combustion turbine burner technology.

The CTGs (Westinghouse) are designed to minimize the formation of CO and ROG. It is estimated that CO and ROG concentrations at a base load operating level will be as low as 4 ppm and 1 ppm (15 percent O_2), respectively. Calpine is proposing to install a CO/ROG oxidation catalyst to guarantee achieving these levels.

Continuous emission monitors (CEMs) are proposed to be installed on the exhaust stacks for NO_x and oxygen, to assure adherence to the proposed emission limits. The CEMs will be installed, calibrated, operated and maintained in accordance with District procedures and applicable EPA Performance Specifications 2, 3, and 4 of Title 40, Code of Federal Regulations, Part 60, Appendix B.

ESTIMATED PROJECT EMISSIONS

SPP Project's Construction Activities and Associated Air Emissions

During the project construction period, air emissions will be generated from the exhaust of heavy construction equipment, such as water trucks, rollers, excavators, graders, tractors, air compressors, forklifts, dozers, and scrapers; fugitive dust will be generated from activities such as cleaning, grading, and preparation of the site; and from the construction of the transmission lines and gas line.

The estimated air pollutant emissions in the tables below are based on the assumption that all equipment is operating concurrently and maintained and operated properly. The air emissions associated with the construction of these facilities are summarized in AIR QUALITY Tables 6 and 6A. AIR QUALITY Table 6 summarizes the daily air emissions associated with each construction phase of the project, including the linear facilities.

The construction of the proposed natural gas line, drip stations, natural gas dehydrators, switchyard and transmission lines will generate short-term air emissions

in the form of fugitive dust and vehicle emissions. The pipeline route requires a total of 13 miles of trenching for a 16-inch diameter pipe. The trench is expected to be 2.5 to 3 feet wide and 6 to 7 feet deep. The natural gas line requires two new dehydrator units, one to be located at the Sacramento Drip Station in Sutter County, and the other at Poundstone Drip Station in Colusa County. Both drip stations will be permitted, owned and operated by PG&E. The air emissions associated with the dehydrators are generated from the condensation tank, which will vent VOC emissions, and from operation of the boilers which will burn natural gas at 1,000,000 Btu per hour. The boilers will operate 8,760 hours per year. The air emissions associated with the dehydrators, boilers and fugitive VOC emissions from the valves and flanges are summarized in AIR QUALITY Table 7.

The electrical transmission line will require the installation of approximately 32-38 poles. Each pole will be supported by a 3.5 feet in diameter and 12 feet deep hole for concrete foundation. In addition, the switchyard site will be excavated to a depth of two feet to allow for the installation of the ground grid and conduits. A summary of the air emissions associated with the construction activities for the gas pipe line, switchyard and transmission lines is shown in AIR QUALITY Table 7A.

AIR QUALITY Table 6
Estimated SPP Construction Emissions (lb/Day)

NOx	SO_X	PM_{10}	CO	ROG
Phase I - Site Preparation Emissions				
315	27.7	343	153	37.5
Phase II - Construction Emissions				
163.5	14.1	19.3	77.2	19.8
Construction Worker Vehicle Emissions				
19.5	0	7.7	106	12.1
Natural Gas Line Construction Emissions				
40	4	37	28	5
Electrical Transmission Lines Construction Emissions				
57.9	4.2	7.2	26.3	6.8
Site Elevation Emission Estimates (Equipment & Fugitive Dust)				
154	18	1941(1)	178	23
Switchyard Construction Emissions				
57.5	5	11	35.1	9.3
1. This value includes 550 lb/day from equipment PM10 emissions and 1,391 lb/day from fugitive dust.				

Sources: Calpine (Calpine Corporation). 1997 page 8.1-25 through 8.1-31) and Calpine (Calpine Corporation). 1998j. Response to data requests 64 and 66 with additions to 63, 67 and 68.

AIR QUALITY Table 6A
Estimated SPP Construction Emissions (lb/Project)

Equipment Type	NOx	SOx	PM10	CO	ROG
Heavy-duty Construction Equip. Phase I[4]	6,659	616	819	3,188	886
Light-duty Trucks[4]	6,517	592	764	3,371	853
Worker Vehicles[1]	4,200	(2)	1,600	23,400	2,600
Delivery Vehicles[4]	1,235	82	141	534	141
Wheeled Tractors[4]	570	48	59	384	81
Track type loaders[4]	1,635	137	204	762	136
Fugitive Dust from Excavation & Delivery[3]			9,216		
Total Emissions (lbs)	**20,815**	**1,476**	**12,804**	**31,640**	**4,697**
SPP Construction Emissions (tons)	**10.4**	**0.74**	**6.4**	**15.82**	**2.35**

1. Assumes that: a) vehicles are 1990 models, 250 workers, 208 vehicle, 80 miles round trip, avg. speed 45 mi/hr., 1.2 worker/vehicle and 2 cold start-up/vehicle/day.
2. Anticipated to be negligible based on the fuel sulfur content and engine efficiency.
3. Based on: AP-42 section 13.2.3.3., 64 percent of the TSP emissions is PM10.
4. Based on: a) emission factors from EPA 1991, b) all particulate matter assumed to be PM10.

Source: Calpine (Calpine Corporation). 1997. Pages 8.1-27-30.

AIR QUALITY Table 7
Drip Stations Natural Gas Dehydrators Emissions*

Pollutant	lb/hour	lb/day	Ton/Year
NOx	0.2	4.8	0.86
CO	0.042	1.0	0.18
VOC	0.012	0.28	0.06
SO2	0.0012	0.028	0.006
PM10	0.024	0.56	0.1

* Natural gas dehydrator units construction emissions include Sacramento and Poundstone Drip Stations. Emissions estimates are based on the revised (oct. 1996) U.S. EPA AP-42 emission factors, section 1.4.

Source: Calpine (Calpine Corporation). 1997. Page 8.1-25.

AIR QUALITY Table 7A
Estimated Linear Facilities Construction Emissions

	NOx	SOx	PM10(1)	CO	ROG
Natural Gas Line	4,247	385	3,925	2,932	526
Electrical Transmission Lines	3,400	280	280	1,440	280
Switchyard	5,800	400	1,200	3,600	1,000
Site Elevation (equipment)	5,529	654	550	6,392	810
Site Elevation (Fugitive Dust)		0	49,891		
Total Emissions (lbs/Project)	18,976	1,719	55,846	14,364	2,616
Total Emissions (tons/Project)	**9.5**	**0.86**	**28**	**7.2**	**1.3**

1. Includes both vehicle exhaust and fugitive dust.

Source: Calpine (Calpine Corporation). 1997. Pages 8.1-30-32.

Potential Criteria Pollutants Generated from the Operation of SPP Project

Air emissions will be generated from the dehydrators and the major components of the SPP project. Calpine assumes that each dehydrator unit includes 100 glove valves and 100 flat gasket flanges. By using the American Petroleum Institute (1980) emission factors of 0.471 lbs/day for the valves and 0.267 lbs/day for the flanges, the total hydrocarbon emissions are 26,937 lbs/year. The Applicant assumes that natural gas is approximately 95.21 percent by volume methane and carbon dioxide and 4.79 percent by volume VOCs. By using these assumptions, the maximum annual fugitive VOC emissions for all valves and flanges is 0.65 ton per year.

Air pollutant emissions will also be generated from operating the major project components. The SPP will utilize two combustion turbines. Calpine examined more than one turbine type and chose the Westinghouse 501FC turbine for the SPP project. Staff evaluated the air emissions associated with the turbine based on manufacturer hourly guaranteed emission factors.

The proposed operating assumptions are:

a) operating each turbine for 19 hours per day with a maximum 8,110 hours per year;

b) operating each duct burner for 22 hours per day with a maximum 5,460 hours per year;

c) two start-ups per day for each turbine, one hot start-up for one hour and one cold start-up of 3 hours (only two hours of uncontrolled emissions); cold start-up is when the turbine has not been in operation for 72 hours or longer;

d) two one-hour shut-downs per day for each turbine;

e) 50 cold start-ups and 250 hot start-ups per each turbine on an annual basis;

f) operating the dry cooling tower, no PM10 emissions;

g) steam injection for power augmentation is based on 19 hours per day, with a maximum of 2,000 hours per year.

Westinghouse Turbine

AIR QUALITY Table 8 shows the hourly air emission levels as calculated by Calpine and guaranteed by the manufacturer for the major components of the project.

AIR QUALITY Table 8
Maximum Hourly Emissions (lb/hour) Using Westinghouse Turbine

Pollutant	CTG(2)	Duct Burner(3)	Steam Injection	Hot Start-up	Cold Start-up(4)	Shutdown
NOx	16.8	1.4	0.9	170	175	26.6
CO	16.7	3.4	14.2	902	838	98.2
VOC	1.5	2.0	0.01	7.2	7.2	7.2
SO2	3.7	0.005	0.31	2.3	2.3	2.3
PM10	9.0	2.5	0.0	6.7	6.7	6.7

(1) No emissions associated with cooling towers.
(2) All air emissions are calculated based on CTG operation at 20F and 100 percent load rate.
(3) Duct burner emissions are calculated based on firing 170 MMBtu/Hr (HHV) of natural gas.
(4) Cold start-up emission levels represent one hour.

Sources: Calpine (Calpine Corporation). September 22,1998. Cooling Tower Information.
Calpine (Calpine Corporation). 1998j. Response to data requests 64 and 66 with additions to 63, 67 and 68.

AIR QUALITY Table 9 presents the maximum daily emission levels as estimated by Calpine using the assumptions presented above. The air emission levels assume maximum hourly operation of the project per day. Calpine estimates that uncontrolled air emissions associated with cold start-ups are based on 2 hours, which staff believes is sufficient time for the SCR to warm-up and control the NOx emissions consistent with manufacture guarantees.

AIR QUALITY Table 9
Maximum Daily Emissions (lb/day) Using Westinghouse Turbine

	CTG	Duct Burner	Steam Injection	Hot Start-up	Cold Start-up[1]	Shutdown	Total Emission Per CTG	Calpine[2] Maximum Project Daily Emissions
Hrs./Day	19	22	19	1	2	2	24	24
NOx	318.3	29.9	17.5	170	349	24	909	1817
CO	317.3	74.8	269.5	902	1,675	25	3264	6528
VOC	28.5	44.9	0.2	1.1	2	2.2	79	158
SO2	70.3	0.12	5.9	2.7	5	5.3	90	179
PM10	171.0	54.6	-	9.0	18	18	271	541

(1) Cold start-ups are based on 1.5 of uncontrolled emissions to allow the SCR to warm-up, then, all the emissions will be controlled.

(2) Based on two turbines, Calpine (Calpine Corporation). 1998j. Response to data requests 64 and 66 with additions to 63, 67 and 68. Submitted to the California Energy Commission, May 6, 1998, Sept.22, 1998.

Source: California Energy Commission Staff assumptions and calculations of daily emissions.

AIR QUALITY Table 10 presents the maximum annual emissions, as estimated by Calpine using the above assumptions. The air emission levels assume maximum hourly operation of the project per year.

AIR QUALITY Table 10
Annual Emissions Using Westinghouse Turbine (Tons/Year)

	CTG	Duct Burner	Steam Injection	Hot Start-up	Cold Start-up(1)	Shutdown	Total Emission Per CTG	Calpine(2) Annual SPP Emissions
Hrs/Yr.	8,110	5,460	2,000	250	100	300		
NOx	65.9	3.7	0.9	21.2	8.7	1.8	102	205.86
CO	61.6	9.3	14.2	113	41.9	1.9	242	483.18
VOC	5.9	5.6	0.01	0.1	0.1	0.2	11.9	24.41
SO2	14.6	0.01	0.3	0.3	0.1	0.4	15.7	31.5
PM10	36.5	6.8	0.0	1.1	0.5	1.4	46.2	92.5

(1) Cold start-up emissions are based on 50 annual start-ups, each for 2 hours.

(2) Calpine (Calpine Corporation). 1998(j). Response to data requests 64 and 66 with additions to 63, 67 and 68. These emission levels include Dehydrators, valves and flanges emissions.

Source: California Energy Commission Staff assumptions and calculations of annual emissions.

PROJECT INCREMENTAL IMPACTS

This section discusses the project's direct impacts and cumulative impacts, as estimated by Calpine and evaluated by the CEC staff.

DIRECT IMPACTS

The project's principle air pollutant emissions will be generated during the construction of the project and during the operation of the gas turbines and the duct burners. Several operating scenarios were evaluated and the worst case scenario was chosen to be modeled to estimate the project's ambient air quality impacts. The U.S. EPA approved SCREEN model was used first to evaluate the project's ambient air quality impacts. If the impacts were significant and violated the ambient air quality standards, considering the ambient background, a more refined modeling of the worst case scenario was conducted to evaluate and quantify the project ambient air quality impacts. For that purpose, the U.S. EPA recommends the use of the Industrial Source Complex (ISC) model, with either short-term (ST) or long term (LT) option. Short-term refers to impact predictions of 1 to 24 hours, whereas long-term refers to

monthly, seasonal and annual averaging periods. The ISC model is a steady-state Gaussian plume model, appropriate for regulatory use to assess pollution concentrations from a wide variety of sources associated with an industrial source complex.

Five years of hourly meteorological data collected at the Sacramento Metro Airport National Weather Service (NWS) station monitor (1985 through 1989) were used in the modeling analysis. Concurrent mixing height data from the Oakland Airport, as well as different meteorological conditions, such as stability classifications and various wind speeds, were also used in the modeling analysis.

Construction Impacts

The SPP construction activities will be completed in two phases. Phase I will include the site preparation, phase II will be limited to the construction of the project. The air quality impacts of construction and site preparation are summarized in AIR QUALITY Table 14 below. The linear facilities impacts are insignificant because they require minimal equipment and occur along roads covering a large geographical area. The impacts from the construction equipment are anticipated to be of short duration and unavoidable, because of the sporadic nature of the construction phase of the project.

As AIR QUALITY Table 14 also shows that the estimated PM10 and NO2 impacts from the project incombination with ambient pollutant levels, exceed air quality standards. The ISC model was used to evaluate the maximum impact levels. However, for SO2 and CO, the SCREEN model was used to quantify the emission impacts.

AIR QUALITY Table 14
Summary of the SPP Construction Activities Impacts
On Ambient Air Quality

Pollutant	Averaging Period	Max. Impacts (µg/m3)	Background	AAQS Standard (µg/m3)
SO2	3 hours	138.7	26.1	1,300 NAAQS
	24 hours	61.6	7.83	105 CAAQS
	annual	15.4	0.0	80
CO	1 hour	840.6	11.4	23,000 CAAQS
	8 hours	488.4	8.3	10,000 CAAQS
NO2	1 hour	170.9	150.4	470 CAAQS
	annual	90.4	31.97	100 NAAQS
PM10	24 hours	699.3	154	50 CAAQS
	annual	14.4	36/7	30 CAAQS

(1) Calpine used ISC model to evaluate NOx and PM10 emissions impacts, and used SCREEN model to evaluate the SO2 and CO impacts.

Source: Calpine (Calpine Corporation). 1997. Page 8.1-35.

OPERATING IMPACTS

The modeling analysis of the operation of the combined cycle facility indicated that the worst case emission scenario resulted from operating the CTG during cold start-up for one hour and the duct burner at 100 percent load. The SCREEN model was used initially to evaluate the NO2, CO and SO2 emissions impacts. More refined modeling was needed to accurately evaluate the impacts. The ISC model was used for the refined analysis. AIR QUALITY Table 15 summarizes the ISC modeling results. The impacts from the project added to the ambient background were much lower than the most stringent standards for these pollutants, as shown in AIR QUALITY Table 15.

In evaluating PM10 impacts from the project, Calpine included the two CTGs, duct burners, and steam injection emissions. Since the project's PM10 impacts will likely contribute to existing violations of the state 24 hour standard, the ISC model was used to refine the analysis and better evaluate the PM10 impacts. The project impacts were added to the ambient background and calculated as a percent of the National or California standards. As shown in AIR QUALITY Table 15, project emissions will violate both the 24 hour and annual PM10 standards.

Given the complexities of secondary pollutant formation in the atmosphere, staff did not model the ozone or the secondary PM10 impacts of the project. Staff, nevertheless, assumes that emissions of ozone precursors, such as NOx and VOC, in areas of ozone non-attainment, may contribute significantly to ongoing violations within the District and therefore cause an adverse air quality impact. Staff considered the significance of such contributions in the context of historical air quality trends, current ambient air quality conditions and expected future air quality conditions, as described in the District's air quality management plan. Staff also assumes that the project's NOx emissions may be converted to nitrates and potentially contribute to existing PM10 violations. As with ozone, staff evaluates the significance of such contributions in the context of current and expected future PM10 air quality trends. As shown in AIR QUALITY Table 5, the District is currently classified nonattainment for both the state ozone and PM10 standards. Therefore, staff believes that the project's contributions of NOx and VOC emissions to ozone and secondary PM10 formation are potentially significant and should be mitigated.

AIR QUALITY Table 15
SPP Nonreactive Pollutant
Ambient Air Quality ISC Modeling Results

Pollutant	Averaging Period	Project Impact (µg/m3)	Background (µg/m3)	Total Impact (µg/m3)	Limiting Standard (µg/m3)	Type of Standard	Percent of Standard (%)
NO2(1)	1-hour	241.2	150.4	391.6	470	CAAQS	83
	Annual	0.26	31.96	32.2	100	NAAQS	32
PM10(1)	24-hours	0.55	154	154.55	50	CAAQS	309
	Annual	0.097	36.7	36.8	30	CAAQS	123
PM2.5(1)	24-hours	0.55	154	154.55	50	CAAQS	238
	Annual	0.097	36.7	36.8	30	CAAQS	245
CO(1)	1-hour	1243	11.4	1254	23,000	CAAQS	6
	8-hours	305.2	8.3	314	10,000	CAAQS	3
SO2	3-hours	1.3	26.1	27.4	1,300	NAAQS	2
	24-hours	0.6	7.83	7.89	365	NAAQS	8
	Annual	0.1	0.0 [3]	0.1	80	NAAQS	0.1

1. The project emissions include emissions during start-up.
2. Background data is based on Yuba City monitoring station.
3. No representative ambient data available within the region.

Source: Calpine (Calpine Corporation). 1997. Pages 8.1-33-35, November 2,1998.

CUMULATIVE IMPACT ANALYSIS

The Energy Commission staff provided Calpine with a modeling protocol to conduct the cumulative impact analysis. The major component of the protocol required Calpine to include in the modeling all known future projects within six miles of the SPP. Then, the modeling results (impacts) would be added to the ambient background levels to establish the total impact. The District conducted a comprehensive review and determined that there are no planned facilities within the six miles that are eligible for modeling. Therefore, the cumulative impact analysis was unnecessary.

The cumulative impacts of the linear facilities reviewed by the Sutter Community Services Department identified that Hughes Road - East Sutter Bypass Canal Bridge replacement is a proposed project within the County. This project is adjacent to the natural gas pipeline route. The project construction will be completed by October 15, 1998. The natural gas line construction is planned for the summer of 2000. Since the Hughes Road - East Sutter Bypass Canal Bridge replacement project will be completed prior to the start of construction of natural gas line, a cumulative impact analysis was not necessary.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS AND STANDARDS

FEDERAL

Calpine has submitted an application for a PSD permit to the EPA Region IX Office. At the time of preparation of this analysis, the PSD application has been deemed complete. Staff will maintain contact with the EPA staff to track the status of the permit review and any project issues identified.

STATE

Based on our assessment of the project's impacts, staff believes that the project complies with section 41700 of the California State Health and Safety Code.

LOCAL

The District has issued their Final Determination Of Compliance (FDOC) on November 10, 1998. Based on a review of the FDOC,staff has determined that the project will comply with applicable District rules and regulations subject to the completion of the memorandum of understanding (MOU) between the District and Sacramento Metropolitan Air Quality Management District (SMAQMD), and approval of the paving the road contract between Calpine and the Sutter County.

MITIGATION

In this section we evaluate the measures that Calpine is proposing to mitigate the project's air pollutant emissions impacts from the construction of the combined cycle facility and the transmission line, and from operation of the power plant.

CONSTRUCTION MITIGATION

Project construction activities will occur over a two-year period. The fugitive dust emissions from the construction of the project, switchyard and transmission line will be controlled by periodic watering of the site, assuming a 50 percent effectiveness, along with the following mitigation measures proposed by Calpine:

1. Areas of excavated or disturbed soils where construction activities have ceased for more than 15 days will be covered, or treat with a dust suppressant compound (such as magnesium chloride).

2. The beds of trucks will be covered when hauling excavated soils which have the potential to generate fugitive dust.

3. The construction area and scheduled activities will be limited to minimize disturbance.

4. Before trucks leave the site, their tires will be rinsed so they will not track soil off-site.

5. A maximum speed limit of 15 miles per hour will be posted on site.

6. Construction activities will be discontinued when wind speeds are greater than 20 mph.

The emissions from the construction equipment listed in AIR QUALITY Tables 6 and 7 will be minimized through the proper maintenance of the construction equipment to meet the applicable equipment emission standards.

OPERATION MITIGATION

The project's air pollutant emission impacts will be mitigated through a combination of the use of natural gas as the sole fuel, the use of air pollution control equipment and the provision of offsets. Calpine proposes to use a CTG with dry-low NO_X combustors, combined with an SCR system which uses ammonia injection to further reduce the NOx missions.

Calpine proposes to use a CO oxidation catalyst to reduce CO emissions to 4 ppm (15 percent O_2). Air pollutant emission levels will be properly monitored through the use of a continuous emission monitoring system.

Control of NOx Emissions

The project's NO_X emissions consist primarily of nitric oxide (NO) and a small percentage of nitrogen dioxide (NO2). Thermal NOx is the product of the oxidation of NO2 (present in the air used for combustion) at the temperatures present in the combustion process. Some NOx is formed from the oxidation of nitrogen present in the fuel. Nitrogen is not present in significant quantities in natural gas, so most of the NOx emissions from this project are due to thermal NOx.

Combustion chamber NO_X can be controlled by reducing the flame temperature in the combustion chamber through quenching steam and dilution using water and steam

injection. Additionally, thermal NOx can be controlled with combustor designs that premix the air and fuel and stage the combustion process (a reducing atmosphere followed by an oxidizing atmosphere).

NOx emissions from the generation facility will be controlled through the use of dry low NOx combustors in the CTGs and the use of SCR as a post-combustion emission control. The turbines will be equipped with a number of dry low-NOx combustors to ensure optimal uniform temperature distribution in the primary air zone. A reduction in NOx emissions is also achieved by raising the mean air/fuel ratio. The dry-low NOx burner produces emissions as low as 25 ppm when natural gas is burned before entering the SCR.

Calpine's proposed SCR system will control NOx emission levels to 2.5 ppm corrected @ 15 percent O_2. SCR is a process that chemically reduces NOx with ammonia (NH_3) over a catalyst in the presence of oxygen (O_2). The process is termed selective because the NH_3 reducing agent preferentially reacts with NOx rather than O_2 to form N_2 in the presence of excess O_2 at temperatures in the range of 400 to 750 ^oF. If the temperature is lower than 400^oF, the ammonia reaction rate is low, and therefore, NH_3 emissions (called ammonia slip) will increase.

SCONOx Technology as An Alternative Mitigation

The SCONOx system uses a catalyst bed which is located inside the HRSG anywhere within a 260 ^oF to 700 ^oF temperature range. As hot exhaust gases pass through the catalyst rack, the NOx molecules are adsorbed onto the catalyst surface. When the catalyst is regenerated using a regeneration gas containing 4 percent hydrogen, 3 percent nitrogen, and 1.5 percent carbon dioxide. The regeneration gas is created by reacting natural gas with air in the presence of an electrically heated nickel oxidation catalyst, which is electrically heated to 1900 ^oF. The gas is then mixed with steam (produced from the HRSG) and passes over a second catalyst to form the regeneration gas. The regeneration gas is introduced into the catalyst rack through a system of piping and louvers. The regeneration gas exits the catalyst rack is ducted back into the HRSG, upstream of the SCONOx.

SCONOX has been evaluated by USEPA Region IX, and they have acknowledged that a 2 ppm @ 15% O_2 NOx control level can be achieved in practice using the technology. Furthermore, USEPA recommended that new sources subject to the BACT requirements in Part C of the CAA should consider the 2.0 ppmv @15% O_2 for three hours avenging time or 2.5 ppmvd @15% O_2 for one hour avenging time as an achievable emissions limit in their BACT analyses.

Control of Carbon Monoxide (CO) and Reactive Organic Gases (ROG)

Combustion turbines inherently generate low CO and ROG emissions. High combustion temperatures, fuel/air mixing, and the excess air inherent in the CTG's combustion process favor complete combustion of fossil fuels. These conditions, however, also lead to higher NO_x emissions. Current CTG designs attempt to

balance achieving low NO_X emissions (from the CTG prior to post-combustion controls) while keeping CO and ROG emissions low. Good operating and maintenance practices will be used to limit the project's CO and ROG emissions.

Calpine proposes to install an oxidation catalyst downstream from the CTGs and the duct burners to reduce CO emissions. While the catalyst's ROG removal effectiveness is not guaranteed, the oxidation catalyst, which is a standard design, is expected to reduce ROG emissions by five percent for this project.

Control of PM10

Natural gas fuel contains only trace quantities of noncombustible material. Particulate emissions (PM_{10}) will be controlled by inlet air filtering for the combined cycle CTG and HRSG unit. In addition, Calpine proposes to use a dry cooling tower which has no PM10 emissions associated with its operation, which is the best control technology available.

Sulfur Dioxide Emissions Control

SO2 emissions result from the combustion of any sulfur-bearing fuel. The SPP SO2 emissions will be controlled by burning only natural gas, which typically contains only traces of sulfur. The emissions from the project's CTGs are expected to be very small without any additional post-combustion SO2 control equipment. Since natural gas contains only 2000 grains of sulfur per million cubic feet, the resulting SO2 emission concentrations should be less than 1.0 ppm @15% O_2.

Emission Offsets

To fully mitigate the facility's potential emission increases, Calpine plans to purchase emission reduction credits (ERCs) from District's ERCs bank and the Sacramento Metropolitan Air Quality Management District (SMAQMD) ERCs bank. Calpine has option contracts with some of these sources of ERCs and has letters of intent to purchase ERCs with others. Calpine will provide option contracts for all of the ERC sources before the Commission's makes its final decision on the project. AIR QUALITY Table 16 provides a summary of all proposed sources of ERCs, including quantities and contract types. The ERCs levels in the table are much greater than the SPP liabilities to satisfy the District rules.

AIR QUALITY Table 16
ERCs Sources Types And Location

ERC Source	Contract Type	Location	ERC Certificate No.	NOx Location Emissions (Tons)	VOC Emissions (Tons)	PM10 Emissions (Tons)
Atlantic Oil Co.	Optional Contract	FRAQMD	95-1	21.9	5.0	0
PG&E	Letter of intent	SMAQMD	0020	105	0	0
PG&E	Letter of intent	SMAQMD	287/288	132	3.8	0
Rosboro Lumber	Optional Contract	FRAQMD	94-1	41.1	20.6	28.1
Tri-Union	Letter of intent	FRAQMD	98-101	6.8	0	0
Tri-Union	Letter of intent	FRAQMD	992024	34	0.52	0
Road Paving	MOU	FRAQMD		0	0	82.8
Total ERCs under negotiation and secured with option contracts				**340.8**	**29.92**	**110.9**
Total SPP Project Liabilities				**205.86**	**24.41**	**92.5**

Source: Feather River Air Quality Management District (FRAWMD)

According to the District rules, District's staff has to prepare a memorandum of understanding (MOU) with the SMAQMD for those ERCs coming from the Sacramento District's bank. The District's staff is actively preparing the MOU and is in the process of presenting it to the Sutter District Board. Furthermore, Calpine is in the process of signing an agreement with the Sutter County to pave 5.6 miles of county roads to partially mitigate PM10 emissions from the SPP. These roads are 0.7 mile of McClatchy Road, 0.5 mile of Schlag Road, 3.5 miles of Boulton Road and 0.9 mile of Pierce Road.

Interpollutant Trading Ratios

Calpine has suggested that they may use interpollutant trading of VOC ERCs for NOx

ERCs as part of their offset strategy, which is identified and evaluated in the PDOC. Both VOCs and NOx are precursors to the formation of ozone in the atmosphere. The premise of interpollutant trading is based on "interprecursor offsets", which are limited to exchange between pollutants which are both precursors to the same secondary pollutant. However, this concept does not apply when a pollutant is a precursor to a nonattainment pollutant but would also contribute to existing violations of a state or federal standard. The District New Source Review Rule 10.1 section E.2.d., which deals with the use of interpollutant trading, reads: "...The APCO may approve the substitution of one air contaminant for another air contaminant to meet the requirement for offsetting an emission increase on a case-by-case basis, provided that the applicant demonstrates to the satisfaction of the APCO, through the use of an impact analysis, that the emission increases from the new or modified source will result in a net air quality benefit and will not cause or contribute to a violation of any air quality standard." Calpine is proposing to mitigate NOx for NOx and VOC for VOC at this time. They may choose to use interpollutant trading ratio of 2 to 1 VOC for NOx.

CONCLUSIONS AND RECOMMENDATIONS

Based upon the evidence of record, and assuming the implementation of the following Conditions of Certification, including the conditions contained in the FDOC, the Commission staff concludes that the SPP will meet all applicable air quality requirements and will not cause any significant air quality impacts.

CONDITIONS OF CERTIFICATION

AQ-1 As part of the requirements for Condition SOIL&WATER-3 for the preparation of a grading and erosion control plan for the project site, the project owner shall include and identify in that plan the following:

- the location of all paved roads, parking and laydown areas,
- the location of all roads, parking areas and laydown areas that are surfaced with gravel,
- the location of all roads, parking areas and laydown areas that are treated with magnesium chloride dust suppressant or equivalent, and
- the location of all dirt storage piles

Verification: At least 30 calendar days prior to the start of grading on the project site, the project owner shall submit for review and approval to the Commission Compliance Project Manager (CPM) in writing, and with construction drawings, a City/County of Sutter-approved erosion and sediment control plan. This plan shall include the delineation of the control measures discussed above for all roads, parking areas and laydown areas, and the location of all dirt storage piles.

AQ-2 The project owner shall perform the following mitigation measures during the construction phase of the project:

a. The areas of disturbance within the construction site shall be watered so that they are visibly wet, twice or more daily, as necessary. This condition shall not apply on rainy days when precipitation exceeds 0.1 inch.

b. Any graded areas where construction ceases shall be treated with a magnesium chloride (or equivalent) dust suppressant within fifteen days, or sooner if windy conditions create visible dust beyond the project site boundary.

c. Magnesium chloride (or equivalent) dust suppressant or fabric covers shall be applied to any dirt storage pile within three days after the pile is formed, or sooner if windy conditions create visible dust beyond the project site boundary.

d. Prior to entering public roadways, all truck tires shall be visually inspected, and, if found to be dirty, cleaned of dirt using water spraying or methods of equivalent effectiveness, subject to CPM approval.

e. At least 500 yards from construction site entrances, public roadways shall be cleaned on a weekly basis, or when there are visible dirt tracks on the public roadways, by either mechanical sweeping or water flushing.

f. A speed limit sign shall be posted at the entrance of the construction site, to limit vehicle speed to no more than 15 miles per hour on unpaved areas.

g. All construction equipment shall be properly maintained to detect and prevent mechanical problems that may cause excess emissions.

h. No construction equipment shall be kept idling when not in use for more than 30 minutes.

Verification: The project owner shall maintain a daily log of water truck activities, including the number of gallons of water used to reduce the dust at the construction sites. A log or record of the frequency of public road cleaning shall also be maintained. These logs and records shall be available for inspection by the CPM during the construction period. The project owner shall identify in the monthly construction reports, the area(s) that the project owner shall cover or treat with dust suppressants. The project owner shall make the construction site available to the District staff and the CPM for inspection and monitoring.

AQ-3 Prior to the start of construction (defined as any construction-related vegetation clearance, ground disturbance and preparation, and site excavation

and soil remediation activities) , the project owner shall provide the CPM with the following information: the name, telephone number, resume, and indication of availability of the on-site Environmental Coordinator.

Protocol: The resume shall include appropriate education and/or experience in environmental management or coordination such as monitoring hazardous waste site remediation, experience as an inspector with an air pollution control district, or experience as an environmental health and safety project manager.

The CPM will review the qualifications of, and must approve in writing, the project owner's designated Environmental Coordinator prior to the start of construction.

Verification: At least 90 days prior to the start of construction, the project owner shall submit to the CPM for review and written approval the information required above.

AQ-4 The on-site Environmental Coordinator shall be on-site every work day during site preparation.

Duties: The on-site Environmental Coordinator shall inspect and ensure that all fugitive dust mitigation measures during the site preparation phase of construction are properly implemented, including, but not limited to, the mitigation measures specified in Condition AQ-2. The primary responsibility of the Environmental Coordinator is to insure that no fugitive dust emissions are seen being emitted beyond the property line under control by the project owner.

Verification: See verification for Condition AQ-5.

AQ-5 The on-site Environmental Coordinator will exercise the authority to halt any on-site activity, temporarily stop activities, or direct activities to proceed under a modification of the mitigation requirements of Condition AQ-2, if, in the opinion of the Environmental Coordinator, the project owner is not complying with the requirements of Condition AQ-2 or fugitive dust emissions are noticed beyond the project boundary.

Verification: The environmental Coordinator will prepare a daily report of the day's construction activities and appropriate fugitive dust mitigation measures employed by the project owner. A summary of the daily reports shall be included in the monthly compliance report to the CPM. If any complaints by the public are received, or if the project owner does not agree to comply with instructions given by the Environmental Coordinator, or if any other fugitive dust issue, in the judgement of the Environmental Coordinator, needs to be brought to the attention of the CPM, the Environmental Coordinator shall contact the CPM immediately.

AQ-6 For all utility trenching activities, the project owner shall implement the following control measures if necessary to prevent fugitive dust emissions:

a. To top layer of soil shall be pre-wetted prior to excavation,

b. Travel surfaces shall be wetted with the use of a water truck, and

c. All exposed soil areas shall be wetted by the use of hose spraying.

Verification: District staff and the CPM may inspect utility trenching sites at any time to monitor compliance for this condition.

AQ-7 The facility shall not discharge from any source whatsoever such quantities of air contaminants or other materials that cause a public nuisance. (District General ATC Permit Condition a)

Verification: As part of the semiannual Air Quality Reports (as required by AQ-43), the project owner shall include the date and time when any accidental release of air contaminants or other materials occur. The Air Quality Report shall also include the reason for the accidental release and measures taken to correct it.

AQ-8 The facility shall not emit particulate emissions from any single source which exceed an opacity equal to or greater than twenty percent (20%) for a period aggregating more than three (3) minutes in any one (1) hour, excluding uncombined water vapor. (District General ATC Permit Condition b)

Verification: As part of the semiannual Air Quality Reports (as required by AQ-43), the project owner shall include an explanation and the date, time, and duration of any violation of this condition.

AQ-9 The facility shall not discharge into the atmosphere from any source particulate matter in excess of 0.3 grains per cubic foot of gas at standard conditions. When the source involves a combustion process, the concentration must be calculated to 12 per cent carbon dioxide (CO_2). (District General ATC Permit Condition c)

Verification: As part of the annual Air Quality Reports, the project owner shall submit to the District and CPM the annual source test and specify the level of particulate matter in grains per cubic foot of gas at standard conditions.

AQ-10 Facility shall not discharge in any one hour from any source whatsoever fumes in total quantities in excess of the amounts as prescribe for and shown in District's Rule 3.3 Table of Allowable Rate of Emission Based on Process Weight Rate. (District General ATC Permit Condition d)

Verification: As part of the semiannual Air Quality Reports (as required by AQ-43), the project owner shall indicate the date, time, and duration of any violation of this

condition.

AQ-11 The facility shall not discharge into the atmosphere from any single source of emission whatsoever, any sulfur oxides in excess of 0.2 percent by volume (2,000 ppm) collectively calculated as sulfur dioxide (SO_2). (District General ATC Permit Condition e)

Verification: As part of the annual Air Quality Reports, the project owner shall submit to the District and CPM the annual source test and specify the level of sulfur oxides in percent by volume of gas at standard conditions.

AQ-12 Project owner shall not build, erect, install, or use any article, machine, equipment or other contrivance to conceal an emission which would otherwise constitute a violation of the Health and Safety Code of the State of California or of these Rules and Regulations. (FRAQMD General ATC Permit Condition f)

Verification: Refer to AQ-34 through AQ-36. The project owner shall obtain approval from the District and the CPM prior to installing any new equipment that results in releasing air contaminants.

AQ-13 Project owner shall take every reasonable precaution not to cause or allow the emissions of fugitive dust from being airborne beyond the property line from which the emission originates, from any construction, handling or storage activity, or any wrecking, excavation, grading, clearing of land or solid waste disposal operation. Reasonable precautions shall include, but are not limited to: Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, construction of roadways, or the clearing of land; Application of asphalt, oil, water, or suitable chemical on dirt roads, material stockpiles, and other surfaces which can give rise to airborne dusts; Other means approved by the Air Pollution Control Officer. (FRAQMD General ATC Permit Condition g)

Verification: Refer to conditions AQ-1 through AQ-6.

AQ-14 In the case of shut-down or re-start of air pollution equipment for necessary scheduled maintenance, the intent to shut down such equipment shall be reported to the Air Pollution Control Officer at least twenty-four (24) hours prior to the planned shutdown. Such prior notice may include, but is not limited to the following:

a. Identification of the specific equipment to be taken out of service as well as its location and permit number;

b. The expected length of time that the air pollution control equipment will be out of service;

c. The nature and quantity of emissions of air contaminants likely to occur during the shut-down period;

d. Measures such as the use of off-shift labor and equipment that will be taken to minimize the length of the shutdown period;

e. The reasons that it would be impossible or impractical to shut down the source operation during the maintenance period. (FRAQMD General ATC Permit Condition h)

Verification: As part of the semiannual Air Quality Report (as required by AQ-43), the project owner shall include the dates of the equipment maintenance schedule including when each piece of equipment will be shut-down and when it will start-up.

AQ-15 In the event that any emission source, air pollution control equipment, or related facility breaks down in such a manner which may cause the emission of air contaminants in violation of any permit condition or applicable rules or regulations, other than as exempted here in, the shall immediately notify the Air Pollution Control Officer of such failure or breakdown and subsequently provide a written statement giving all pertinent facts, including the estimated duration of the breakdown. The Air Pollution Control Officer shall be notified when the condition causing the failure or breakdown has been corrected and the equipment is again in operation. (FRAQMD General ATC Permit Condition i)

Verification: As part of the semiannual Air Quality Report (as required by AQ-43), the project owner shall include the date and duration of all equipment breakdowns, the cause of the breakdown, how it was corrected, and the measures that will be used to prevent the problem from occurring again.

AQ-16 Project owner shall submit an application for a Federal Operating Permit Title-V within 12 months after operational startup. (FRAQMD General ATC Permit Condition j)

Verification: The project owner shall submit to the CPM a copy of the report at the time of filing it to the District.

AQ-17 Project owner shall prepare and submit to the District a Toxic Hot Spots emission inventory by the first month of August following the first full calendar year of facility operational history. (FRAQMD General ATC Permit Condition k)

Verification: As part of the semiannual Air Quality Report (as required by AQ-43), the project owner shall submit to the District and the CPM an inventory of all Toxic Hot Spots emissions.

AQ-18 A PSD permit must be obtained from the USEPA before commencement of

facility operations. (FRAQMD General ATC Permit Condition L.)

Verification: At least 90 days prior to commencement of facility operations, the project owner shall submit to the CPM a copy of the PSD permit from the US EPA.

AQ-19 The equipment is subject to the federal NSPS codified at 40 CFR Part 60, Subparts A (General Provisions), Db (Standards of Performance for Industrial-Commercial-Institutional Steam Generating Systems), and GG (Standards of Performance for Stationary Gas Turbines), Compliance with all applicable provisions of these regulations is required. (FRAQMD General ATC Permit Condition m)

Verification: As part of the first semi-annual Air Quality Report, the project owner shall submit to the District and CPM a copy of a statement of compliance with the above federal applicable provisions and regulations.

AQ-20 Project owner shall meet the provisions of the Federal Acid Rain Program Title-IV by filing an Acid Rain permit 24 months before operational startup and by certifying CEMS for NOx and O_2 within 90 days after operational startup. (FRAQMD General ATC Permit Condition n)

Verification: The project owner shall provide the District and the CPM with a copy of the Acid Rain permit within 90 days after the permit is approved. Refer to AQ-33 for verification.

AQ-21 Project owner shall file an RMP with the Sutter County office in charge of the prevention of accidental releases prior to operational startup. (FRAQM General ATC Permit Condition o)

Verification: Refer to Hazardous Materials conditions and verifications HazMat-2..

AQ-22 The Athority To Construct (ATC) is not transferable from one location to another, or from one person to another without the written approval of the APCO. (FRAQMD General ATC Permit Condition p)

Verification: At least sixty days in advance, the project owner shall notify, in writing, the District and the CPM of any intended transfer of ownership or location and obtain written approval prior to any transfer.

AQ-23 District personnel shall be allowed access to the plant site and pertinent records at all reasonable times for the purposes of inspections, surveys, collecting samples, obtaining data, reviewing and copying air contaminant emission records and otherwise conducting all necessary functions related to this permit. (FRAQMD General ATC Permit Condition q)

Verification: During site inspection, the project owner/operator shall make the plant logs available to the District, California Air Resources Board (CARB), and Commission staff.

AQ-24 Project owner shall maintain a copy of all District permits at the facility. (FRAQMD General ATC Permit Condition r)

Verification: During site inspection, the project owner/operator shall make all plant permits available to the District, California Air Resources Board (CARB), and Commission staff.

AQ-25 Combustion turbine exhaust stacks shall exhaust at a height of 145 feet and the maximum diameter shall not exceed 18 feet. (FRAQMD General ATC Permit Condition s)

Verification: The project owner/operator shall make the site available for inspection to the District, California Air Resources Board (CARB), and Commission staff.

AQ-26 Project owner shall submit to the District and the Energy Commission ERC option contracts or final signed contracts for the project's ERC liability, except for PM10, as listed in condition AQ-42 prior to the Energy Commission's Final Decision on the project. (FRAQMD General ATC Permit Condition t)

Verification: At least 10 days prior to the Commission adoption of the final decision on the project, the Project owner shall have provided copies of all option contracts or signed contracts required by this condition.

AQ-27 The following Sutter County roads and corresponding miles are to be paved prior to operational startup of the project by the Project owner in order to obtain a portion of the PM10 ERC credits, as indicated in AQ-42:

Roads	Length to be paved (miles)
McClatchy	0.7
Schlag	0.5
Boulton	3.5
Pierce	0.9

a. The location and distance of the roads above may be changed provided that the total offset PM10 ERC credits remain the same, and that the District and CPM is notified, in writing, prior to the start of project construction.

b. Project owner shall provide, prior to start of construction, a copy of an executed legally binding contract between project owner and Sutter County that ensures the paving and maintenance of said roads and which provides conditions enforceable by the District. (FRAQMD General ATC Permit Condition u)

Verification: At least 30 days prior to the start of construction, project owner shall submit to the District and CPM a copy of the required contract.

AQ-28 Calpine has produced evidence indicating that it has an enforceable right to ERCs located in another District. These ERCs cannot be used until the District Board adopts an approving resolution and enters into an MOU with the other District. The District intends to act on the resolution and MOU as soon as practicable after CEC completes an environmental analysis document and the criteria in Section 15253, Subdivison (b) of the CEQA Guidelines are met.(FRAQMD General ATC Permit Condition v)

Verification: At least 30 days prior to the start of construction, Project owner shall provide a copy of the signed MOU to the CPM.

AQ-29 Project owner may substitute interpollutant offsets of VOCs (ROCs) for NOx at a 2.0 to 1.0 interpollutant offset ratio pursuant to Rule 10.1, Section E.2, d. (FRAQMD General ATC Permit Condition w)

Verification: The project owner shall submit to the District and the CPM a copy of the offsets calculations that satisfy AQ-42 if they choose to use the interpollutant substitution offset ratio specified in this condition.

AQ-30 The facility shall exclusively use California PUC pipeline quality natural gas as fuel. The fuel gas total sulfur and heat content will be determined and reported to the District by collecting and analyzing a sample on a monthly basis or by providing monthly certification of the natural gas total sulfur and/or heat content issued by the natural gas distributor. (FRAQMD General ATC Permit Condition x)

Verification: As part of the semi-annual Air Quality Report (as required by AQ-43), the project owner shall submit to the District and CPM a copy of the natural gas analysis or certification issued by the natural gas distributor to satisfy this condition.

AQ-31 All basic and control equipment is to be operated and maintained in accordance with vendors recommended practices and procedures. (FRAQMD General ATC Permit Condition y)

Verification: Refer to AQ-14 verification.

AQ-32 The maximum heat input allowed to each permitted internal and external combustion emissions unit, expressed in MMBtu units on a High Heating

Value basis (HHV), shall not exceed the limits indicated in the table below: (FRAQMD specific ATC Permit Condition a)

Emission Unit	MMBtu/hour (1)	MMBtu/day (2)	MMBtu/year (3)
CTG-1	1,900	45,600	16,644,000
CTG-2	1,900	45,600	16,644,000
Duct Burners-1	170	4,080	928,200
Duct Burners-2	170	4,080	928,200

(1) Based on a rolling three-(3) hour average
(2) Based on 24 hour-day
(3) Based on 365 days/year

Verification: As part of the semi-annual Air Quality Reports (as required by AQ-43), the project owner shall document the date and time when the hourly fuel consumption exceeds the hourly limits included in this condition. The reports shall include a summary of hourly and daily fuel consumption in MMBtu [high heating value (HHV)] for all the cases indicated in the table above. The January Air Quality Report shall also include information on the amount of fuel consumed, in MMBtu (HHV), in the prior calendar year.

AQ-33 The following definitions and limitations shall apply: (FRAQMD specific ATC Permit Condition b)

(1) Startups are defined as the time period commencing with the introduction of fuel flow to the gas turbine and ending when the NOx concentrations do not exceed 2.5 ppmvd at 15% O2 averaged over 1-hour.

(2) Cold Startups are those that occur after the CTG has not been in operation for more than 72 hours.

(3) For each CTG, the Cold Startup shall not exceed 180 consecutive minutes.

(4) Hot Startups are startups that are not Cold Startups.

(5) The maximum allowable NOx emissions for Hot and Cold Startups from each CTG shall not exceed 519 lb/day.

(6) For each CTG, the Hot Startup shall not exceed 60 consecutive minutes.

(7) Shutdowns are defined as the time period commencing with a 15 minute period during which the 15 minute average NOx concentrations exceed 2.5 ppmvd at 15% O_2 and ending when the fuel flow to the gas turbine is discontinued.

(8) For each CTG, the Shutdown shall not exceed 60 consecutive minutes.

(9) The maximum duration of Cold Startups per CTG shall be 150 hours per year and 39 hours per calendar quarter.

(10) The maximum duration of Hot Startups per CTG shall be 250 hours per year, and 63 hours per calendar quarter.

(11) The maximum duration of Shutdowns per CTG shall be 300 hours per year, and 76 hours per calendar quarter.

(12) Compliance with the above yearly limits shall be calculated based on a rolling 12 month average.

(13) All emissions during startups and shutdowns shall be included in all calculations of daily and annual mass emissions required by this permit.

(14) For each CTG the maximum number of Duct Burner hours of operation shall not exceed 5,460 per calendar year.

(15) For each CTG the maximum number of Power Augmentation Steam Injection hours shall not exceed 2,000 per calendar year.

(16) For each CTG the maximum hourly emission rates (lbs/hr) (for a cold startup not to exceed 120 minutes of uncontrolled emissions) are given in the table below:

Pollutant	CTG	Duct Burner	Steam Injection	Hot Start-up	Cold Start-up	Shutdown
NOx	16.8	1.4	0.9	170	175	26.6
CO	16.7	3.4	14.2	902	838	98.2
VOC	1.5	2.0	0.01	7.2	7.2	7.2
SO2	3.7	0.005	0.31	2.3	2.3	2.3
PM10	9.0	2.5	0.0	6.7	6.7	6.7

(17) For maximum project daily emissions (lbs/day) are given in the table below:

	CTG	Duct Burner	Steam In-jection	Hot Start-up	Cold Start-up	Shutdown	Total Emission Per CTG	Calpine Maximum SPP Daily Emissions
NOx	318.3	29.9	17.5	170	349	24	909	1817
CO	317.3	74.8	269.5	902	1,675	25	3264	6528
VOC	28.5	44.9	0.2	1.1	2	2.2	79	158
SO2	70.3	0.12	5.9	2.7	5	5.3	90	179
PM10	171.0	54.6	-	9.0	18	18	271	541

(18) The maximum quarterly emissions for the facility are given in the table below:

	January-March lb/quarter	April-June lb/quarter	July-Sept. lb/quarter	October-December lb/quarter
NOx	102,500	102,500	102,500	102,500
CO	241,600	241,600	241,600	241,600
VOC	11,850	11,850	11,850	11,850
SO2	15,750	15,750	15,750	15,750
PM10	46,200	46,200	46,200	46,200

(19) The maximum annual calendar year emissions (tons/year) for the facility are given in the table below:

	CTG	Duct Burner	Steam Injec.	Hot Start-up	Cold Start-up	Shut-down	Total Emission Per CTG	Calpine Annual SPP Emission
Hrs/Yr.	8,110	5,460	2,000	250	100	300		
NOx	65.9	3.7	0.9	21.2	8.7	1.8	102	205.86
CO	61.6	9.3	14.2	113	41.9	1.9	242	483.18
VOC	5.9	5.6	0.01	0.1	0.1	0.2	11.9	24.41
SO2	14.6	0.01	0.3	0.3	0.1	0.4	15.7	31.5
PM10	36.5	6.8	0.0	1.1	0.5	1.4	46.2	92.5

Verification: As part of the semi-annual Air Quality Report (as required by AQ-43), the project owner shall provide all data required in this condition. In the semi-annual Air Quality Reports (as required by AQ-43), the project owner shall indicate the date, time, and duration of any violation to the NO_X, and VOC limits presented in this condition. The project owner shall include in the semi-annual Air Quality Reports (as required by AQ-43) daily and annual emissions as required in this condition.

AQ-34 BACT Emission Limits:

The BACT emission limits (including duct burners emissions) specified in Conditions (a), (b), (c), (d), and (e) apply under all operating load rates except during CTG startups and shutdowns, as defined in Condition AQ-33. (FRAQMD specific ATC Permit Condition c)

(a) NOx emission concentrations shall be limited to 2.5 ppmvd @ 15% O2 on a 1 hour rolling average (based on readings taken at 15 minute intervals) and with a maximum of 10 ppmvd ammonia slip.

(b) CO emission concentrations shall be limited to 4.0 ppmvd @ 15% O2, on a calendar day average.

(c) VOC emission concentrations shall be limited to 1 ppmvd @ 15% O2, on a calendar day average.

(d) PM10 emissions shall be limited to 11.5 pounds per hour, on a calendar day average.

(e) SO2 emission concentrations shall be limited to 1 ppmvd @ 15% O2, on a calendar day average.

Verification: At lease sixty (60) days before conducting a source test, the project owner shall submit to the District and the CPM a detailed performance annual source test procedure designed to satisfy the requirements of this condition for their review. The project owner shall incorporate the District's and Commission's comments on or modifications to the procedure if any are received. The project owner shall also notify the District and the CPM within seven (7) working days before the project begins initial operation and/or plans to conduct source test as required by this condition. All source test results shall be submitted to the CPM and District within 30 days of the date of the tests.

AQ-35 Each CTG set exhaust vent stack shall be equipped with NOx and % oxygen (O2) CEMs in order to analyze and record exhaust gas flow rate and concentrations. CO, PM10, SO2, and VOC emissions shall be monitored by the CEMs, using source test derived algorithms as indicated in (e) below. In the event that test results show that CO emission limits are exceeded, the APCO may require CEMs for recording concentrations of CO.

(a) The NOx CEMs shall have the capability of recording NOx concentrations during all operating conditions, including startups and shutdowns.

(b) Relative accuracy testing shall be performed on the CEMs on a semi-annual basis or as required by the Acid Rain requirements in Title 40, CFR, Part 75, Appendix B. (FRAQMD specific ATC Permit Condition d)

Verification: At least one hundred and twenty (120) days before initial operation, the project owner shall submit to the District and the CPM a continuous emissions monitoring procedure. Within sixty (60) days of receipt of the procedure, the District and the CPM will advise the project owner of the acceptability of the procedure. Based on the results of the source test identified in AQ-36, the District and CPM may require CEMs for recording concentrations of CO.

AQ-36 Within ninety days after the start of commercial operation of the SPP, source testing shall be performed to determine the mass emission rates and concentrations of NOx, CO, VOC, and SO2 emissions at four different steady-state CTG load rates over the expected operating range of either combustion turbine, as required by 40 CFR 60.335.c (2). The source testing will be used to determine compliance with the permitted emission limits indicated in Specific ATC Permit Conditions (b) and (c). Source testing shall be conducted to determine PM10 mass emissions and concentrations while the CTG is operating at 100 percent load with and without the duct burners, firing at the maximum rated capacity or 170 MMBtu/hr (HHV), whichever is greater.

(a) The source testing results shall be used to develop predictive emission algorithms to estimate mass emission rates for CO, VOC, and SO2, and PM10 emissions.

(b) Source testing to determine the mass emission rates and concentrations of NOx shall be conducted annually after the initial source test indicated in e) above.

(c) Source testing to determine the mass emission rates and concentrations of CO, VOC, SO2 and PM10 shall be conducted annually. The Air Pollution Control Officer may waive annual source testing requirements if prior test results indicate an adequate compliance margin has been maintained. (FRAQMD specific ATC Permit Condition e)

Verification: At least sixty (60) days before the start of commercial operation of the project, the project owner shall submit to the District and the CPM for review a detailed performance test procedure necessary to comply with this condition. The project owner shall incorporate the District and CPM's comments on or modifications to the procedure. At least sixty (60) days prior to any subsequent annual compliance source tests, the project owner shall submit to the District and the CPM for review any proposed changes to the original source test procedure. The project owner shall incorporate the District's and CPM's comments on or modifications to the annual source test procedure.

The project owner shall also notify the District and the CPM within seven (7) working days before the project begins initial operation and/or plans to conduct source testing as required by this condition. Source test results shall be submitted to the District and the CPM within 30 days of the date of the tests.

AQ-37 Source tests to determine ammonia slip shall be conducted within ninety days after commercial operation of the SPP and thereafter as required by the APCO. (FRAQMD specific ATC Permit Condition f)

Verification: Please refer to AQ-36 verification.

AQ-38 The maximum allowable ammonia injection rate to each of the SCR systems shall be 25 pounds per hour. This injection rate may be set at a lower limit based on source tests results. (FRAQMD specific ATC Permit Condition g)

Verification: Please refer to AQ-34 verification.

AQ-39 Within ninety days after beginning commercial operation of the SPP, cold startup, hot startup, and shutdown source tests shall be conducted to determine the emissions of CO and NOx. The APCO may approve the use of the NOx CEMS readings in lieu of source testing if annual Relative Accuracy Testing Audits (RATA) testing is provided. (FRAQMD specific ATC Permit Condition h)

Verification: Within ninety days after the start of commercial operation of the project, the project owner shall submit to the District and the CPM for review a detailed performance source test procedure designed to satisfy the requirements of this condition. The project owner shall incorporate the District's and Commission's comments on or modifications to the procedure. The project owner shall also notify the District and the CPM within seven (7) working days before the project begins commercial operation and/or plans to conduct source test as required by this condition. Source test results shall be submitted to the District within 30 days of the date of the tests.

AQ-40 Records and logs of all data generated by CEMS and algorithms shall be maintained for a period of five (5) years. (FRAQMD specific ATC Permit Condition i)

Verification: During site inspection, the project owner shall make all data generated by the CEMS and algorithm, and included in the plant logs for a period of five years, available to the District, California Air Resources Board (CARB), and the Commission staff.

AQ-41 The project owner shall provide calendar quarterly reports to the District in a format determined in consultation with the District. The calendar quarterly reports shall include the following: CEMS and predictive algorithm emissions data; CTG and duct burner fuel use and operating hours; power augmentation steam injection rates and hours of operation; ammonia injection rates; emission control systems and CEMS hours of operation including the time, date, duration, and reason for any malfunctions of these systems; the number of hot startups, cold startups, and shutdowns; and the electrical and steam production rates. These data shall be averaged on a daily basis, except where required to demonstrate compliance with an emission limitation. (FRAQMD specific ATC Permit Condition j)

Verification: Within 30 days of the end of the calendar quarter, the project owner shall provide to the District and CPM the data required in this condition.

AQ-42 Prior to the start of construction, the SPP facility must provide ERC certificates for NOx, ROC, and PM10, as indicated in the table below. (A portion of required PM10 ERCs and offsets are to be provided by AQ-27.) The ERC sources are Atlantic Oil Company, PG&E, Tri Union, and Rosboro Lumber, as specified in Air Quality Table 16 of the FSA. (FRAQMD specific ATC Permit Condition k)

Verification: At least 30 days prior to the start of constuction, the project owner must submit a copy of the required ERC certificates to the CPM and the District.

	January-March (pounds)	April-June (pounds)	July-September (pounds)	October-December (pounds)	Total ERCs & Offsets	
					Total Pounds	Total Tons
Required NOx	170,061	170,037	170,012	171,535	681,643	340.8
Required VOC	14,797	14,796	14,797	15,558	59,949	29.92
Required PM10	55,440	55,440	55,440	55,440	221,760	110.9

AQ-43 The project owner must file a semi-annual air quality report with the CPM documenting the information required by these conditions and verifications.

Verification: The semi-annual Air Quality report (as required by AQ-43) must be submitted to the CPM within 30 days of the end of the 6 month reporting period.

REFERENCES

Calpine (Calpine Corporation). 1997. Application for Certification, Sutter Power Project (97-AFC-2). Submitted to the California Energy Commission, December 15, 1997.

Calpine (Calpine Corporation). 1998a. Additional Data for Sutter Power Plant (97-AFC-2). Submitted to the California Energy Commission, January 8, 1998.

Calpine (Calpine Corporation). 1998e. Sutter Power Plant Prevention of Significant Deterioration Permit Application. Submitted to the California Energy Commission, February 10, 1998.

Calpine (Calpine Corporation). 1998f. Sutter Power Plant, Responses to February 2, 1998 Data Requests. Submitted to the California Energy Commission, March 4, 1998.

Calpine (Calpine Corporation). 1998i. Cooling Tower Information. Submitted to the California Energy Commission, May 22, 1998.

Calpine (Calpine Corporation). 1998j. Response to data requests 64 and 66 with additions to 63, 67 and 68. Submitted to the California Energy Commission, May 1, 1998.

CEC (California Energy Commission). 1998a. Data Requests Numbers 1 through 59. Submitted to Charlene Wardlow, Calpine Corporation, February 2, 1998.

CEC (California Energy Commission). 1998c. March 25 and March 31 workshop Data Requests 60 through 69. Submitted to Charlene Wardlow and Curt Hildebrand, Calpine Power project, April 7, 1998.

Foster Wheeler (Foster Wheeler Environmental Corporation). 1998. Oxides of Nitrogen Isopleths for Sutter Power Project's PSD Permit Application. Submitted to the California Energy Commission, March 27, 1998.

Calpine (Calpine Corporation). 1998i. Cooling Tower Information. Submitted to the California Energy Commission, September 22, 1998.

PUBLIC HEALTH

Testimony of Michael Ringer

INTRODUCTION

Normal operation of the proposed SPP facility will result in the routine release of potentially harmful substances to the environment. The purpose of staff's public health analysis is to determine if these emissions will have the potential to cause significant adverse public health impacts or to violate standards for public health protection. If potential significant health impacts are identified, staff will evaluate mitigation measures which may be used to reduce such impacts to insignificant levels.

Potential impacts on public and worker health resulting from accidental or non-routine releases of hazardous materials are addressed in the **Hazardous Materials Management** and **Industrial Safety and Fire Protection** sections, respectively. A discussion of health effects from electromagnetic fields may be found in the **Transmission Line Safety and Nuisance** section. Plant releases in the form of hazardous and nonhazardous wastes are described in the **Waste Management** section.

COMMISSION STAFF METHOD OF ANALYSIS

Emissions of concern from a public health perspective include potentially toxic substances to which the public could routinely be exposed during project construction and operation. Following the release of toxic contaminants into the air, public exposure may occur through inhalation, dermal contact, or ingestion via contaminated food or water.

The remainder of this section addresses potential public health impacts from project air emissions. In order to examine potential public health impacts from hazardous air pollutants, it is most useful to separate air emissions into two categories: (1) criteria and (2) noncriteria pollutants.

Criteria Pollutants

Criteria pollutants are those for which ambient air quality standards have been set either by the U.S. Environmental Protection Agency (U.S. EPA) or the California Air Resources Board (CARB). These standards specify maximum concentrations of specific pollutants which are allowed in the outdoor (ambient) air. This section describes the general manner in which standards are established to protect public health due to inhalation exposure. Please refer to Table 1 in the **Air Quality** section of the Final Staff Assessment for a listing of both national and California ambient air quality standards.

The federal Clean Air Act requires that federal primary ambient air quality standards be set at levels requisite to protect the public health, including an adequate margin of safety. (42 U.S.C. § 7409(b)(1)) The margin of safety addresses uncertainties

associated with inconclusive scientific and technical information available at the time of standard setting, and is to provide a reasonable degree of protection against hazards that research has not yet identified. Thus, the margin of safety is designed to prevent pollution levels that have been demonstrated to be harmful as well as to prevent lower pollutant levels that may pose an unacceptable risk of harm, even if the risk is not precisely identified as to nature or degree.

CARB is required by California law to adopt state standards in consideration of the public health and safety, including "health, illness, and irritation to the senses" (Health & Saf. Code, § 39606). The federal act requires that state standards be at least as strict as federal standards, but allows them to be more stringent. California has set more stringent standards for some pollutants and has set standards for hydrogen sulfide and sulfates, which do not have national standards.

The state standards are intended to protect those members of the population considered to be at highest risk to adverse health effects from exposure to air pollutants. Generally, such groups include the young, elderly, or those with existing illness (Kleinman et al., p. 3-9). For a particular pollutant, the standard is set based on that health impact which is the most sensitive indicator of an adverse effect to the most sensitive population subgroup. An adverse effect is considered one which causes noticeable discomfort, causes an individual to reduce or curtail normal activities, or causes a health response requiring medication or medical attention, whether or not the effect is reversible. Each standard set by the state of California includes a margin of safety. Thus, as long as levels of a pollutant do not exceed the standard, no adverse health effects from that pollutant would be expected, even in sensitive members of the population. Recommendations for the standards come from scientists and physicians with CARB, the Office of Environmental Health Hazard Assessment, and an independent advisory panel, based on their review of the most recent research on the health effects of air pollution. State law requires standards to be reviewed whenever substantial pertinent new information becomes available and at least once every five years (Cal. Code Regs., tit. 17, § 70101).

Each standard consists of two parts. One part establishes the concentration of a pollutant allowed in ambient air, while the second specifies the duration, or time period, over which the concentration is to be measured. Criteria pollutants which have both federal and California standards include ozone (0_3), carbon monoxide (CO), particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and airborne lead. California-only standards have been established for sulfates and hydrogen sulfide (H_2S). Public Health attachment A contains descriptions of criteria pollutants and their relevant health effects apply only to pollutants which may be emitted by the proposed project. Therefore, lead, sulfates, and hydrogen sulfide are not included.

Noncriteria Pollutants

Noncriteria pollutants have no associated ambient air quality standards to identify pollution levels considered safe for everyone. Lacking such standards, a process known as health risk assessment is used to ensure that exposure to these pollutants will not result in an unacceptable public health risk. The risk assessment procedure consists of the following steps:

1) identify hazardous substances which will be emitted to the environment through applicable pathways (air, water, soil) and estimate emission rates;

2) estimate ambient concentrations of project emissions using dispersion modeling (how the substance travels in the environment);

3) estimate exposure levels to affected populations through applicable exposure routes such as inhalation, ingestion, and dermal contact; and

4) characterize potential health risk by comparing estimated individual exposure to safe standards based on known health effects.

Initially, a screening level risk assessment is performed using simplified assumptions which are intentionally biased toward protection of public health. That is, a simplified assessment is designed so that public health impacts from exposure to project emissions will not be underestimated. This is done by calculating risks for the worst case exposure that could be expected, taking into account the uncertainties involved. In reality, it is extremely likely that the actual risks from the power plant will be lower than the risks which are estimated for the study. This is accomplished by examining which conditions would lead to the highest or worst-case risks and then using those in the study. Such conditions include:

- the highest expected level of pollutants emitted from the plant;
- those weather conditions which would result in the public's highest exposure to pollutants;
- using the type of air quality computer model which results in the highest pollutant concentration in the ambient (outdoor) air;
- calculating health risks to a person at the location where the pollutant concentrations are calculated to be the highest;
- using health-based standards designed to protect the most sensitive members of the population (i.e., the young, elderly, and those with respiratory illnesses); and
- assuming that an individual's exposure to cancer causing agents occurs for 70 years.

If a proposed project passes the initial screening analysis, staff will conclude that the project does not pose a significant health risk to the exposed population. Failure to pass the initial screening analysis does not automatically indicate that the project would pose a significant risk to public health, but that a more detailed assessment, using more realistic project-specific assumptions, is necessary to more accurately determine potential public health risks.

The process described above addresses three categories of health impacts: acute (short-term) health effects, chronic (long-term) noncancer effects, and cancer risk (also long-term). Acute health effects result from short-term (one hour) exposure to relatively high concentrations of pollutants. Such effects include irritation of the eyes, skin, and respiratory tract. Chronic health effects result from long-term (annual) exposure to lower concentrations of pollutants.

The screening level analysis for both acute and chronic noncancer health effects compares the estimated project contaminant levels at the points of maximum concentration to safe levels called reference exposure levels found in the California Air Pollution Control Officers Association (CAPCOA) Air Toxics "Hot Spot" Program Risk Assessment Guidelines (see CAPCOA, p. III-36). Reference exposure levels are amounts of toxic substances to which people can be exposed and suffer no adverse health effects. These exposure levels are designed to protect the most sensitive individuals in the population, such as infants, the aged, and people suffering from illness or disease which makes them more sensitive to the effects of toxic substance exposure. Reference exposure levels are based on the most sensitive adverse health effect reported in the medical and toxicological literature, and include margins of safety. Health protection is achieved if the estimated worst-case exposure is below the relevant reference exposure level. In such a case, an adequate margin of safety exists between the predicted exposure and the estimated threshold dose for toxicity.

When there is the potential for exposure to multiple toxic substances, a combination of subthreshold exposures could result in an adverse health effect. The assumption is also made that the effects of each substance are additive. In those cases where the actions may be synergistic (the effects are greater than the sum), this approach may underestimate the health impact (CAPCOA, p. III-37).

For carcinogenic substances, the health assessment considers the risk of developing cancer over a 70-year lifetime. Cancer risk is a function of the maximum expected pollutant concentration, the probability that a particular pollutant will cause cancer (called potency factors, these are published in the CAPCOA Guidelines), and the length of the exposure period. Cancer risks for each carcinogen are added to yield total cancer risk. The conservative nature of the screening assumptions used mean that actual cancer risks are likely to be lower or even considerably lower than those estimated.

SIGNIFICANCE CRITERIA

Criteria Pollutants

Ambient air quality standards specify levels of air quality for pollutants which are considered safe, and below which no adverse health effects are expected to occur, even in sensitive members of the population. If the ambient air quality in an area is in compliance with a particular standard (i.e., ambient concentrations are less than the standard), it follows that no adverse public health effects would be expected to occur from exposure to existing levels of the corresponding pollutant. It may be concluded, then, that emissions of a criteria pollutant from a new facility in an area which is already in compliance for that particular standard will not result in adverse public health effects as long as: (1) no violations of that standard are caused by the new facility and (2) the area remains in compliance in the future. Thus, public health staff would conclude in such a case that the project would not have the potential to cause a significant public health impact due to emissions of the pollutant in question.

Existing ambient levels of criteria pollutants in a project area may also exceed the applicable air quality standard. In this case, the area would not be in compliance and would be designated a "nonattainment" area for that pollutant. Exposure to pollutant levels which exceed the standard set to protect public health may be expected to cause adverse health effects among some members of the public. Thus, any increase in pollutant levels as a result of operating a new facility would contribute to further violations of the standard and consequently increase the severity of public health impacts. Staff, therefore, considers any increase of a nonattainment criteria pollutant to have the potential to cause a significant public health impact.

Noncriteria Pollutants

Commission staff determines the public health significance of exposure to project noncriteria pollutant emissions based on impacts to the maximum exposed individual. Such an individual is a person hypothetically exposed to project emissions at a location where the highest emission levels were calculated using worst-case assumptions as described above.

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

Acute and Chronic Noncancer Health Effects

The potential significance of acute and chronic noncancer health impacts is based on comparing hypothetical worst-case exposures to reference exposure levels and determining a "hazard index" (see below). (As described earlier, reference exposure levels are amounts of toxic substances to which people can be exposed and suffer no adverse health effects. These exposure levels are designed to protect the most sensitive individuals in the population, such as infants, the aged, and people suffering from illness or disease).

The method used to assess the significance of non-cancer health effects is based on determining the total hazard index, which is calculated separately for acute and chronic effects. A hazard index is calculated for each noncarcinogenic toxic substance and is the ratio of the worst-case exposure estimate to the applicable reference (safe) exposure level. A ratio of less than one signifies that the anticipated worst-case exposure is below the safe level. Each individual hazard index is then added to yield a total hazard index. The total hazard index reflects impacts from all toxic substances to which the individual could be exposed. A total hazard index of less than one indicates that cumulative worst-case exposures are less than the reference exposure levels. Health protection is likely to be achieved, then, even for sensitive members of the population. In such a case, staff would presume that there will be no significant non-cancer project-related public health impact.

Cancer Risk

Staff presumes that a total additional lifetime cancer risk of less than one chance in one million ($1x10^{-6}$) is not significant for purposes of requiring additional health-related mitigation measures. Staff believes that this level constitutes a de minimis risk, or one that is so small as to be effectively no risk. The Federal Food and Drug Administration made such a finding in the context of cancer risks from food additives (FDA 1985, p. 51557). They emphasized that the risk level did not mean that one in every one million people would contract cancer, but that the level represented an additional one in one million chance over a person's normal risk of developing cancer in his or her lifetime. The agency noted that "as far as can be determined, in all probability no one will contract cancer" (Id.). The Bay Area Air Quality Management District noted that a survey of 132 regulatory decisions found that, with the exception of one decision, no action was taken to reduce risks below one in a million (BAAQMD 1993, p. 16).

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

The following federal, state, and local LORS generally apply to the protection of public health. These provisions have established the basis for Energy Commission staff's determination regarding the significance and acceptability of project-related impacts on public health.

FEDERAL

- The Clean Air Act (42 U.S.C. §7401 et seq.). Section 109(b)(1) of the Clean Air Act (CAA) adopted in 1970 established authority for adoption of Ambient Air Quality Standards to protect the public from adverse health effects of air pollution.

- National Ambient Air Quality Standards (40 C.F.R. Part 50). The U.S. Environmental Protection Agency has established ambient air quality standards for nitrogen dioxide (NO_2), ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter (PM), and lead. Primary standards are designed to

protect public health and secondary standards are intended to protect the public welfare from effects such as nuisance, soil deposition, and reduction in visibility. The Environmental Protection Agency classifies areas as attainment, unclassified, or non-attainment, depending on whether or not the monitored ambient air quality results demonstrate compliance (attainment), insufficient data available (unclassified), or non-compliance (non-attainment) with air standards.

STATE

- California Health and Safety Code section 39606 requires that the California Air Resources Board adopt ambient air quality standards to protect the public health. Pursuant to this section, the ARB has adopted standards for O_3, CO, SO_2, PM_{10}, lead, hydrogen sulfide (H_2S), and NO_2. These standards are defined in Title 17, California Code of Regulations, section 70100 et seq.

- California Health and Safety Code sections 39650 et seq. mandate the Air Resources Board and the Department of Health Services to establish safe exposure limits for toxic air pollutants and identify pertinent best available control technologies. They also require that the new source review rule for each air pollution control district include regulations that require new or modified procedures for controlling the emission of toxic air contaminants.

- California Health and Safety Code section 41700 states that "no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property."

SETTING

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

SITE AND VICINITY DESCRIPTION

The topography at the site is flat with an elevation about 36 feet above sea level. The

surrounding area is also predominantly flat, with the exception of the Sutter Buttes north of the site rising to a height of about 2,100 feet above sea level.

Agriculture is the predominant land use in the surrounding area. The site itself is a former rice field and is currently vacant and undeveloped. Field crops are located immediately to the west, north, and south, and an orchard is located to the northeast. For more detailed information, please refer to the **Land Use** section.

As mentioned above, the location of sensitive receptors near the proposed site must be considered. The nearest residence to the proposed site is approximately 2,000 feet to the northeast along South Township Road. Other nearby residences are located further north and south on south Township road, and along Best Road and Pierce Road. AFC Figures 8.12-1a and 8.12-1b depict the location of residences within three miles of the site (Calpine 1997, AFC pp. 8.12-2 and 8.12-3). Sensitive receptors are listed in AFC Table 8.6-3 (Calpine 1997, AFC p. 8.6-3). The nearest urban area is Yuba City, which is located approximately seven miles to the northeast.

METEOROLOGY

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

The climate in the Sacramento Valley is significantly affected by high pressure over the Pacific Ocean. During the summer months, the temperature is high with low relative humidity, and the prevailing winds are from the south due to the orientation of the valley and the location of the Carquinez Strait, through which marine breezes flow. During winter months, the predominant wind direction is from the south, with occasional winds out of the north. Mixing heights (the height above ground in which pollutants can be dispersed) are lower during the more stable mornings and in the winter, and increase during the warmer afternoons and warmer months. On an annual basis, moderately stable meteorological conditions occur slightly over 70 percent of the time. Staff's **Air Quality** section presents more detailed meteorological data.

EXISTING AIR QUALITY

As explained earlier, ambient air quality standards are established to protect the public health based on known effects of various pollutants. Consequently, the standards define levels of healthful air quality such that people living in areas meeting the standards are not expected to suffer health consequences from exposure to criteria air contaminants. Conversely, if a project is located in an area where standards are exceeded (or its operation causes standards to be exceeded), then adverse health impacts to some members of the exposed population may be anticipated. Therefore, it is necessary to consider existing pollution levels in the area in relation to air quality

standards in order to assess project-related health impacts. This section summarizes existing air quality with regard to criteria pollutants. Please refer to staff's **Air Quality** section for more detailed information regarding compliance with ambient standards.

An area where a criteria pollutant concentration is within the applicable air quality standard and there have been no violations over specified time periods is said to be in federal or state compliance for that standard. The area may then be designated as "attainment" for that standard.

In Sutter County, the attainment status for carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead are considered unclassified due to insufficient monitoring data, but are assumed in attainment of ambient air quality standards by the U.S. EPA. PM_{10} is classified attainment at the federal level, but moderate nonattainment under state standards. The northern portion of the county is classified as no status for ozone at the federal level and nonattainment at the state level. The southern portion is in serious nonattainment status for both federal and state standards, while the northern portion is classified transitional nonattainment at the federal level and nonattainment at the state level. The new $PM_{2.5}$ standard is based on a three year average of monitoring data, so designations will not be made until 2002.

SITE CONTAMINATION

Activities associated with facility construction may require significant site disturbances in the form of excavation, grading, and earth moving. Such activities have the potential to adversely affect public health through various mechanisms, such as the creation of airborne dust, material being carried off-site through soil erosion, and uncovering buried hazardous substances.

In order to determine whether any existing site conditions could pose a hazard to public health, Calpine conducted an environmental site assessment. A Phase I environmental site assessment (ESA) was performed for the Greenleaf Unit 1 power plant in April 1995 (Calpine 1997, AFC Appendix 8.13A). In August 1997, an incremental site assessment was performed to bring the 1995 ESA up to date and assess environmental conditions for the location of the proposed project (Calpine 1997, AFC Appendix 8.13B). The Phase I ESA for the Greenleaf site found no evidence of environmental contamination, however certain site conditions and practices were found which had the potential to cause the release of chemicals to the environment. The incremental ESA found that all conditions and practices of concern noted in the earlier ESA had been corrected with the exception of transformers which had no secondary containment. It was noted, however, that there was no indication of leaks or spills at the transformer location. Based on an interview with the site

manager and a visual inspection, no conditions of environmental concern were discovered during the incremental ESA at the proposed site.

IMPACTS

PROJECT SPECIFIC IMPACTS

Potential risks to public health may occur both during project construction and operation.

Construction Impacts

Potential risks to public health during construction may be associated with particulate matter and toxic substances disturbed during site preparation and remediation, as well as emissions from heavy equipment.

As noted earlier, no evidence of site contamination has been found by Calpine. Therefore, no significant toxics-related public health impacts are anticipated from earth moving due to project construction.

Construction activities also result in the emission of criteria pollutants from the operation of heavy equipment and particulate matter from earth moving. These impacts are examined in staff's **Air Quality** analysis. As **Air Quality** Table 14 shows, the estimated PM_{10} and NO_2 impacts from project construction are very high. However, these impacts are anticipated to be of short duration and unavoidable. Construction activities must meet California Occupational Safety and Health Administration standards for emissions, and impacts to the public are minimal due to dispersion. If such standards are exceeded, corrective measures will be necessary. Staff's **Air Quality** section presents these analyses and associated modeling results.

Operation Impacts

During operation, potential public health risks are related to natural gas combustion emissions from the gas turbines, duct burners, and natural gas dehydrators.

Criteria Pollutants

Staff's **Air Quality** section presents a detailed analysis of project criteria emissions. NO_2, CO, and SO_2 emissions impacts from the project, when added to ambient background levels, were found to be much lower than the most stringent standards for these pollutants. The project's PM_{10} impacts will likely contribute to existing violations of the state 24 hour standard. Staff did not model the O_3 or secondary PM_{10} impacts of the project. Nontheless, staff assumes that emissions of O_3 precursors, such as NOx and volatile organic compounds, in areas of federal or state O_3 nonattainment, may contribute significantly to ongoing violations within the District and therefore cause an adverse air quality impact. Staff also assumed that the project's NOx emissions may be converted to nitrates and contribute to existing PM_{10} violations. **Air Quality** staff will evaluate the significance of such contributions in the context of current and expected ozone and PM_{10} air quality trends.

Noncriteria Pollutants

Staff examined potential short-term (acute) and long-term (chronic) health effects and cancer risk from exposure to project noncriteria pollutants based on a screening analysis. As noted earlier, the first step in a screening health risk assessment is to identify potentially toxic compounds which may be emitted. Emissions sources from the project include combustion-related emissions from the combustion turbine generators, duct burners, and natural gas dehydrators.

PUBLIC HEALTH Table 1 lists toxic emissions for natural gas-fired combustion turbines taken from the California Toxic Emissions Factors (CATEF) database, and also contains reference exposure levels and cancer potency values (unit risks for inhalation and oral potency values for ingestion) listed in the CAPCOA Guidelines.

PUBLIC HEALTH Table 1
Noncancer Reference Exposure Levels (REL) and Cancer Potency Values for Natural Gas-Fired Combustion Turbine Emissions[1]

Substance Emitted[2]	Acute REL $\mu g/m^3$	Chronic REL $\mu g/m^3$	Cancer Unit Risk $(\mu g/m^3)^{-1}$	Oral Potency Value $(mg/kg\text{-}d)^{-1}$	Oral REL mg/kg-d
Ammonia	2.1E+03	1.0E+02			
Benzo(a)anthracene			1.1E-04	1.15E+00	N/A
Benzo(a)pyrene			1.1E-03	1.15E+01	N/A
Benzo(b)fluoranthene			1.1E-04	1.15E+00	N/A
Benzo(k)fluoranthene			1.1E-04	1.15E+00	N/A
Chrysene			1.1E-05	1.15E-01	N/A
Dibenz(a,h)anthracene			3.9E-04	4.1E+00	N/A
Indeno(1,2,3cd)-pyrene			1.1E-04	1.15E+00	N/A
Napthalene		1.4E+01		N/A	4.0E-03
1,3-Butadiene			1.7E-04		
Acetaldehyde		9.0E+00	2.7E-06		
Acrolein	2.5E+00	2.0E-02			
Benzene		7.1E+01	2.9E-05		
Formaldehyde	3.7E+02	3.6E+00	6.0E-06		
Propylene Oxide	1.0E+03	3.0E+01	3.7E-06		
Toluene		2.0E+02			
Xylene (Total)	4.4E+03	3.0E+02			

[1] Reference exposure levels and cancer potency factors from CAPCOA Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines, October 1993
[2] California Toxic Emissions Factors (CATEF) database for natural gas fired combustion turbine cogeneration (4/96)

Calpine calculated maximum emission rates for each substance in PUBLIC HEALTH Table 1 using the highest expected hourly and annual heat input for the CTGs and duct burners and toxic emissions factors from the CATEF database (Calpine 1997, AFC p. 8.1-26, AFC Appendix 8.1E and Calpine 1998, data response p. AIR 1-10).

Calpine then conducted an initial screening analysis using the SCREEN3 model to determine worst-case ambient emissions concentrations (Calpine 1997, AFC Appendix 8.1J p. 10). SCREEN3 incorporates a full range of meteorological conditions including atmospheric stability classes and wind speeds to calculate maximum pollutant concentrations. In addition, Calpine ran the model using nine scenarios with various load rates and ambient temperatures to obtain worst-case impacts (Calpine 1997, AFC Appendix 8.1I).

Staff agrees with the methods and results of Calpine's calculations of ambient concentrations of toxic substances. The next two sections present staff's calculations of noncancer hazard indices and cancer risks based on these ambient concentrations.

Noncancer Hazard

Staff calculated an acute inhalation hazard index for each substance for which an acute REL value is listed in PUBLIC HEALTH Table 1. The hazard indices were calculated according to the CAPCOA Guidelines described previously, and summed to yield a total acute hazard index of 0.01, as shown in PUBLIC HEALTH Table 2. As described earlier, a total hazard index of less than 1.0 indicates that facility emissions are not expected to result in any short-term adverse health effects, even in sensitive members of the population.

Staff also calculated chronic hazard indices for each substance having a chronic REL (for inhalation hazard) or oral REL (for noninhalation hazard) listed in PUBLIC HEALTH Tables 1 and 2. Chronic noninhalation hazards for combustion emissions are less than 0.001 and do not add meaningfully to the hazard index. As shown in PUBLIC HEALTH Table 2, the total chronic hazard index is 0.02, well under the safe level, indicating that no long-term adverse health effects are expected.

PUBLIC HEALTH Table 2
Facility Hazard/Risk

Type of Hazard/Risk	**Hazard Index/Risk**	**Significance (Safe) Level**
Acute Noncancer	0.01	1.0
Chronic Noncancer	0.02	1.0
Individual Cancer	0.02×10^{-6}	1.0×10^{-6}

Cancer Risk

Staff calculated cancer risk according to CAPCOA Guidelines for each combustion-related emission having a unit risk (inhalation) and oral potency value (noninhalation) listed in PUBLIC HEALTH Table 1. Inhalation as well as non-inhalation pathways (soil ingestion, dermal exposure, and mother's milk) were included. As shown in PUBLIC

HEALTH Table 2, total worst-case individual cancer risk is 0.02 in one million for combustion emissions, or well below the level of one in one million considered significant by staff.

It should be noted that the hazard indices and cancer risks in PUBLIC HEALTH Table 2 do not include emissions from the two natural gas dehydrators, which are planned to be constructed offsite by PG&E, and thus would not contribute to total risk from the facility proper. Dehydrator emissions could include both combustion and noncombustion related substances.

Staff does not expect combustion emissions from the dehydrators to constitute a significant health impact given the very low impacts (both from criteria and noncriteria emissions) from the much larger turbines. The reboilers on the dehydrators are each rated at a maximum heat input of 1.0×10^6 BTUs per hour, compared to a maximum hourly heat input of 3784×10^6 BTUs for the two combustion turbines. AFC Table 8.1-21 shows that criteria emissions from the dehydrators are less than one-tenth of one percent of combustion turbine emissions. Similarly, staff do not expect dehydrator noncriteria emissions to be significant, given the very low risks for the turbines calculated above.

The dehydrators also have the potential to emit noncombustion pollutants removed from the natural gas during the dehydration process. Certain system designs could allow such pollutants to be vented to the atmosphere. However, Calpine has proposed a system wherein potential emissions are vented through condensers or activated carbon filters to control their levels (Calpine 1997, AFC p. 8.1-24). The U.S. EPA is in the process of promulgating standards based on this type of control system, which would limit emissions of hazardous air pollutants from such dehydrators (63 Fed. Reg., p. 6288). Staff will require that the dehydrators be constructed with condensers to minimize emissions of hazardous air pollutants and resultant potential public health risks.

CUMULATIVE IMPACTS

Criteria Pollutants

Cumulative impacts on public health are considered by examining the effects of project emissions in conjunction with existing pollutant (ambient background) levels and other projects which may receive permits to construct. The **Air Quality** analysis referred to in this section includes consideration of ambient criteria pollutant levels. For the cumulative analysis, the major component of the protocol required by staff was to include all known future projects within six miles of the SPP. The Feather River Air Quality Management District (FRAQMD) conducted a comprehensive review and determined that there are no planned facilities within the six miles that are eligible for modeling. Therefore, that aspect of the cumulative impact analysis was unnecessary.

Non-Criteria Pollutants

Noncancer Health Effects

In general, elevated concentrations of toxic air contaminants from stationary sources tend to be quite localized. Significant cumulative risks are likely to occur only when multiple facilities with substantial low-level toxic emissions are immediately adjacent to, or very close to, one another. Neither Greenleaf 1, immediately adjacent to the SPP site, or the nearest additional facilities, Greenleaf 2, Sunsweet, and Yuba City Cogeneration (approximately seven miles to the northeast), meet Feather River AQMD criteria for significant risk. Since upper-bound estimates for non-criteria emissions from the SPP project are substantially lower than significance levels for both acute and chronic health effects, and nearby facilities do not pose significant public health risks, staff does not expect cumulative health hazards from project-related non-criteria emissions to be of concern.

Cancer

Staff's upper-bound estimate of additional lifetime cancer risk is less than one chance in one million. As explained earlier, this estimate is based on maximum impacts to a critical receptor, and actual risks are likely to be lower. Nonetheless, the estimate is below the de minimis risk level. Thus, project related carcinogenic emissions will not meaningfully change the existing overall level of lifetime cancer risk.

FACILITY CLOSURE

As noted in the introduction to this section, the scope of staff's public health analysis is limited to routine releases of harmful substances to the environment. During either temporary or permanent facility closure, the major concern would be from accidental or nonroutine releases from either hazardous materials or wastes which may be onsite. These are discussed in the sections on **Hazardous Materials** and **Waste Management**, respectively. During temporary closure (periods greater than those required for normal maintenance), it is unlikely that there would be any routine releases of harmful substances to the environment since the facility would not be operating. For permanent closure, the only routine emissions would be related to facility demolition or dismantling, such as exhaust from heavy equipment or fugitive dust emissions. These would be subject to closure conditions promulgated by Energy Commission air quality staff once a closure plan is received from the project owner.

MITIGATION

Potential public health impacts from the proposed project are related to the types and quantities of contaminants released into the atmosphere. These are determined by many factors such as mode of facility operation, type of pollution control equipment, and type of fuel used. Please refer to the **Air Quality** section of this document for a detailed description and analysis of air pollution mitigation measures.

COMPLIANCE WITH APPLICABLE LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Prior to certification, the proposed project will need to receive a Final Determination of Compliance (DOC) from the Feather River AQMD (FRAQMD). To fully mitigate the facility's potential emission increases of NOx, SOx, PM_{10}, and VOC, Calpine will need to provide emission reduction credits (ERCs) to FRAQMD. Calpine is still in the negotiation phase with potential ERC owners and has not yet secured any ERCs. However, Calpine is proposing to comply with all of the District's ERC requirements and offset 100 percent of the project's liabilities for NOx, PM_{10}, and VOC emissions. The appropriate interpollutant trading ratio, operating profile, and other minor issues are unresolved at this time. The resolution will affect the findings and conditions contained in the Final DOC and **Air Quality** staff's recommendations on the project, including specific conditions of certification.

CONCLUSIONS AND RECOMMENDATIONS

Due to outstanding criteria pollutant issues noted above including offsets, interpollutant trading, and emission control requirements, **Air Quality** staff cannot at this time make final recommendations regarding criteria air pollutant impacts from the project until the Final DOC is issued, which staff expects to be in mid October.

In a September 11, 1998 letter to Paul Richins of staff, Calpine proposed additional environmental mitigation which included utilization of a dry cooling design. This would eliminate the need for cooling towers and their associated emissions. **Public Health** staff has reflected this design in its analysis, and concludes that operation and construction of the SPP project is not expected to result in atmospheric emissions of non-criteria pollutants sufficient to cause adverse public health consequences.

CONDITIONS OF CERTIFICATION

PUBLIC HEALTH-1 Unless a screening health risk assessment performed by the project owner pursuant to CAPCOA Guidelines shows that health risks to the public are not significant, the project owner will require its contractor(s) to construct natural gas dehydrators using a design which vent emissions from glycol regeneration tanks through packed-chilled condensers to minimize hazardous air emissions.

Verification: Prior to construction of the dehydrators, the project owner will provide the CPM with copies of the Authority to Construct for the dehydrators from the Colusa County Air Pollution Control District and the Feather River Air Quality Management District.

REFERENCES

Calpine (Calpine Corporation). 1997. Application for certification, Sutter Power Plant, (97-AFC-2). Submitted to the California Energy Commission, December 15.

Calpine (Calpine Corporation). 1998. Response to California Energy Commission (CEC) staff data requests, Sutter Power Plant (97-AFC-2). Submitted to the CEC, March 4.

Calpine (Calpine Corporation). 1998a. Response to California Energy Commission (CEC) staff data requests, Sutter Power Plant (97-AFC-2). Submitted to the CEC, May 1.

CAPCOA. California Air Pollution Control Officers Association. CAPCOA Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines. Prepared by the Toxics Committee. October 1993.

CARB 1982. California Air Resources Board. California Ambient Air Quality Standard for Particulate Matter (PM_{10}). December.

CARB 1989. California Air Resources Board. Adequacy of the Statewide Carbon Monoxide Ambient Air Quality Standard: The Impact of Recent Health Effects Studies. Staff Report. December.

CARB 1991. California Air Resources Board. Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide. April 11.

CARB 1991a. California Air Resources Board. Amendments to Regulations for the 24-Hour Ambient Air Quality Standard for Sulfur Dioxide. Staff Report. August.

CARB 1992. California Air Resources Board. Review of the One-Hour Ambient Air Quality Standard for Nitrogen Dioxide. Staff Report. December.

CARB 1992a. California Air Resources Board. Review of the One-Hour Ambient Air Quality Standard for Nitrogen Dioxide. Technical Support Document. December.

CARB 1994. California Air Resources Board. Review of the One-Hour Ambient Air Quality Standard for Sulfur Dioxide. Staff Report. December 27.

FDA 1985. United States Food and Drug Administration. Federal Register. Vol. 50, No. 243. December 18.

Kleinman et al. Effects on Human Health of Pollutants in the South Coast Air Basin. Final Report to the South Coast Air Quality Management District. June 1989.

ATTACHMENT A - CRITERIA POLLUTANTS

OZONE (O_3)

Ozone is formed when reactive organic gases are mixed with nitrogen oxides in the presence of sunlight. Heat speeds up the reaction, typically leading to higher concentrations in the summer months. Ozone is a colorless, very reactive gas which oxidizes other materials. Oxidation damages living cells and tissues by altering their protein, lipid, and carbohydrate components or products. Such damage leads to dysfunction and death of cells in the lung and in other internal tissues.

The U.S. EPA revised the federal ozone standard on July 18, 1997 (62 Fed. Reg. 38856), based on new health studies which became available since the standard was last revised in 1979. These new studies showed that adverse health effects occur at lower ambient concentrations over longer exposure times than those reflected in the previous standard, which was based on acute health effects associated with heavy exercise and short-term exposures.

The U.S. EPA's proposed ozone rule lists health effects which have been attributed to result from short-term (one to three hours) and prolonged (six to eight hours) exposure to ozone (61 Fed. Reg. 65719). Acute health effects induced by short-term exposures include transient reductions in pulmonary function, and transient respiratory symptoms including cough, throat irritation, chest pain, nausea, and shortness of breath with associated effects on exercise performance. Other health effects associated with short-term or prolonged O_3 exposures include increased airway responsiveness (a predisposition to bronchoconstriction caused by external stimuli such as pollen and dust), susceptibility to respiratory infection by impairing lung defense mechanisms, increased hospital admissions and emergency room visits, and transient pulmonary inflammation.

Generally, groups considered especially sensitive to the effects of air pollution include persons with existing respiratory diseases, children, pregnant women, and the elderly. However, controlled exposure data on people in clinical settings have indicated that the population at greatest risk of acute effects from ozone exposures are children and adults engaged in physical exercise. Children are most at risk because they are active outside, playing and exercising, during the summer when ozone levels are at their highest. Adults who are outdoors and engaging in activities involving heavy levels of exertion during the summer months are also among those most at risk. Exertion increases the amount of O_3 entering the airways and can cause O_3 to penetrate to peripheral regions of the lung where lung tissue is more likely to be damaged. These individuals, as well as those with respiratory illnesses, such as asthma, can experience a reduction in lung function and increased respiratory symptoms, such as chest pain and cough, when exposed to relatively low ozone levels during periods of moderate exertion.

CARBON MONOXIDE (CO)

Carbon monoxide is a colorless, odorless gas which is a product of inefficient combustion. It does not persist in the atmosphere, but is quickly converted to carbon dioxide. However, it can reach high levels in localized areas, or "hot spots".

CO reduces the oxygen carrying capacity of the blood, thereby disrupting the delivery of oxygen to the body's organs and tissues. Persons sensitive to the effects of carbon monoxide include those whose oxygen supply or delivery is already compromised. Thus, groups potentially at risk to carbon monoxide exposure include persons with coronary artery disease, congestive heart failure, obstructive lung disease, vascular disease, anemia, the elderly, newborn infants, and fetuses (CARB 1989, p. 9). In particular, people with coronary artery disease were found to be especially at risk from carbon monoxide exposure (CARB 1989, p. 9). Tests conducted on patients with confirmed coronary artery disease indicated that exposure to low levels of carbon monoxide during exercise produced significant cardiac effects. These included earlier onset of chest pain (angina) and electrocardiographic changes indicative of effects on the heart muscle (CARB 1989, p. 6). Such changes can limit the ability of patients with coronary artery disease to exert themselves even moderately. Therefore, the statewide carbon monoxide one hour and eight hour standards were adopted in part to prevent aggravation of chest pain. Additionally, however, the standards are intended to prevent decreased exercise tolerance in persons with peripheral vascular disease and lung disease, impairment of central nervous system functions, and increased risk to fetuses (Cal. Code Regs., tit. 17, §70200).

PARTICULATE MATTER (PM)

Particulate matter is a generic term for particles of various substances which occur as either liquid droplets or small solids over a wide range of sizes. Particles having the most potential to adversely affect human health are those less than 10 micrometers (millionths of a meter) in diameter which may be inhaled and deposited into the deep portions of the lung (PM_{10}). PM may originate from anthropogenic or natural sources such as stationary or mobile combustion sources or windblown dust. Particles may be emitted directly to the atmosphere or may be the result of physical and chemical transformation of gaseous emissions such as sulfur oxides, nitrogen oxides, and volatile organic compounds. PM_{10} includes elements such as carbon, lead, and nickel; compounds such as nitrates, organics, and sulfates; and complex mixtures such as diesel exhaust and soil. The size, chemical composition, and concentration of ambient PM_{10} can vary considerably from area to area and from season to season within the same area.

PM_{10} can be grouped into two general sizes of particles, fine and coarse, which differ in formation mechanisms, chemical composition, sources, and potential health effects. Fine-mode particles are those having a diameter of 2.5 micrometers or less ($PM_{2.5}$), while the coarse-mode fraction of PM consists of particles ranging from 10 micrometers down to 2.5 micrometers in diameter ($PM_{10\text{-}2.5}$).

$PM_{2.5}$ is derived both from combustion by-products which have volatilized and condensed to form primary $PM_{2.5}$ and from precursor gases reacting in the atmosphere to form secondary $PM_{2.5}$. Fine particles include nitrates, organic compounds, sulfates, ammonium, and trace elements (including metals) as well as elemental carbon such as soot. Major sources of fine particles are fossil fuel combustion by electric utilities, industry and motor vehicles, vegetation burning, and the smelting or other processing of metals. Dry deposition of fine mode particles is slow and such particles may have long lifetimes in the atmosphere (days to weeks) and travel hundreds to thousands of kilometers. They tend to be uniformly distributed over urban areas and larger regions and are removed from the atmosphere primarily by forming cloud droplets and falling out in raindrops.

Coarse-mode $PM_{10-2.5}$ is formed by crushing, grinding, and abrasion of surfaces, breaking large pieces of materials into smaller pieces. Coarse particles consist mainly of soil dust containing oxides of silicon, aluminum, calcium, and iron; as well as fly ash, particles from tires, pollen, spores, and plant and insect fragments. Coarse particles normally have shorter lifetimes (minutes to hours) and only travel short distances (less than tens of kilometers). They tend to be unevenly distributed across urban areas and have more localized effects than fine particles.

Because PM_{10} includes many different types of particles with widely divergent chemical characteristics, potential health effects depend upon the constituent make-up of PM_{10} to which persons may be exposed.

The size of the particles inhaled determines where they are deposited in the respiratory system. Coarse particles are deposited most often in the nose and throat. Fine particles are deposited most often in the bronchial tubes and in the air sacs, with the greatest percentage being deposited in the air sacs. Particles deposited in the air sacs are removed more slowly by the body than particles in either the nose and throat or the bronchial tubes. Because of the longer residence time, they have a greater opportunity to cause adverse health effects.

Many epidemiological studies have shown that exposure to particulate matter is associated with a variety of health effects, including premature mortality, aggravation of respiratory and cardiovascular disease, changes in lung function and increased respiratory symptoms, changes to lung tissues and structure, and altered respiratory defense mechanisms. Based on their review of a number of such community epidemiological studies published after 1987 when the federal standards were last revised, the U.S. EPA concluded that then-current standards were not sufficiently stringent to prevent the occurrence of adverse public health effects. Therefore, federal PM standards were revised on July 18, 1997 (62 Fed. Reg. 38652) by adding new annual and 24-hour $PM_{2.5}$ standards to the existing annual and 24-hour PM_{10} standards. The U.S. EPA's review concluded that fine particles were a better surrogate for those components of PM most likely linked to mortality and morbidity effects at levels below the previous standards, while high concentrations of coarse fraction particles are linked to effects such as aggravation of asthma. Taken together, the new standards are meant to provide increased protection against a wide range of

PM-related health effects, including premature mortality and increased hospital admissions and emergency room visits, primarily in the elderly and individuals with cardiopulmonary disease; increased respiratory symptoms and disease in children and individuals with cardiopulmonary disease such as asthma; decreased lung function, particularly in children and individuals with asthma; and alterations in lung tissue and structure and in respiratory tract defense mechanisms.

California has 24-hour and annual standards for PM_{10} only which are based on studies which describe the lowest probable effects levels and which represent the lowest pollution levels at which health effects were investigated (CARB 1982, pp. 81,84). The studies included investigations of increased rates of asthma attack, increased mortality, and changes in the health status of bronchitis patients.

California's 24-hour PM_{10} standard is intended to prevent exacerbation of symptoms in sensitive patients with respiratory disease, declines in pulmonary function (especially in children), and excess mortality from short-term exposure (Cal.. Code Regs., tit. 17, §70200). The standard is intended to provide a small margin of safety to account for the possibility of effects occurring at lower levels (CARB 1982, p. 84). The state 24 hour PM_{10} standard was set to be more stringent than the national 24 hour PM_{10} standard. At the time of CARB's adoption of the state standard, the U.S. EPA had not set federal 24 hour $PM_{2.5}$ standards, and CARB found that the federal standard did not adequately protect public health (CARB 1991, p. 26).

The annual standard is based on studies which show that long-term exposure to PM_{10} causes decreased breathing capability and increased respiratory illness in susceptible populations such as children (CARB 1991, p. 25). The annual standard is also based on the lifetime risk of cancer from exposure to carcinogenic particles known to be present in this size fraction (CARB 1982, p. 84).

NITROGEN DIOXIDE (NO_2)

Nitrogen dioxide is formed either directly or indirectly when oxygen and nitrogen in the air combine during combustion processes. It is a relatively insoluble gas which is able to penetrate deep into the lungs, its principal site of toxicity. Its toxicity is thought to be due to its capacity to initiate free radical reactions and to oxidize cellular proteins and other biomolecules (CARB 1992, Appendix A, p. 4).

Sublethal exposures in animals produce inflammation and various degrees of tissue injury characteristic of oxidant damage (Evans in CARB 1992, Appendix A, p. 5). The changes produced by low-level acute or subchronic exposure appear to be reversible when animals are allowed to recover in clean air.

Health effects of particular concern in relation to low-level nitrogen dioxide exposure include: (1) effects of acute exposure on some asthmatics and possibly on some persons with chronic bronchitis, (2) effects on respiratory tract defenses against infection, (3) effects on the immune system, (4) initiation or facilitation of the

development of chronic lung disease, and (5) interaction with other pollutants (CARB 1992, Appendix A, p. 5).

Several groups which may be especially susceptible to nitrogen dioxide related health effects have been identified (CARB 1992, Appendix A, p. 3). These include asthmatics, persons with chronic bronchitis, infants and young children, cystic fibrosis and cancer patients, people with immune deficiencies, and the elderly.

Studies using controlled brief exposures on sensitive groups have shown an increase in bronchial reactivity or airway responsiveness of some asthmatics, and decreased lung function in some patients with chronic obstructive lung disease (CARB 1992, Appendix A, p. 2). In general, bronchial hyperreactivity (an exaggerated tendency of the airways to constrict) is markedly greater in asthmatics than in nonasthmatics upon exposure to respiratory irritants (CARB 1992a, p. 107). At exposure concentrations relevant to the current one hour ambient standard, there appears to be little, if any, effect on respiratory symptoms of asthmatics (CARB 1992a, p. 108).

SULFUR DIOXIDE (SO_2)

Sulfur dioxide is formed when any sulfur-containing fuel is burned. SO_2 is highly soluble and consequently absorbed in the moist passages of the upper respiratory system. Exposure to sulfur dioxide can cause changes in lung cell structure and function that adversely affect a major lung defense mechanism known as muco-ciliary transport. This mechanism functions by trapping particles in mucus in the lung and sweeping them out via the cilia (fine hair-like structures) also in the lung. Slowed mucociliary transport is frequently associated with chronic bronchitis.

Exposure to sulfur dioxide can produce both short- and long-term health effects. Therefore, California has established sulfur dioxide standards to reflect both short- and long-term exposure concerns. Based on controlled exposure studies of human volunteers, investigators have found that asthmatics comprise the group most susceptible to adverse health effects from exposure to sulfur dioxide (CARB 1994, p. V-1).

The primary short-term effect is bronchoconstriction, a narrowing of the airways which results in labored breathing, wheezing, and coughing. The short-term (one hour) standard is based on bronchoconstriction and associated symptoms (such as wheezing and shortness of breath) in asthmatics and is designed to protect against adverse effects from five to ten minute exposures. In the opinion of the California Office of Environmental Health Hazard Assessment, the short-term ambient standard is likely to afford adequate protection to asthmatics engaged in short periods of vigorous activity (CARB 1994, Appendix A, p. 16).

Longer-term exposure is associated with an increased incidence of respiratory symptoms (e.g., coughing and wheezing) or respiratory disease, decreases in pulmonary function, and an increased risk of mortality (CARB 1991a, p. 12). The long-term (24 hour) standard is based upon increased incidence of respiratory disease

and excess mortality. The standard includes a margin of safety based on epidemiological studies which have shown adverse respiratory effects at levels slightly above the standard. Some of the studies indicate a sulfur dioxide threshold for effects, whereby "no adverse effects" are expected from exposures to concentrations at the state standard (Ibid.).

WORKER SAFETY AND FIRE PROTECTION

Testimony of Ellen Townsend-Smith

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. The Worker Safety and Fire Protection analysis enables staff to "assess the completeness and adequacy of the measures proposed by Calpine in terms of applicable health and safety standards and other reasonable requirements" (Cal. Code Regs., tit. 20, § 1743), and to draw conclusions about the compliance of the proposed project with applicable LORS (Cal. Code Regs., tit. 20, § 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 Sutter Power Project (SPP) Application for Certification (AFC) to determine whether Calpine has proposed adequate measures to:

- comply with applicable safety laws, ordinances, regulations and standards (LORS);
- protect the workers during construction and operation of the facility;
- protect against fire; and
- provide adequate emergency response procedures.

Staff has assessed both the adequacy of the measures proposed by Calpine to protect workers and the compliance of the proposed project with applicable LORS. Staff has determined that the features of the project comply with applicable LORS and do not present unusual industrial safety or fire protection problems.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

- 29 U.S.C. § 651 et seq. (Occupational Safety and Health Act of 1970)
- 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)

- 29 C.F.R. § 1926 (Occupational Safety and Health Construction Safety regulations.)

STATE

- Title 8, California Code of Regulations, § 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)

LOCAL

- Uniform Fire Code (UFC). The uniform 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. The project owner shall design construct and inspect the project in accordance with LORS in effect at the time initial design plans are submitted to the Chief Building Officer (CBO) for review and approval.

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

EVALUATION CRITERIA

Staff has reviewed the SPP Application for Certification (AFC) to determine whether the applicant has proposed adequate measures to:

- comply with applicable safety LORS;

- protect the workers during construction and operation of the facility;

- protect against fire; and

- provide adequate emergency response procedures.

Staff assesses both the adequacy of the measures proposed by the applicant to protect workers and provide fire protection, and the compliance of the proposed project with applicable LORS. 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.

SETTING

The SPP is located in a rural area. The plant is surrounded by rice fields and orchards. According to Gary Kraus, Director of Sutter County Community Fire and

Emergency Services, the nearest fire fighting and response service providers are equipped and staffed for rural emergency response only. Rural emergencies consists of grass fires, vehicular collisions, farm accidents, house and barn fires and paramedic services.

The fire stations closest to the proposed project site are:

Central Gaither Station - The Station is at the Central Gaither School, four and one-half to five miles away from the proposed site. The station is manned by five volunteer fire fighters. There is one fire truck housed in the school's bus barn. The fire truck is a 1976 model and pumps 750 gallons per minute (gpm) (Kraus 1998).

Oswald Fire Station - The station is at 1280 Barry Road, also four and a one-half to five miles from the proposed site. The station is manned by two paid firefighters and 10 volunteers. It has an engine, a water tender, a grass rig, and an old ambulance that carries shade structures, tents, etc. (Kraus 1998).

When additional fire fighting and emergency services are required, assistance is obtained from the Sutter Fire Department and the City of Live Oaks Fire Department. Sutter and Live Oaks employ county firefighters and are located 11 and 16 miles, respectively, from the proposed facility. The Sutter and Oswald facilities can respond to a hazardous materials (HAZMAT) release incident. (Refer to the **HAZMAT** section of this report for further details.)

IMPACTS

PROJECT SPECIFIC IMPACTS

Fire Protection

To determine the project's impacts on fire protection, Staff reviewed the available fire protection services and equipment, and Calpine's proposed safety and health program. We have determined that the project needs for fire protection may exceed the Sutter County Fire and Emergency Services District's capabilities. In the past, the District has responded to three fires and a dust explosion involving the dryers, not the cogeneration facility, at the Greenleaf plant (Kraus 1998). Based on this experience, if the SPP project is approved and built, the fire fighting and emergency services in the area will need to be upgraded. Refer to the **Socioeconomic's** FSA section of this report for more information on the specific needs for the Fire Department. SPP may create additional demands on the Fire Department, such as a confined space rescue, a new fire hazard, a HAZMAT problem, and a high angle rescue. These types of incidents are not normally experienced in this rural community. Gary Kruaus identified the following as items that could be used to update the fire protection and emergency services in the area:

(1) The Central Gaither fire station will need to be upgraded. The current engine is a 1976 model with a 750 gpm pumping capacity. The average

life span of a fire engine is 25 years. This engine is only adequate for rural fire fighting. The cost of a new heavy rescue fire unit with HAZMAT response capabilities is $300,000. A heavy rescue unit includes: a power generator, a mobil communication system, illumination, breathing apparatus support, non-transport medical capabilities, and limited Urban Search and Rescue capabilities. A new rescue unit will also include a 1,500 gpm pumping capability with an elevated stream and a 65-foot tele-squirt boom to fight industrial fires (Kraus 1998).

(2) If a new rescue unit is bought, the District will need a new fire station or an upgraded bus barn to house the new fire truck. The new fire station would cost approximately $100,000 (Kraus 1998).

(3) It will also be necessary for the Sutter Fire District to consolidate all hazmat equipment on a single vehicle at the Oswald station. Currently Oswald is using a 1979 Ford rescue engine (Kraus 1998).

Worker Safety

Industrial environments are dangerous. Workers are exposed to chemical spills, hazardous waste, fires, confined space entry egress problems, and exposed to moving equipment. It is important for Calpine to have well defined policies and procedures, training, hazard recognition and control at their facility to minimize such hazards and protect workers.

MITIGATION

Injury and Illness Prevention Programs (IIPPs) will be prepared to minimize worker hazards. Separate IIPPs will be prepared to minimize worker hazards during construction and operation.

The SPP facility will have onsite fire protection systems and will need to be supported by local fire protection services. According to the Sutter County Director of Fire and Emergency Services, there is not adequate fire and emergency protection available for a new industrial plant in the area. Staff agrees with the Director of Fire and Emergency Services that the area's rural fire protection services need to be updated with additional modern fire fighting equipment to accommodate extra industrial facilities located in the area. Sutter County and Calpine will have to develop an agreement which specifies the improvements in emergency services needed to support the project. For further discussion of this issue, please refer to the **Socioeconomic's** section of this report.

Safety and Health Program Staff uses the phrase "Safety and Health Program" to refer to the measures Calpine will take to ensure compliance with applicable LORS during the construction or operation phases of the project.

Construction Safety and Health Program

The Construction Safety Orders found in Title 8 of the California Code Regulations contain health and safety requirements promulgated by Cal/OSHA that are applicable to the construction phase of the project (Cal Code Regs., 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) (Cal. Code Regs., tit. 8, § 1509);
- Construction Fire Protection and Prevention Plan (Cal. Code Regs., tit. 8, § 1920);
- Personal Protective Equipment Program (Cal. Code Regs., tit. 8, §§ 1514 - 1522; and §§ 3401 - 3411.

The Construction Safety Orders also contain additional specific worker safety and health requirements applicable to construction activities. In addition, the requirements of the Electrical Safety Orders (Cal. Code Regs., tit. 8, §§ 2299 - 2974) and Unfired Pressure Vessel Safety Orders (Cal. Code Regs., tit. 8, §§ 450 - 544) may be applicable to the project.

Calpine provided adequate outlines for each of the programs and plans and will provide extensive detail in accordance with condition of certification SAFETY-1.

Operation Safety and Health Program

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

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

Calpine provided adequate outlines for each of the programs and plans and will provide extensive detail in accordance with condition of certification SAFETY-2.

Safety and Health Program Elements

Staff requires both a Construction Safety and Health Program and an Operation Safety and Health Program. The measures in these plans are derived from applicable sections of state and federal law. Below is a list of major items required in both Safety and Health Programs.

Injury and Illness Prevention Program (IIPP)

Calpine has provided an adaquate draft outline for an Injury and Illness Prevention Program (IIPP) (SPP 1997). Calpine will need to submit an expanded Operations Illness and Injury Prevention Program to Cal/OSHA for review and comment 30 days prior to operation and construction.

Cal/OSHA will review and provide comments on the IIPP as the result of an onsite consultation at the request of Calpine, during which a Cal/OSHA representative completes a physical survey of the site and analyzes the work practices and points out those practices that are likely to result in illness or injury. The on-site consultation will give Cal/OSHA an opportunity to evaluate Calpine's IIPP and apply it directly to activities taking place on-site (Glendenning 1998).

Emergency Action Plan

California Code of Regulations, tit. 8, Section 3220 contains the requirements for an Emergency Action Plan. The AFC contains an satisfactory outline for an emergency action plan (SPP 1997). The outline lists the following features, fire and emergency reporting procedures, evacuation procedures, and Spill Prevention/Control and Countermeasures Plan. Staff proposes condition of certification SAFETY-2, which requires Calpine to submit a final Operation's Emergency Action Plan to Cal/OSHA, for review and comment after an on-site consultation.

Fire Protection Plan

California Code of Regulations, tit. 8, Section 3221 establishes the requirements for an Operation Fire Prevention Plan. The AFC contains a draft proposed fire protection plan which is adequate for staff's analysis. The plan discusses the following topics:

- On-site Fire Protection Systems, including carbon dioxide extinguishing systems, preaction sprinkler systems, a dry pipe deluge system, hand-held fire extinguishers, and fire detection and alarm systems;

- Local Fire Protection Services.

Staff proposes that Calpine submit a final Fire Protection Plan to the California Energy Commission Compliance Project Manager (CPM) and the Sutter County Fire Department 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. Calpine has provided a satisfactory outline that meets minimum requirements of a proposed PPE program.

Under California Code Regulations, tit. 8, 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.

Calpine's PPE Program should include a written policy on the use of protective equipment and methods of communicating it to the employees, selection of the proper type of equipment, training of employees on the correct use and maintenance of the equipment, and enforcement of personal protective equipment use.

Calpine's PPE program should include the use of devices that provide respiratory protection, hearing conservation, eye protection, and head protection. Staff believes that if Calpine 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, ASNI/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 being able to react quickly enough. The **Visual Resources Section** will provide further detail concerning off-site consequences and performance requirements for exterior lighting.

Hazardous Materials Releases

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

Smoking

Calpine shall not allow smoking in an area designated in the National Electrical Code (NEC) as Class I, Division 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 those areas of the project site will be posted to protect the facility and workers.

Lock-out/Tag-out

California Code of Regulations, title 8, 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. Calpine's 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 California Code of Regulations, title 8, 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. Calpine 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 disconnect 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.

CUMULATIVE IMPACTS

There are no cumulative impacts.

FACILITY CLOSURE

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

CONCLUSION AND RECOMMENDATIONS

CONCLUSIONS

If Calpine provides a Construction Safety and Health Plan, and Operation Safety and Health Plan, as required in conditions of certification **SAFETY** 1 and 2, and signs an agreement with Sutter County to pay for needed improvements in fire protection and emergency service capabilities, staff believes that the project will incorporate sufficient measures to ensure adequate levels of industrial safety and fire protection, and comply with applicable LORS. Refer to conditions of certification **HAZ-3** and **SOCIO-3** for additional information.

I have reviewed the mitigation package submitted by Calpine. There are no additional impacts to fire protection services created with the change from a wet cooling tower to a dry cooling tower. The fire/service water storage tank at the project site will still have 350,000 gallons of water dedicated to the fire protection system (Calpine 1998q).

RECOMMENDATIONS

If the Commission certifies the project, staff recommends that the 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 Calpine will be reviewed by the appropriate agencies before implementation. The conditions also provide verification that the proposed plans adequately assure worker safety and fire protection and comply with applicable LORS.

CONDITIONS OF CERTIFICATION

SAFETY-1 The project owner shall submit to the CPM a copy of the Project Construction Safety and Health Program as follows:

- Construction Injury and Illness Prevention Program

- Construction Fire Protection and Prevention Plan
- 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 Sutter County Fire Department for review and acceptance.

Verification: At least 30 days prior to the start of construction, or a date agreed to by the CPM, the project owner shall submit to the CPM a copy of the Project Construction Safety and Health Program, incorporating Cal/OSHA's Consultation Service comments, and a letter from the Sutter County Fire Department stating that they have reviewed and accept the Construction Fire Protection and Prevention Plan and the Personal Protective Equipment Program.

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

- Operation Injury and Illness Prevention Plan
- Emergency Action Plan
- Operation Fire Protection Plan
- 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 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 Operation Fire Protection Plan and the Emergency Action Plan shall be submitted to the Sutter County Fire Department 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 Consultation Service comments and a letter

from the Sutter County Fire Department 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 contained in ANSI/IES RP-7 were used as a basis for the design and installation of the exterior lighting.

REFERENCES

Brauer, Roger L. 1990. Safety and Health for Engineers. 1990.

Cal/OSHA Consultation. 1990. Cal/OSHA Consultation Pamphlet.

Calpine (Calpine Corporation). 1998q. Calpine's Mitigation Measures, October 1998.

Glendenning, Gene. Statewide Manager of High Hazard Employee Compensation Programs. Personnel communication with Ellen Townsend-Smith regarding review of applicant's Proposed Health and Safety Program. March 9, 1998.

Kraus, Gary. 1998. Director of Sutter County Community Fire and Emergency Services. Personal communication with Ellen Townsend-Smith regarding project's fire prevention and protection system, April 17, 1998.

SPP (Sutter Power Project). 1997. Application for Certification SPP (97-AFC-2), prepared by Calpine Corporation. Submitted to the California Energy Commission, December 1997.

TRANSMISSION LINE SAFETY AND NUISANCE

Testimony of Obed Odoemelam

INTRODUCTION

Calpine Corporation (Calpine) is proposing to construct and operate the Sutter Power Plant (SPP) at a site about 36 miles northwest of Sacramento and 7 miles southwest of Yuba City, California. The electricity generated at the plant will be transmitted into an existing Western Area Power Administration (Western) power network through a 230-kilovolt (kV) overhead transmission line which was initially proposed to be constructed and operated as a single circuit line (Calpine 1997). Subsequently, Calpine proposed (Calpine 1998b) a double circuit line that would be operated as a single circuit line. Such change in design is intended to more easily allow for double circuit operation as needed in the future. Operating such a high-voltage line could create several health and safety hazards, as has been described by Calpine, (Calpine 1997, pp 6-12 through 6-21) together with the design and operational measures necessary to reduce such hazards in connection with the proposed project. Such hazard reduction is usually achieved through compliance with laws, ordinances, regulations and standards (LORS) identified by Calpine as applicable to the line.

The purpose of this California Energy Commission staff analysis is to assess the proposed line design for appropriateness in incorporating the hazard reduction measures necessary for compliance with all applicable LORS. If found satisfactory, staff would recommend that the line be approved as proposed; if not, staff will recommend revisions for further mitigation. The assessment will be made with regard to the issues listed below.

- Aviation safety
- Interference with radio-frequency communication
- Audible noise
- Fire hazards
- Nuisance shocks
- Hazardous shocks
- Electric and magnetic field exposure

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Listed and discussed below by subject area are design-related LORS applicable to the physical impacts of transmission lines as proposed for the Sutter Power Plant.

FEDERAL

Aviation Safety

Title 14, Part 77 of the Code of Federal 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 extending from the end of nearby runways to the top of the structure, and the length of the runways involved.

Federal Aviation Administration Advisory Circular (AC) No. 70/7460-2H, "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" with the FAA.

FAA, AC No. 70/7460-1G, "Obstruction Marking and Lighting", which 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.

As noted by Calpine (1977, page 6-12), the only major aviation facilities in the project area are the Beale Air Force Base approximately 14 miles east of the project site and the McClellan Air Force Base and the Sacramento International Airport both over 25 miles to the south. Two smaller local airports are within 8 miles of the project transmission line. These include the Sutter County (Yuba City) Airport, approximately 7.5 miles northeast and the Yuba County Airport 8 miles northeast. No flight paths in the area will directly cross over the proposed line.

As stated by Calpine (1997, page 6-12), an FAA "Notice of Proposed Construction or Operation" will not be required for the proposed line according to the noted regulatory criteria relative to height, distance from the nearest runways, and slope of the imaginary line from the end of the nearest runway to the top of line related structures. While the line will not pose a significant hazard to general aviation in the area, it would, by its very presence in an agricultural area, pose (as do similar lines in the area) some inevitable obstruction hazard to aircraft involved in crop dusting operations in the immediate vicinity. All the Safety Officers in the area crop dusting companies that were contacted by staff, expressed their concern about such possible hazard. They noted that such a hazard could limit the effectiveness of their operations to a potentially significant degree. The possible consequences to area agriculture is addressed in the **Land Use** section.

There are no specific, collision-related regulations on the safety of crop dusting operations in the area around overhead power lines. According to the pilots contacted by staff, each pilot is responsible for the level of care necessary to avoid collision with power lines during crop dusting-related flights. Addition of the proposed line to the area net work of power lines would increase the level of care involved. One of Calpine's reasons for choosing the present route for the line is to avoid significant impacts on two nearby air strips presently used for area crop dusting operations (Calpine 1998b).

Interference with Radio-Frequency Communication

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 when (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 from the energized line. Such noise effects will usually manifest as interference with radio or television signal reception and usually depend on factors such as distance from the line to the receiving device, orientation of the antenna, signal level, line configuration and weather conditions.

When such effects occur in the area around the line, the project owner is required under these regulations to ensure mitigation to the satisfaction of the individual involved. Several design options are available for minimizing the radio noise associated with modern transmission lines. When incorporated in the line design (as with the proposed line), such mitigation measures will also serve to reduce the line-related audible noise discussed below. Staff has proposed a condition for certification (TLSN-2) to ensure resolution of the communications interference issue on a case-specific basis.

Hazardous Shocks

National Electrical Safety Code, 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. Calpine will design the line in keeping with these requirements (Calpine 1998a)

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. Calpine has stated that all requirements of the order will be implemented in the construction and operation of the proposed line (Calpine 1997, pp 6-12 through 6-14).

Audible Noise

As with radio noise, any audible noise from a transmission line will usually result 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. Such noise is usually generated during wet weather and from lines of 345 kV or higher. Research by the Electric Power Research Institute, (EPRI 1982) has shown the fair-weather audible noise from modern transmission lines to be generally indistinguishable from ambient noise at the edge of a 100-ft right-of-way.

There are no design-specific regulations intended to limit the noise from transmission and other high-voltage lines. The noise from such sources is limited instead through design standards established from research and industry experience as effective for noise reduction without significant impacts on line safety, efficiency and reliability. According to information from Calpine, the proposed line will be designed to specifically reduce its operational noise which, as with the existing lines to which it will be connected, would be only slightly perceivable (above background) during wet weather. The maximum noise from the line would be 2.4 dBA in fair weather and 27 dBA in the rain. For the areas beyond the proposed right-of-way, these noise levels would translate into values between 0 dBA and 10 dBA, the threshold of hearing. These noted maximum values would be much below the County Noise Ordinance levels. 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 section under **Noise**.

Fire Hazards

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.

The fires addressed through these regulations are those that could be caused by the sparks from conductors of overhead lines or that could result from direct contact between the line and nearby trees. Calpine intends to comply with the requirements of these regulations and will use trained maintenance crews in the right-of-way to prevent the accumulation of combustible materials (Calpine 1997).

Hazardous Shocks

GO-95, CPUC, "Rules for Overhead Line Construction". These rules specify uniform, state-level requirements for overhead line construction with regard to clearance, grounding, maintenance and inspection and whose application would ensure the safety of the general public and workers involved.

Title 8,CCR, Section 2700 et seq., "High Voltage Electric Safety Orders", establishes essential requirements and minimum standards for safely installing, operating, and maintaining electrical installations and equipment.

The hazardous shocks that are addressed by these regulations as well as the previously noted National Electrical Safety Code are those that could result from direct or indirect contact between an individual and an 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. Calpine has stated their intention to comply with the requirements of the related state regulations and does not expect the proposed line to pose any significant shock hazards to workers and the general public (Calpine 1997, pp 6-16 through 6-19). Staff has recommended a condition for certification (TLSN-1) to ensure compliance with the mitigative requirements involved.

LOCAL

There are no local laws or regulations specifically aimed at the field-related design of electric power lines.

SETTING

According to information from Calpine (Calpine 1997), this project-related transmission line will be routed through an area with existing network of transmission lines and related facilities (Calpine 1998b, Calpine 1997, pp 6-1 through 6-3). The main nearby lines include:

- A single-circuit 500-kV Pacific Gas and Electric (PG&E) California-Oregon Interconnect transmission line approximately 2.5 miles west of the proposed power plant.

- A double-circuit 230-kV Western line located approximately 2.5 miles west of the plant.

- Calpine's own 115-kV transmission line connecting their 49.5 MW cogeneration plant (adjacent to the project site) to the PG&E 115-kV line that provides power for the Yuba City distribution system.

The proposed 230-kV line will be about 5.7 miles long and will serve to transmit electric power from the Sutter Power Plant into Western's existing 230-kV transmission system. According to submittals by Calpine, the proposed 230-kV system will consist of the following:

- A 230-kV switchyard at the southwest corner of the Sutter Power Plant.

- A single-circuit 230-kV line (on single steel poles) from the switchyard to a proposed switching station near the Sutter Bypass to allow a tie into the two Western 230-kV transmission system about 5.7 miles south of the plant.

The line will exit the plant to the east and run south, parallel to South Township Road (on the west side) for approximately 3.2 miles until the road intersects Tudor Road.

Directly south of this intersection, the line will tie into the Western 230-kV lines via the Sutter Switching Station. The line route from the Tudor Road intersection to the station will be either directly south for 1.6 miles across open agricultural fields or shifted approximately 1,800 feet to the west to run along Murray Road to the station. Given the nature of the residential patterns in the area around each possible route, staff does not consider one route to be preferable to the other from a health and safety standpoint. Calpine intends to choose the final route as much to the satisfaction of the area land owners as feasible. As the line exists from the power plant, it will run parallel to an existing PG&E subtransmission/distribution line which is located mostly on the east side of South Township Road. See Project Description, Figures 1 and 2.

About 38 steel poles (see Project Description Figure 4) will be utilized for the line and be spaced to provide a minimum ground clearance of 30 feet at 90^{o} C, in keeping with the specific requirements of GO-95. The conductor configuration and phasing scheme initially proposed for the line as a single circuit facility is recognized as effective for field strength reduction without significant impacts on safety, efficiency, and reliability. The configuration and phasing scheme presently proposed for the line as a double circuit line to be operated as a single circuit line, is recognized as even more effective for field strength reduction as noted by Calpine (Calpine 1998a, 1998b). The width of the right-of-way will still vary from 100 feet to 125 feet depending on support structure, span and road location. This route will traverse an essentially flat farmland for cultivating rice, walnuts, almonds and other crops.

Although the proposed line will cross over 12.5 kV distribution lines at O'Banion Road and south of Gilsizer Slough, the applicant does not anticipate any construction-related interruptions in power supply to area customers.

IMPACTS

Nuisance Shocks

No specific design-related regulations have been established at the federal, state or local levels with regard to nuisance shocks from energized power lines. Nuisance shocks within the transmission line environment are those non-hazardous but unpleasant experiences caused by current flow at levels generally without significant physiological harm. Such shocks most commonly result from contact with objects in which electric charges were induced by the fields from the energized line. For high-voltage lines of modern design, any such shocks are minimized through grounding procedures specified in the National Electric Safety Code and the joint guidelines of the American Standards Institute (ANSI) and the American Institute of Electrical and Electronic Engineers (IEEE).

Electric and Magnetic Field Exposure

No exposure-related limits have been established by regulatory agencies with regard to human exposure to electric and magnetic fields from power lines or other common

sources. The perceivable effects of power line fields have been noted, and will always be important in the design and operation of modern power lines. The increased concern about power line fields in recent years has not been about these perceivable effects but about the potential for significant health effects in humans exposed around power lines and other sources.

As discussed in submittals from Calpine, the available evidence has not established such power system and similar fields as posing a significant health hazard to exposed humans. While such a hazard has not been established from the available evidence, staff considers it important to also note that the same evidence does not serve as proof of a definite lack of a hazard, hence the appropriateness of some reduction above levels generally achieved before the present concern about health effects. What is clear at the present is that any such health risk to an exposed individual would be small as shown by the difficulty in establishing this risk from the studies conducted so far. It is also clear that the most biologically significant type of exposure cannot be established with regard to possible health risk, calling into question the biological usefulness of any attempt at exposure reduction. These and other facts have led many scientists to conclude that only modest measures would be justified in any effort at further field strength reduction.

Before the present health-based concern, measures to reduce the field effects of power line operations were mostly aimed at the electric field component. The present health-based focus is on the magnetic field which, unlike the companion electric field, can penetrate most objects causing individuals to be exposed in buildings for long periods of time. It is the possible health effects of such long-term exposure that are at the root of the present concern. It is also important to note that the individual in a building could be exposed for short periods to much stronger fields in using some common electrical appliances and equipment. Scientists have not established which type of exposure would be more biologically meaningful in an individual. Such exposure differences are noted only to show that high-level field exposure can occur in areas other than the power line environment.

With no established health effects, most regulatory agencies believe that health-based limits would be inappropriate at the present for electric or magnetic fields from power lines or other common sources. The few states (Florida, Minnesota, Montana, New Jersey, New York and Oregon) with specific limits for power line electric fields, established these limits mainly as a guard against the electric shocks from strong electric fields. The two (Florida and New York) with additional limits on line magnetic fields, established these limits mainly to keep exposure from new lines within limits associated with existing ones. None of these limits were based on established health effects nor intended for the retrofit of existing lines.

Given the limitations in the evidence of a possible health hazard, most agencies supporting additional field reductions, believe that only modest measures would be justified in any given case. The CPUC (which regulates the installation and operation of high-voltage lines in California) requires at the present that California utilities under their jurisdiction incorporate only low-cost, no-cost electric and magnetic field-reducing

measures in the design and siting of new transmission or other high-voltage lines in the state. Utilities not within the jurisdiction of the CPUC have agreed, through their representatives to comply with these CPUC requirements.

As stated by Calpine, the proposed line will be connected to the existing lines of the Western Area Power Administration which will design the line for Calpine. The line configuration as now proposed (and shown in the new Transmission Line Safety and Nuisance Figure 1) will, through enhanced field cancellations among adjacent lines, produce electric and magnetic fields much lower than originally proposed and first evaluated by staff.

In designing a high-voltage line for a given location, the strength of the related electric and magnetic fields can be projected using procedures of established reliability. The field strength values from such procedures are usually specified in units of kilovolts per meter (kV/m) for the electric field and milligauss (mG) for the companion magnetic field. With no health-based limits on the intensity of these and other power-system fields, the environmental acceptability of fields from a given power line will have to be assessed mainly in terms of (a) the successful application of the field reduction measures specified in the guideline document applicable to the line in question and (b) effective field reduction at costs falling within limits presently considered appropriate by the CPUC for such purposes. All related measures will have to be applied in ways without significant impacts on line safety, reliability, efficiency, and maintainability. The pre-project field strength estimates can be used in any given case to assess the effectiveness of reduction measures involved or to compare the fields in question with those from lines of similar voltage and current-carrying capacity.

PROJECT SPECIFIC IMPACTS

According to information provided by Calpine (Calpine 1997) the electric fields from the line as first proposed would average about 2.8 kV/m directly underneath the line and decreased to 0.4 kV/m at the edge of the 125-ft right-of-way. These field strength values are (a) similar to fields from modern transmission lines of the same voltage class and current-carrying capacity and (b) within the estimated limits of between 1.0 kV/m and 2.0 kV/m as established for the edge of the right-of-way by the few states with the safety-based limits on line electric fields. According to existing literature, the transmission line-related nuisance shock problem is mostly associated with electric fields of 1.6 kV/m or higher thereby accounting significantly for staff's past, safety-related guideline limit of 1.6 kV/m for the rights-of-way of transmission lines certified by the California Energy Commission.

The projected strength of the electric fields from the line design as first proposed, does not point to a potential for significant shock hazards in a right-of-way in which appropriate grounding measures will be implemented. The potential for such shocks would even be lower for the lower-field design now proposed. Compliance with applicable practices should also minimize the potential for such shocks along the route of a line. As with all such lines, the applicant will be responsible in all cases for ensuring compliance with these grounding-related practices within the line right-of-way.

Since Calpine has stated their intention to comply with these grounding practices for both the initial and the present lower-field design, staff does not expect their line to pose a significant nuisance shock hazard to individuals in the area. Staff has recommended three conditions for certification (TLSN-3, TLSN-5 and TLSN-6) to (a) verify the field strengths assumed for the new, lower-field design and (b) verify implementation of the mitigative grounding measures necessary in cases of hazards from charged objects within the right-of-way.

The yearly intensity of the magnetic fields from the initial line design was estimated by Calpine to average about 144 mG directly underneath the line, 50 mG at the edge of a 100-ft right-of-way and 25 mG at the edge of a 125-ft right-of-way. These field intensities are similar at these points of measurement to those from modern lines of the same voltage and current-carrying capacity and, as noted by the Calpine, significantly below those of between 150 mG to 250 mG as established for the edge of the right-of-way for similar high-voltage lines by the two states (New York and Florida) with such limits. Since a line of a lower-field design is now proposed, the resulting line would, from a field strength stand point, be more acceptable to staff than initially proposed.

CONCLUSIONS AND RECOMMENDATIONS

The original proposal by Calpine was for a single circuit line whose fields were found acceptable by staff for a line of the proposed voltage and current-carrying capacity. Since no health effects have been reliably associated with magnetic or electric field exposure, staff does not have a public health basis for recommending one route over another for the line as proposed. The concern over crop dusting-related impacts was identified by Calpine as one of the main reasons for the route presently proposed for the line. The option for future operation as a double circuit line is the reason for the present double circuit design. Since the new design would lead to lower field strengths than initially proposed, staff finds also finds the line to be acceptable from a field strength perspective.

The transmission line as analyzed, was later modified by Calpine (Calpine 1998c) to relocate a switchyard to a new site on the south side of O'Banion Road. This modification would reduce the length of the proposed transmission line by approximately 1.7 miles. Such a reduction should improve the situation in terms of the number of individuals potentially exposed to any impacts from the line.

Another route has been identified by staff to reduce the visual impacts of the line as presently proposed by Calpine. The proposed route would proceed south from the proposed plant switchyard for approximately 0.3 miles to an unpaved road that runs west from South Township Road. The route will then turn west to an existing PG&E PG&E 500 kV transmission line. From there, the route will run parallel to the PG&E line to the switchyard proposed to be located on the south side of O'Banion Road. This would make for a 3.8 mile line instead of the 4.0 mile line presently proposed. This route will be substantially farther away from residences and public roads along South Township Road and O'Banion Road.

Given that the use of this route would make for a shorter line and increase the distance of the line from area residences, staff finds that this proposal would further reduce the number of individuals potentially exposed to any impacts from the line.

Given the necessity for measures to mitigate the safety-related effects of continuing concern, staff recommends adoption of the following conditions in the event that the project is certified by the Energy Commission.

CONDITIONS OF CERTIFICATION

TLSN-1 The project owner shall construct the proposed transmission line according to the requirements of GO-95 and Title 8, Section 2700 et seq. of the California Code of Regulations.

Verification: Thirty days before start of transmission line construction, the project owner shall submit to the Commission's Compliance Project Manager (CPM) a letter signed by a California registered electrical engineer affirming that the transmission line will be constructed according the requirements of GO-95 and Title 8, Section 2700 et seq. of the California Code of Regulations.

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, adjusting or repairing, replacing or adding antennas, antenna 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 beginning construction 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 near the right-of-way.

Verification: The project owner shall file a copy of the first set of pre-project measurements with the CPM at least 30 days before the start of construction. The post-project measurements shall be filed within 30 days after the day the line was energized.

TLSN-4 The project owner shall ensure that the transmission line right-of-way is kept free of combustible material 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 along the right-of-way, in the annual compliance report.

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

Protocol: The letter shall include 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 within the right-of-way regardless of ownership.
- A discussion of the property owner's responsibility to notify the project whenever the property owner adds or installs a metallic object which would require grounding as noted above
- 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.

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 within the right-of-way, regardless of ownership. Such objects shall include fences, gates, and other large

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

Calpine Corporation (1998a). Answers to E-Mail Questions from Paul Richens. July 22, 1998.

Calpine Corporation (1998b). Supplemental filing to Change Electric Transmission Line Route. May 11, 1998.

Calpine Sutter Project (1998c). Additional Mitigation for Calpine's Sutter Power Plant. Sptember 11, 1998

Calpine Sutter Project. Application for Certification (AFC). Submitted by Calpine Corporation, December 15, 1997

California Energy Commission Staff, 1992. High-Voltage Transmission Lines: Summary of Health Effects Studies. California Energy Commission Publication, P700-92-002.

Electric Power Research Institute (EPRI) 1982. Transmission Line Reference Book: 345 kV and Above. 625p

HAZARDOUS MATERIAL MANAGEMENT

Rick Tyler

INTRODUCTION

The purpose of this analysis is to determine if the proposed Sutter Power Plant Project (SPP) will have a significant impact on the public as a result of the handling or storage of hazardous materials used in operation of the proposed facility. The potential for impacts associated with hazardous wastes are adressed in Staff's Waste Management analysis.

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 Code of California Regulations (CCR) Title 20 section 1748.5.

Hazardous materials to be used at the facility in quantities which exceed the reportable amounts defined in section 25501(P) of the California Health and Safety Code, include the following:

- sodium hypochlorite
- sodium hydroxide
- sulfuric acid
- anhydrous ammonia
- hydrochloric acid

Other hazardous materials used in smaller quantities, such as scale inhibitors (phosphate), oxygen scavengers, biocides and chemicals for pH control, will be present at the proposed facility. However, these materials pose minimal potential for off-site impacts. Sections 2 and 8.12 of the Sutter Power Plant Application for Certification provide a description of hazardous materials to be used at the proposed facility. These sections also provide a description of how such materials will be used, the reportable quantity for each material and the maximum quantities that will be stored on site.

Of these materials, anhydrous ammonia poses the principle significant risk of off-site impacts in the event of a major accidental release. This is due to the relative toxicity of ammonia and the high internal energy of material when stored as a liquified gas. This energy acts as a driving force in an accidental release to introduce large quantities of the material to the ambient air, where it can be transported off-site. Although not stored in reportable quantities, the potential rate of release of natural gas could result in significant fires and/or explosions.

Staff believes that the use, handling and storage of anhydrous ammonia in this project poses a potential to cause significant off-site impacts. However, the potential emission rates, toxicities, and distances to receptors make it unlikely that the other materials proposed for use at the site would pose significant off-site risks.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

The following federal, state, and local laws and policies generally apply to the protection of public health and hazardous materials management. Their provisions establish part of the basis for CEC staff's determination regarding the significance and acceptability of project-related impacts on the public health due to accidental releases of hazardous materials. Staff's analysis is also the result of the need to identify and reduce, to the extent feasible, potentially significant impacts imposed by CEQA.

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 CFR 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, sections 25520 et. seq.

STATE

Section 25520 of the Health and Safety Code directs facilities storing or handling hazardous materials in reported quantities to develop a risk management plan (RMP) and submit it to appropriate local authorities and the United States Environmental Protection Agency (EPA) for review and approval. The plan must include the severity of 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 associated with the handling of the material in the past. These regulations also require the development of comprehensive safety management plans addressing the handling of hazardous materials at the facility. This new, recently developed program supersedes the old requirement for California Risk Management and Prevention Plan (RMPP).

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."

Government Code Section 65850.2 restricts the permitting of any new facility involving the handling of acutely hazardous materials within 1,000 feet of a school. This section also requires the completion of an RMP analysis.

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. Article 80 was extensively revised in the latest 1994 edition. These articles contain requirements that are generally similar to those contained in the Health and Safety Code. The Code does, however, contain unique requirements for secondary containment, monitoring, and treatment of toxic gases emitted through emergency

venting. These unique requirements are generally restricted to extremely hazardous materials.

The California Building Code contains requirements regarding the storage and handling of hazardous materials. The Building Official must inspect and verify compliance with these requirements prior issuance of occupancy permit. A further discussion of these requirements is provided in staff's Facility Design section.

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,
- special location considerations,
- 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 SPP, Application For Certification (AFC) (SPP 1997). This data indicates that low wind speeds below 3 knots and temperatures exceeding 100^{o}F are common for the project area (see Figures 8.1-2 through 6, SPP AFC). Therefore, staff suggested that the applicant use F stability (stagnated air, very little mixing), 1 meter/second wind speed and an ambient temperature of 100^{o}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 anhydrous ammonia release.

Terrain Characteristics

The location of elevated terrain (terrain above the power plant stack 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. There is no elevated terrain in close proximity to the project site.

Special Location Considerations

The project is located on a site surrounded by farm land. This land is sparsely populated. It also frequently requires crop dusting by aircraft. This activity increases the risk of an accidental release by a small amount as a result of a crash involving the ammonia storage facility at the site.

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 8.12 on page 8.12-2 of the AFC is a diagram showing the locations of both population and sensitive receptors in the project vicinity.

IMPACTS

CEC staff has identified two potentially significant hazardous materials impacts associated with the proposed project:

- accidental toxic gas releases of anhydrous ammonia,
- fire and/or explosion from the use of natural gas.

ANHYDROUS AMMONIA

Anhydrous ammonia is proposed for use 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. This is the result of its storage as a liquified gas at elevated pressure. Accidental release of anhydrous ammonia can result in denser than air plumes as a result of auto refrigeration of the ammonia aerosol. Most actual releases have involved this phenomenon. The modeling done for this project to assess the consequences of an accidental release reflect both formation of a denser than air plume and pessimistic meteorological conditions.

Staff typically evaluates where four "bench mark" exposure levels of ammonia gas occur off-site to assess the potential impacts associated with an accidental release of ammonia. 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 RMP level 1 criterion used by EPA and California which is 200 ppm (the ERPG-2), and 4) the level considered by the Energy Commission staff to be without risk of serious adverse effects on the public of 75 ppm (based on non-repetitive one time exposure from unanticipated accidental release). 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.

In their response to staff Data Request No. 20, (Calpine 1998f) Calpine has performed a worst case analysis of a release of ammonia from a storage tank assuming a rupture resulting in a 5-inch diameter hole in the tank (scenario A). They also assumed that winds of 1 meter per second and category F stability would exist at the time of the accidental release. This screening analysis was designed to predict impacts based on distance from the storage tank without regard to specific direction of transport. HAZMAT Figure 1 shows the results of this modeling, which indicate the potential for significant impacts in the event of such a release. This modeling indicates that a worst case release could result in lethal ammonia concentrations at the nearest 5 residences. It also indicates that the IDLH level would be exceeded at 6 more residences. However, such impacts could only realistically occur if the worst case release occurred concurrently with worst case meteorological conditions. In addition, the wind direction would have to be in the direction of an affected residence. Under these pessimistic conditions, no more than 3 residences would be potentially exposed to concentrations exceeding 2,000 PPM or the IDLH level by a single event.

To better understand the potential for impacts, staff requested that Calpine analyze the probability of such an occurrence. The final results of this analysis were provided in the Calpine's response to staff Data Request No. 60 (Calpine 1998f). This analysis reflects the guidance provided by staff at the March 25, 1998 data response workshop. Staff recommended that Calpine's response include an evaluation of the probability of occurrence of such impacts. Calpine's analysis indicated that the risk would be less than one in one million. Staff concurs with the methods and assumptions used to conduct these analyses and concludes that the likelihood of occurrence of such an event is extremely low.

An additional concern raised by local residents is the potential hazard posed by frequent crop dusting of the fields adjacent to the facility. This activity poses an external hazard to the ammonia storage facility. In their April 15, 1998 responses to comments received at the March 25, 1998 workshop, Calpine provided an analysis of this hazard which indicates that this activity does not significantly increase the risk of an accidental ammonia release. The analysis provided considered the frequency of crashes, the amount of time that flights would occur near the facility, and the probability that the aircraft would crash at the tank location. It did not address the infrequent occurrence of unfavorable meteorological conditions which would further reduce the risk.

While the risk of a tank rupture is estimated to be extremely low, the Sutter County Fire Department believes that the quantity of material at the site and its location will require the Department to develop additional services to ensure effective response in the event of such an accidental release at the facility to reduce the potential consequences of any release. The Department has determined that both equipment and additional personnel will be required. Calpine is currently working with the Department to specify the extent of needs and the mechanisms to fund these needs. At present the extent of support and funding are not fully quantified. Staff believes that the Fire Departments requirements are both reasonable and prudent. Based on information provided by Calpine regarding this matter, staff believes that the Department's needs will be provided through tax revenues, special assessments or through an agreement between Calpine and the County. A discussion of the revenues that will be provided to the Sutter County Fire Department as a result of the project are described in the **Socioeconomics** section.

To ensure that the Department receives the additional support required to effectively respond to an accident at the proposed facility, staff has proposed a condition requiring verification of adequate resources prior to delivery of anhydrous ammonia to the facility. It should be noted that the additional facilities required for the SPP will significantly improve the Department's response to the outlying area where the project is located. It is staff's belief that this will further reduce the potential for impacts associated with public exposure to anhydrous ammonia in the unlikely event of a release. By reducing the response time to an accidental release at the facility and to other types of emergency events this mitigation will reduce the risk to local residents.

NATURAL GAS

Natural gas, which will be used as a fuel for the SPP, 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) 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 the Heat Recovery Steam Generators (HRSG). Additionally, start-up procedures will require air purging of fire boxes prior to start-up to preclude the presence of an explosive mixture.

It is staff's belief that these mitigation measures, as proposed by Calpine, will reduce to insignificant levels the potential for impacts associated with the use of natural gas.

CUMULATIVE IMPACTS

The proposed facility is the only facility in the immediate area which poses risk of impacts on the surrounding public from accidental release of hazardous materials.

Therefore, cumulative impacts will not be associated with the use of hazardous materials by the Calpine project.

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, closure has no bearing on the responsibility to continue handling such materials in a safe manner, as required by applicable laws.

MITIGATION

The typical methods used for mitigating accidental releases of hazardous materials are as follows:

- use of non-hazardous or less hazardous materials,
- use of engineered controls,
- use of administrative controls, and
- emergency response planning.

While staff does not believe that the risk of a tank rupture occurring at the proposed facility is significant, the storage of anhydrous ammonia does pose some small risk of adverse impact on public health in the event of a major release. If one believes that this risk is unacceptable, the use of aqueous ammonia (a less hazardous form of the material) would significantly reduce that risk. Staff has not recommended the use of this material in this case because of the long distance to the nearest receptors and the very low probability of such an event. Also, the proposed facility will be subject to the most stringent requirements of the new federal and state RMP program, which will include implementation of detailed engineering, administrative controls and emergency response planning. Otherwise, the proposed project reflects use of these methods to the extent feasible. These mitigation measures are reflected in both Calpine's proposed design and in staff's conditions of certification.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSION

Staff's evaluation of hazardous materials proposed for use in the project indicates that they pose minimal risk of potential for significant impacts on the public. While a catastrophic failure of the ammonia storage tank would result in the potential to cause serious exposures, staff has concluded the probability of such an occurrence is too small to be considered plausible. Staff has, however, proposed conditions of certification to minimize the impacts of such a release, if it occurs. The conditions will ensure that the project will be constructed and operated in accordance with applicable LORS and that the controls and requirements that are proposed in the AFC are implemented.

Staff has reviewed the applicants proposed additional mitigation package and determined that the proposed changes will not effect our findings regarding the hazardous materials management analysis.

With adoption of the proposed conditions of certification, the proposed project will comply with all applicable LORS. In response to Health and Safety Code sections 25520 et. seq., Calpine will be required to submit a Business Plan and RMP to the Sutter County Fire Department. The Environmental Protection Agency, the Sutter County Fire Department and the CEC staff will evaluate the RMP, including the hazardous materials storage and handling systems and the risk assessment provided by Calpine and indicate whether they are satisfied with the proposed facilities. To insure adequacy of the Business Plan and RMP, Energy Commission staff has required that the plan be submitted for concurrent Energy Commission staff review and that confirmation of the Sutter County Fire Department's approval also be submitted prior to delivery of any hazardous materials to the facility.

With adoption of Energy Commission staff's proposed conditions the proposed facility will 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.

There are no schools located closer than 1,000 feet to the proposed facility (see AFC Figure 4.6-1). Therefore, the facility will comply with section 65850.2 of the California Government Code.

RECOMMENDATION

If the Commission certifies the project, staff recommends that proposed conditions of certification presented herein be adopted by the Commission to ensure that the project is designed, constructed and operated to comply with applicable LORS and protect the public from a significant 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 Code Of Federal Regulations, Part 40, Subpart F, Section 68.130, that is not listed in Tables 5.8-4 and 5.8-5 of the AFC, unless approved in advance by the California Energy Commission's Compliance Project Manager (CPM).

Verification: The project owner shall provide, 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 the Sutter County Fire Department and the Energy Commission 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 Sutter County Fire Department and CPM in the final document. A copy of the final plans, reflecting all comments, shall be provided to the Sutter County Fire Department and the CPM once approved by EPA and Cal OSHA.

Verification: At least sixty (60) days prior to the delivery of anhydrous ammonia to the facility, the project owner shall provide the final approved plans listed above to the CPM.

HAZ-3 The project owner shall provide a letter from the Sutter County Fire Department indicating that adequate funding for fire protection resources has been identified and that such funding will be available to the Department as needed to ensure adequate emergency response capability.

Verification: At least 30 days prior to delivery of anhydrous ammonia to the facility, the project owner shall provide a copy of the letter described above from the Sutter County Fire Department.

REFERENCES

AIChE (American Institute of Chemical Engineers). 1989. Guidelines For Technical Management of Chemical Process Safety, AIChE, New York, NY 10017.

API (American Petroleum Institute). 1990. Management of Process Hazards, API Recommended Practice 750, American Petroleum Institute, First Edition, Washington, DC, 199

Baumeister, T. and L.E. Marks. 1967. Standard Handbook for Mechanical Engineers, McGraw-Hill, New York, NY. (Tables 24 and 43).

Calabrese, E.J. 1978. Pollutants and High Risk Groups. John Wiley and Sons, New York.

EPA (Environmental Protection Agency). 1987. Technical Guidance for Hazards Analysis, Environmental Protection Agency, Washington, DC, 1987.

EPA (Environmental Protection Agency). 1988. Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Environmental Protection Agency, Research Triangle Park, NC, 1988.

FEMA (Federal Emergency Management Agency). 1989. Handbook of Chemical Hazard Analysis Procedures, Federal Emergency Management Agency, Washington, DC, 1989.

Lees, F.P. 1983. Loss Prevention in the Process Industries Vols. I and II. Butterworths.

NFPA (National Fire Protection Association). 1987. NFPA 85A, Prevention of Furnace Explosions in Fuel Oil and Natural Gas Fired Single Burner Boiler Furnaces, National Fire Protection Association, Batterymarch Park, Quincy, MA, 1987.

NRC (National Research Council). 1979. Ammonia. Subcommittee on Ammonia. Committee on Medical and Biologic Effects of Environmental Pollutants. Division of Medical Sciences, Assembly of Life Sciences, National Research Council (NRC), Baltimore, Maryland, University Park Press (NTIS No. PB 278-027).

Perry. 1973. Perry's Chemical Engineers' Handbook, Sixth Edition, McGraw-Hill, USA.

SPP (Sutter Power Project). 1997a. Application for Certification, Sutter Power Project, submitted by Calpine Corporation on December 15, 1997.USOSHA (United States Occupational Safety and Health Administration). 1993. Process Safety Management / Process Safety Management Guidelines For Compliance. US Department of Labor, Washington, DC.

APPENDIX A

Basis For 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 design changes or other major changes to a proposed facility. The preface to the Emergincy Responce Planning Guidlines (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 adult healthy 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 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.

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 impair 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 suggest 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, Switerland.

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 Guidlines
IDLH, Immediately Dangerous to Life and Health Level
NIOSH, National Institute of Occupational Health and Safety
NRC, National Research Council
STEL, Short Term Exposure Limit
STPEL, Short Term Public Emergency Limit
TLV, Threshold Limit Value
WHO, World Health Organization

WASTE MANAGEMENT

Testimony of Michael Ringer

INTRODUCTION

This analysis presents an assessment of issues associated with managing wastes generated from constructing and operating Calpine Corporation's (Calpine) Sutter Power Plant (SPP) Project. It evaluates Calpine's 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 navigable waters. Such wastewaters are discussed in the **Soil and Water Resources** section of this document.

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

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

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

FEDERAL

Resource Conservation and Recovery Act (42 U.S.C. §6901 et seq.)

The Act, known as RCRA, sets forth standards for the management of hazardous solid wastes. The provisions of RCRA may be administered in each state by the U.S. Environmental Protection Agency (EPA). However, the law allows EPA to delegate the administration of RCRA to the various states. When a state receives final EPA authorization, its regulations have the force and effect of federal law. EPA grants final authorization when a state program is shown to be equivalent to the federal requirements. The Department of Toxic Substances Control in California received final authorization on August 1, 1992.

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.

The Resource Conservation and Recovery Act also establishes requirements applicable to hazardous waste transporters, including record keeping, compliance with the manifest system, and transportation only to permitted facilities.

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 (GENERAL BACKGROUND LORS)

Public Resources Code section 40000 et seq. (California Integrated Waste Management Act of 1989)

These sections, comprising Division 30 of the Public Resources Code, regulate solid waste management in California and created the California Integrated Waste Management Board. The Board is required to adopt and revise minimum standards for solid waste handling and disposal, including design, operation, maintenance and ultimate reuse of solid waste processing or disposal facilities.

California Water Code section 13000 et seq. (Porter-Cologne Water Quality Control Act)

This law regulates the discharge of wastes which could affect water quality and is designed to protect surface and groundwaters of the state against contamination and loss of beneficial use. The Act requires the State Water Resources Control Board to classify wastes according to the risk of impairing water quality and the types of disposal sites according to the level of protection provided for water quality. Regional boards issue waste discharge requirements addressing the nature and limiting the release of any wastes which could degrade waters of the state.

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.

STATE (PROJECT SPECIFIC LORS)

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 22, California Code of Regulations, section 66262.10 et seq. (Generator Standards)

These sections establish requirements for generators of hazardous waste. Under these sections, waste generators must determine if their wastes are hazardous according to either specified characteristics or lists of 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, hazardous waste must only be handled by registered hazardous waste transporters. Generator requirements for record keeping, reporting, packaging, and labeling are also established.

LOCAL

There are no additional local LORS to be considered.

SETTING

PROJECT AND SITE DESCRIPTION

The SPP project consists of a nominal 500 megawatt natural gas-fired combined cycle generating facility, approximately 5.7 miles of new 230 kV line, and 12 miles of new 16 inch natural gas pipeline. The proposed location is on 12 acres of vacant land (formerly farmland) within a 77 acre parcel and would be adjacent to Greenleaf 1, an existing 49.5 MW Calpine cogeneration plant.

A Phase I environmental site assessment (ESA) was performed for the Greenleaf Unit 1 power plant in April 1995 (Calpine 1997, Appendix 8.13A). In August 1997, an incremental site assessment was performed to bring the 1995 ESA up to date and assess environmental conditions for the location of the proposed project (Calpine 1997, Appendix 8.13B). The Phase I ESA for the Greenleaf site found no evidence of environmental contamination, however certain site conditions and practices were found which had the potential to cause the release of chemicals to the environment. The incremental ESA found that all conditions and practices of concern in the earlier ESA had been corrected with the exception of transformers which had no secondary containment. It was noted, however, that there was no indication of leaks or spills at the transformer location. Based on an interview with the site manager and a visual inspection, no conditions of environmental concern were discovered during the incremental ESA at the proposed site.

IMPACTS

PROJECT SPECIFIC IMPACTS

Construction

Project construction will generate both hazardous and nonhazardous wastes. Nonhazardous wastes include excess lumber and concrete, scrap metal, insulation, and empty chemical containers. Calpine estimates that about 100 tons of paper, wood, glass, and plastics will be generated from these waste types during the course of project construction (Calpine 1997, p. 8.13-3). Those wastes which cannot be recycled will be disposed of on a weekly basis at a Class III (nonhazardous) landfill (Id.). About 70 tons of excess concrete will be generated during construction which will be disposed of on a weekly basis at a Class III landfill or at clean fill sites (Id.). Metal wastes will include steel from welding and cutting operations, packing materials, and empty chemical containers. Aluminum waste will be generated from packing materials and electrical wiring. Calpine expects that approximately 25 tons of metal waste will be generated during construction. Metal which cannot be reclaimed will go to a Class III landfill (Id.).

Hazardous wastes which may be generated during construction include waste oil and grease, paint, spent solvent, welding materials, and cleanup materials from spills of hazardous substances. Hazardous flushing, cleaning, and passivating solutions from pre-operational chemical cleaning and treatment of the heat recovery steam generator boiler and pre-boiler systems will also be generated. Chemical wastes from cleaning the boiler prior to start-up will be temporarily stored on-site in portable tanks and transported off-site prior to treatment or disposal (Calpine 1997, p. 8.13-11). The quantities of other hazardous wastes will be minor and temporarily stored on-site (less than 90 days) at designated locations in approved containers prior to being transported to licensed treatment, recycling, or disposal facilities.

Operation

Under normal operating conditions, the proposed facility is expected to generate both nonhazardous and hazardous wastes.

Nonhazardous wastes from operations will include trash, office wastes, empty containers, broken or used parts, used packing material, and used filters. Calpine has estimated the quantity of such wastes to be about 80 cubic yards annually (Calpine 1998, response to CURE data request 151), with some of the material being recyclable. This waste will be collected in dumpsters on-site and picked up by Yuba Sutter Disposal, Inc. where it will be taken to their integrated waste recovery facility for removal of recyclables. Residues will be deposited in the Ostrom Road sanitary landfill (Calpine 1997, p. 8.13-10).

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

The heat recovery steam generator may require cleaning every three to five years, a process which generates acid and alkaline chemical cleaning waste solutions and flushing waters. This waste may be classified as hazardous due to dissolved metals, and will be collected, transported off-site, treated, and disposed of in compliance with regulatory requirements (Calpine 1997, p. 8.13-11).

The oxidation catalyst, used for CO emissions control, and the selective catalytic reduction catalyst, used for NOx emissions control, must be replaced as they become contaminated, typically after several years' service. Classified as hazardous due to heavy metals content, the spent catalysts will be sent back to the manufacturer for recycling if possible, or disposed of at a Class I (hazardous) landfill (Calpine 1997, p. 8.13-11).

Waste lubricating oil which will be generated will be removed by a licensed waste oil recycling contractor for recycling (Calpine 1997, p. 8.13-11).

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

Waste from the project will ultimately go to the landfill which has the least expensive tipping fee in combination with the cost of transportation. It is likely that nonhazardous waste will be collected by Yuba Sutter Disposal Inc. where it would be taken to their integrated waste recovery facility for recovery of recyclables followed by disposal at the Ostrom Road sanitary landfill (Calpine 1997, p. 8.13-8). That landfill is currently operating at about 600 tons per day with a permitted capacity of 1000 tons per day

and a remaining life of 45 years. Even discounting the effects of recycling on the total amount of non-hazardous wastes destined for landfilling, the amount of such waste generated during project construction and operation is less than one percent of existing disposal capacity, and would not significantly impact the landfill's capacity or operating life.

Three Class I landfills in California are permitted to accept hazardous waste:

- Chemical Waste Management's Kettleman Hills facility (Kings County). There is approximately eight million tons of remaining capacity which is operational and an additional four million tons of capacity which has been permitted but not yet constructed (Yarborough 1998, pers. comm.). The expected remaining life is 48 years.

- Laidlaw Environmental Service's Lokern facility in Buttonwillow (Kern County). Remaining capacity is approximately 17 million tons with a lifetime of about 30 years (Nielson 1998, pers. comm.)

- Laidlaw Environmental Service's facility in Westmoreland (Imperial County). The estimated remaining capacity is four million tons with a life expectancy of about 50 years (Yadvish 1998, pers. comm.).

Much of the hazardous waste generated during facility construction and operation will be recycled, such as used oil and spent catalysts. Even without recycling, the generation of hazardous waste from this type of facility is relatively minor and thus would not significantly impact the capacity of any of the Class I landfills in California.

CUMULATIVE IMPACTS

Due to the minor amounts of wastes generated during project construction and operation, the insignificant impacts on individual disposal facilities, and the availability of additional regional landfills, cumulative impacts will be insignificant for both hazardous and nonhazardous wastes.

FACILITY CLOSURE

During either temporary or permanent facility closure, the major concern is that wastes (both hazardous and nonhazardous) not pose any potentially significant problem to the public, workers, or the environment. During temporary closure (periods greater than those required for normal maintenance), of relatively short duration, waste management practices normally required by LORS and already in-place would likely be adequate to avoid significant problems. During temporary closures exceeding 90 days, all hazardous wastes must be removed from the facility to remain in compliance with LORS limiting on-site storage to less than 90 days. Depending on the length of the temporary shutdown, Calpine proposes implementing a contingency plan which could include draining all chemicals from storage tanks and other equipment, and the disposal of all wastes in accordance with applicable LORS (Calpine 1997, p. 4-1).

For permanent closure, Calpine will develop a decommissioning plan which will include draining equipment of chemicals, collecting and disposing of nonhazardous wastes in appropriate landfills or waste collection facilities, and disposing of hazardous wastes in accordance with all applicable LORS (Calpine 1997, p. 4-2).

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

Energy Commission staff concludes that Calpine will be able to comply with all applicable LORS regulating the management of hazardous and non-hazardous wastes during project construction and operation. Calpine is required to dispose of hazardous and non-hazardous wastes at facilities approved by the Central Valley Regional Water Quality Control Board or the CAL EPA - Department of Toxic Substances Control. Because hazardous wastes will be produced during project construction and operation, Calpine must acquire and maintain an EPA identification number as a hazardous waste generator. Accordingly, Calpine will be required to properly store, package and label waste, use only approved transporters, prepare hazardous waste manifests, and keep detailed records. Calpine may also be required, pursuant to California Code of Regulations, title 22, section 67100.1 et seq., to undertake a hazardous waste source reduction and management review, depending on the amounts of hazardous waste ultimately generated.

MITIGATION

Calpine intends to implement the following mitigation measures during construction and operation of the proposed cogeneration project:

- Hazardous wastes will not be stored on-site for periods longer than 90 days (Calpine 1997, p. 8.13-11).

- Hazardous wastes will be stored in segregated storage areas that are surrounded by berms to contain leaks and spills and sized to hold the contents of the single largest container (Calpine 1997, p. 8.13-11).

- Hazardous wastes will be collected by a licensed hazardous waste hauler using a manifest and managed only at authorized facilities (Calpine 1997, p. 8.13-11).

- Non hazardous materials will be used instead of hazardous materials and wastes will be recycled whenever possible (Calpine 1997, p. 8.13-11).

- Waste lubricating oil will be recovered and recycled by a waste oil recycling contractor and spent SCR catalysts will be recycled by the supplier if possible (Calpine 1997, p. 8.13-11).

In addition to the above mitigation measures, Calpine has proposed additional environmental mitigation in a letter to Paul Richins of staff dated September 11, 1998. Additional information concerning the mitigation was submitted by Calpine in an AFC

Mitigation Program Supplement (Calpine 1998a). Additional mitigation proposed by Calpine includes eliminating the wet cooling tower and achieving a zero process effluent discharge project. These measures will result in the generation of additional waste streams associated with wastewater treatment. Sludge from the treatment of process wastewater (from the oil/water separator, filter backwash, heat recovery steam generator blowdown, sanitary waste treatment, and evaporative cooler blowdown) will accumulate in the treatment basin and must be removed every two to three years and taken offsite for disposal. Water purification processes which provide makeup water for the steam cycle and subsequent volume reduction of reject water will result in a concentrated brine which must be managed. Calpine has proposed three options for brine handling: an evaporation pond, off-site disposal as liquid, and crystallization and off-site disposal of dry salt (Calpine 1998a, p. 3). If an evaporation pond is used, accumulated salt from precipitation will be removed every three to ten years and taken off-site for disposal. If liquid brine is to be taken off-site, a wastewater disposal contractor will transport the brine for disposal at a licensed treatment facility. If a crystallizer is used, a dry salt will be generated at the rate of from 0.5 to 2 tons per day for off-site disposal. All of the wastes from the above processes are expected to be nonhazardous and will be periodically tested. Staff has examined the above mitigation measures proposed by Calpine 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 wastes. However, staff recommends to the committee that prior to certification, Calpine identify the specific mitigation measure which will be used to manage project related wastewaters.

CONCLUSIONS AND RECOMMENDATIONS

Energy Commission staff concludes that management of the wastes generated during construction and operation of the SPP project will not result in any significant adverse impacts if Calpine implements the mitigation measures proposed in the Application for Certification (97-AFC-2) and the proposed conditions of certification specified below. Staff recommends to the committee that prior to certification, Calpine identify the specific mitigation measure which will be used to manage project related wastewaters.

CONDITIONS OF CERTIFICATION

WASTE-1 The project owner shall obtain a hazardous waste generator identification number and hazardous waste treatment permits for neutralization facilities and oil-water separator(s) from the Department of Toxic Substances Control prior to generating any hazardous waste.

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

WASTE-2 The project owner shall notify the CPM of any waste management-related enforcement action taken or proposed to be

taken against it, or against any waste hauler or disposal facility or treatment operator that the owner contracts with.

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 Sutter County Community Services Department and the CPM 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 Sutter County Community Services Department and 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 how actual waste management methods compared to planned management methods during the year.

REFERENCES

Calpine. 1997. Calpine Corporation. Application for Certification for Sutter Power Plant Project (97-AFC-2). Submitted to California Energy Commission, December 15.

Calpine, 1998. Calpine Corporation. Response to CURE Data Requests dated May 18, 1998. Submitted to California Energy Commission July 8.

Calpine, 1998a. Calpine Corporation. Calpine Sutter Power Plant, AFC Mitigation Program Supplement, October 1998.

Nielson, D. 1998. Telephone conversation with Mike Ringer (California Energy Commission), February 4.

Yadvish, A. 1998. Telephone conversation with Mike Ringer (California Energy Commission), February 4.

Yarborough, T. 1998. Telephone conversation with Mike Ringer (California Energy Commission), February 4.

LAND USE

Testimony of Amanda Stennick

INTRODUCTION

This assessment of land use impacts for the Sutter Power Project (SPP) focuses on two main issues: the conformity of the project with local land use plans, ordinances and policies; and the potential of the proposed project to have direct, indirect, and cumulative land use conflicts with existing and planned uses. In addition to the power plant, the project includes a zone change from AG to M-2 PD (General Industrial Combining Planned Development District) and a general plan amendment from Agriculture 80-acre minimum to Industrial. In general, an electric generation project and its related facilities can be incompatible with existing or planned land uses when it creates unmitigated noise, odor, dust, public health hazard or nuisance, traffic, or visual impacts or when it significantly restricts existing or future uses.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

COUNCIL ON ENVIRONMENTAL QUALITY MEMORANDUM

The President's Council on Environmental Quality (CEQ) in the late 1970s recognized that continued land development was causing a loss of prime or unique farmlands (CEQ 1980). In a memorandum, the CEQ cautioned federal agencies to take into account the potential for impact on these lands when preparing and reviewing environmental impact statements.

WARREN ALQUIST ACT

Under Public Resources Code Section 25500, the Commission has jurisdiction over the proposed power plant and all related facilities. The issuance of a "certificate" (or license) by the Commission is "in lieu" of any state or local permit, and supersedes "any applicable statute, ordinance, or regulation of any state, local, or regional agency." However, the Commission must make findings concerning whether the proposed project conforms with state and local laws and ordinances, including land use plans and zoning ordinances. The project cannot be licensed unless the Commission finds that the project conforms with state and local laws and ordinances, unless the Commission finds instead that "such facility is required for public convenience and necessity and that there are not more prudent and feasible means of achieving such public convenience and necessity." (Public Resources Code, § 25525.)

SUTTER COUNTY GENERAL PLAN

The general plan is the legal document that acts as a constitution for land use and development in Sutter County. It consists of the seven mandatory elements: land use, transportation and circulation, open space, conservation, housing, safety, seismic safety (Sutter County 1996a). In 1993, Sutter County initiated a comprehensive update of its general plan. The resulting revised and updated general plan was

adopted on November 25, 1996. The following provisions of the Sutter County General Plan are specific to the proposed project.

Land Use Designations

Industrial (IND)

The IND designation on the general plan land use map is intended to accommodate industrial type uses. Typical uses include: manufacturing, assembling, processing, fabricating, bulk handling of products, storage, warehousing, heavy trucking, refining, repairing, packaging or treatment of goods. Light and heavy industries would conduct their operations in designated areas and minimize the external effect of traffic congestion, noise, glare, air pollution, fire and safety hazards on adjoining districts.

Findings, Goals, Policies

Agricultural Land

Finding

1k. Urbanization and other land conversion often results in conflicts between agricultural and non-agricultural land uses.

Goal

1f. To minimize conflicts between agricultural and non-agricultural land uses.

Policies

1.F-1 The county shall require that new development adjacent to agricultural lands be designed to minimize conflicts with adjacent agricultural uses.

1.F-2 The county shall require that all lands set aside or utilized for mitigation of development in Sutter County demonstrate that its creation and existence will not adversely impact existing and/or future planned agriculture or urban development.

1.F-3 The county shall continue to implement its Right to Farm Ordinance (Agricultural Operations Disclosure, Ordinance Code 1013, Chapter 1330 or its successor).

1.F-4 The county shall protect agricultural operations from conflicts with non-agricultural uses by requiring buffers between proposed non-agricultural uses and adjacent agricultural operations.

Protection and Enhancement of Agricultural Resources

Findings

6a. Between 1987 and 1992, the number of farms and acres of farmlands in Sutter County decreased, while the total value of farm products increased. However, the amount of developed land remains below 4 percent of the total county land area.

6b. Prime agricultural lands and lands of statewide significance total 275,998 acres or roughly 71% of the total area of Sutter County.

6d. Urbanization often results in conflicts between agricultural and non-agricultural land uses.

Goal

6.A To preserve high quality agricultural land for agricultural purposes.

Policies

6.A-1 The county shall preserve agriculturally-designated areas for agricultural uses and direct non-agricultural development to areas designated for urban/suburban growth, or rural communities and/or cities.

6.A-2 The county shall balance the needs of proposed urban and suburban development with the need to preserve agricultural lands.

Commercial and Industrial Land

Finding

1h. The designation of areas for commercial and industrial development in a variety of locations is necessary in order to provide adequate opportunities for new non-residential development.

Goal

1.D To designate adequate commercial and industrial land to provide convenient and valuable business areas and employment opportunities within Sutter County.

Policies

1.D-1 The county shall designate specific areas suitable for commercial and industrial development and reserve such lands in a range of parcel sizes to accommodate a variety of commercial and industrial uses.

1.D-2 The county will discourage strip development, particularly along the Highway 20 corridor between the City of Yuba City and the east side of the Industrial area located southwest of the Community of Sutter. County actions will support retention of an agricultural atmosphere between Township Road and the Industrial area southwest of the Community of Sutter.

Industrial Buffers

Findings

1i. In order to create an atmosphere where industrial development can thrive, industrial areas must be protected from encroachment by potentially incompatible land uses.

1j. Buffers can be utilized in conjunction with other strategies to reduce land use conflicts and protect the integrity of the county's industrially designated areas.

Goal

1E. To reduce the potential for conflicts between industrial land uses and surrounding uses which are sensitive to the impacts of industrial development.

Policies

1.E-1 New development that may be incompatible with adjacent uses shall be required to provide buffer zones consistent with county standards to reduce anticipated conflicts with existing and future land uses.

1.E-3 The county encourages industrial uses to be developed in contiguous or generally consolidated areas to reduce the potential for conflicts with surrounding uses.

SUTTER COUNTY ZONING CODE

The Sutter County Zoning Ordinance was adopted in January, 1998. The ordinance implements the Sutter County General Plan by applying development standards and construction requirements on land as it is developed within the unincorporated areas of the county. It regulates such items as building height, property line setbacks, parking spaces, landscaping, and land use (Sutter County 1998). The following divisions of the Sutter County Zoning Ordinance apply to the project:

General Industrial District (M-2)

The purpose of the M-2 zoning district (§§ 1500-4910 through 1500-4914) is to provide for a full range of industrial, manufacturing and related uses to expand the economic base, employment opportunities and provide for the general welfare. Due to potential

high intensity operational characteristics and features, this district should be located away from residential neighborhoods and other potentially sensitive uses.

Combining Planned Development District (PD)

The PD district (§§1500-6310 through 1500-6336) is designed to be combined with other zone districts, and through the adoption of a development plan, can provide specific additional uses and/or requirements. The purpose of the PD district is:

(a) To encourage creative and more efficient approaches to the use of land through lot design, use of open space, mixture of open space, mixture of land usage and/or densities, adjustments of setbacks or other means to create a better environment; or

(b) To allow development whose type or design require special consideration in order to assure compatibility with adjacent land use.

General Provisions and Exceptions

Communication equipment buildings, substations, generation plants, and transmission lines shall require a use permit (§1500-8011).

Standards in §1500-8022 pertaining to fences (c) (1), (c) (4) also apply.

Parking and Loading Requirements

The purpose of §§1500-8110 through 1500-8118 is to:

1) Provide off-street parking and loading spaces for all land uses.
2) Promote vehicular and pedestrian safety.
3) Reduce street congestion and traffic hazards.
4) Provide and maintain safe and well designed off-street parking facilities.

Sutter County Use Permit # 1392

On February 5, 1986, Sutter County approved Use Permit #1392 to allow Greenleaf Power Corporation to construct and operate an electrical generation plant and cogeneration use of waste heat for drying wood chips and/or heating irrigation water on the 77-acre parcel. When this use permit was approved in 1986, it was the second time the Sutter County Planning Commission had considered the project. The facility was originally approved at a smaller size in 1984 (Use Permit #1207) based on findings that "[t]he project [was] consistent with the General Plan by allowing full development of a natural resource located in the County." At that time, Sutter County stated that the agricultural zoning designation of the plant site and pipeline route was not expected to change in the foreseeable future because of the county's commitment to preserve agricultural uses and discourage urban development within agricultural areas. The environmental documentation provided by Greenleaf Power Corporation

stated that 5.8 acres would be developed and non plant-related facilities were expected to remain in agricultural use (Greenleaf 1984).

Colusa County Use Permits

The criteria of Colusa County's use permit apply to the natural gas dehydrator and that portion of the pipeline within Colusa County, and the county's grading permit criteria apply to projects of five acres or more (Colusa County Code Chapter 9, Ordinance No. 414 - Land Grading and Leveling).

SETTING

The SPP site is located at the southwest corner of South Township and Best Roads on a 77-acre parcel (APN 21-230-25), about seven miles southwest of Yuba City. Current uses on the parcel consist of Greenleaf 1, a 49.5 MW Calpine cogeneration plant, ancillary storage and office buildings, wetlands, grasslands, borrow pits, abandoned mosquito abatement trenches, and a six-foot wide canal on the south side of the property. The parcel was used to farm rice until 1986 when the Greenleaf facility was constructed. The parcel has not been farmed since 1986 (Calpine 1997).

Agriculture is the predominant land use in the SPP area. The SPP parcel is surrounded by other large agriculture parcels consisting of orchards, rice, and field crops. The Sutter Bypass of the Feather River, which includes a National Wildlife Refuge, is located about one mile west of the parcel. The nearest residence is located about 2,000 feet to the northeast along South Township Road. There are a total of 84 residences within two miles of the SPP site (Calpine 1997).

The parcel is situated in an area designated by the California Department of Conservation as Farmland of Statewide Importance. This designation is considered to be land with a good combination of physical and chemical features for the production of agricultural crops (Calpine 1997). Because the exact location of the transmission line has not yet been determined, the proposed line may traverse land designated by the California Department of Conservation as Prime Farmland and Farmland of Statewide Importance. These designations are considered to be lands with the best combination of physical and chemical features for the production of agricultural crops, and lands with a good combination of physical and chemical features for the production of agricultural crops, respectively. Analysis of the transmission line on prime agricultural lands and farming practices indicates no significant impact. Please refer to the discussion on **Proposed Transmission Line Route** under the **IMPACTS** section, below.

REGIONAL DESCRIPTION

Sutter County encompasses an area of approximately 607 square miles. The 1992 Census of Agriculture classifies about 82 percent of the county's acreage as being in farms. This is the third highest percentage of land area of all counties in the state.

Rural communities in the county include Sutter, Robbins, Rio Oso, Nicolaus, Meridian, and East Nicolaus; the incorporated cities include Yuba City and Live Oak.

The county expects most growth to occur in the unincorporated southern portion of the county, known as the South Sutter County Industrial/Commercial Reserve (SSCI/C), and the area south of the Sutter Buttes, also known as the Sutter Buttes Industrial Area (Sutter County 1996b). The SSCI/C is an Industrial-Commercial Reserve that allows for 10,500 acres of industrial and commercial development in south Sutter County. Sutter County has determined that large scale industrial and commercial development in South Sutter County is appropriate because of the area's proximity to major transportation corridors (Sutter 1996b). The Sutter Buttes Industrial Area consists of about 350 acres, and is located about six miles west of Yuba City on the north side of Highway 20, and about one mile south of the unincorporated area of Sutter.

CURRENT GENERAL PLAN DESIGNATION AND ZONING

The SPP parcel is currently designated AG-80 on the Sutter County General Plan Land Use Diagram. The Sutter County General Plan defines AG-80 as follows:

> This designation identifies land for the production of food and fiber, including areas of prime agricultural soils, and other productive and potentially lands where commercial agricultural uses can exist without creating conflicts with other land uses, or where potential conflicts can be mitigated. Lands designated AG-80 typically have soils with characteristics that are particularly suited for field crops, row crops, and range lands as defined or described in the County's Soil Survey. Typical land uses allowed include: crop production, orchards, grazing, pasture and rangeland, resource extraction activities, facilities that directly support agricultural operations such as agricultural products processing, and necessary public utility and safety facilities.

The SPP parcel is currently zoned AG (General Agriculture). The Sutter County Zoning Ordinance defines the purpose and intent of the AG district as follows:

> The AG District is established to provide areas for general farming, low density uses, open spaces, and by use permit limited retail service uses which in the opinion of the Planning Commission support the local agricultural industry, in order to provide for the general welfare. It is intended that this classification may be applied to rural communities where the predominance of land use is of a general agricultural nature, however, the needs of the agricultural community may require the location of retail, commercial and service establishments. This district is consistent with the AG-20 or AG-80 and AG-RC General Plan land use designations.

The surrounding land uses, zoning, and general plan designations are as follows:

South - agriculture; AG; AG 80

North - agriculture; AG; AG 80

East - agriculture; AG; AG-20

West - agriculture; AG; AG 80

The SPP site is located in Flood Zone X, as designated by the Federal Emergency Management Agency (FEMA). Flood Zone X is defined as areas of 500-year flood; areas of 100-year flood with average depths of less than one foot or with drainage areas less than one square mile; and areas protected by levees from 100-year flood. The area is protected from the one percent annual chance flood by levee, dike, or other structures subject to possible failure or overtopping during larger floods (Calpine 1997).

Existing zoning and general plan designation of the site and adjacent properties are shown on LAND USE Figure 1. The proposed PD site plan is shown on LAND USE Figure 2.

TRANSMISSION LINE

Calpine's May 18, 1998 supplemental filing to change the transmission line route indicates that the new proposed route will consist of about 5.7 miles of 230 kV transmission line along South Township Road to Tudor Road then either 1) west along Murray Road south to the Sutter Bypass levee and then along the levee to end at a new switching station to be located adjacent to the Sutter Bypass, or 2) directly south from Tudor Road, across farmland to the new switching station location (Calpine 1998h). The width of the proposed easement is 125 feet. Calpine has indicated that the proposed routing of the transmission line has not yet been determined because the Western Area Power Administration (Western) indicated that they will not secure, and has directed Calpine not to secure, any easements for placement of the transmission line and poles.

Calpine is proposing to place the transmission line within the undeveloped west shoulder of South Township Road between the road and the irrigation ditch, and within the shoulders of Tudor and Murray Roads if the Murray Road route is implemented. From the point where Murray Road ends at the Sutter Bypass to the proposed switchyard, the line would be placed in farmland currently used for row crops. If the direct line from Tudor Road to the new switching station route is used, the line would be placed in farmland currently used for row crops. Calpine has stated in the supplemental filing that 1.9 acres and .003 acres of agricultural land will be taken permanently out of production for the switchyard and transmission lines, respectively (Calpine 1998h). Additional farmland acreage will be temporarily taken out of production during construction of the laydown, staging, and storage areas. Calpine proposes to compensate landowners for the value of lost production of crops during construction and staging, and proposes to purchase from the landowner farmland required for the switchyard (Calpine 1998h). However, if the transmission line cannot be placed within the proposed right-of-way (Sutter Extension Water District's land

holdings), the easement would be situated on 86.36 acres of currently farmed land consisting of rice, row crops, and orchards. The proposed switchyard is on land designated AG-80 in

LAND USE Figure 1

LAND USE Figure 2

the Sutter County General Plan land use map, and is zoned AG. Sutter County would require a use permit for the proposed utility transmission lines and switchyard; however, this requirement is superseded by Commission action on certification. If Western constructs, owns, and maintains the transmission line, Western will meet the requirements of the applicable provisions of the Sutter County General Plan, but they are not required to obtain a use permit.

GAS LINE

A sixteen-inch gas pipeline will run north and then west, across the Sutter Bypass and end on the northeast side of the Sacramento River. The pipeline will not cross the Sacramento River but will connect to an existing PG&E natural gas pipeline. The pipeline will run along an existing 13.4 mile gas pipeline route that currently provides gas to Greenleaf 1. A fifty-foot temporary construction right-of-way will be required along portions of the proposed pipeline route. Permission will be obtained from landowners for the use of any roads crossing private property during construction, and landowners will be compensated for any loss of crop production during construction (Calpine 1997). Calpine expects no permanent loss of agricultural land to occur as a result of pipeline construction.

A dehydrator unit will replace an existing PG&E drip station located in a mature walnut orchard, in Colusa County. Additional land for the dehydrator will be acquired from the landowner (Calpine 1997). Colusa County would require a use permit for the dehydrator and that portion of the pipeline within its jurisdiction and a grading permit for projects of five acres or more (Calpine 1997). These requirements are superseded by Commission action on certification.

IMPACTS

Sutter County characterizes the SPP as an intensive industrial use and has determined that because the project is proposed on agricultural land, the project will require a general plan amendment from Agriculture 80-acre minimum to Industrial, and a rezone from AG to M-2 PD (General Industrial Combining Planned Development District). Calpine submitted an application for a general plan amendment and rezone on December 26, 1997. In its application to Sutter County, Calpine included a site plan for all existing and proposed development for the entire 77-acre parcel, as required for the rezone to General Industrial Combining Planned Development District.

Sutter County has the discretion to allow conversion of agricultural lands to non-agricultural uses where the proposed general plan amendment and zone change are not detrimental to existing agricultural operations. Sutter County will use the Energy Commission's Final Staff Assessment (FSA) to make the required findings for a general plan amendment, rezone and to adopt the PD site plan.

PROJECT SPECIFIC IMPACTS

Proposed General Plan Amendment

The general plan is a comprehensive, long-term plan for the physical development of the county and consists of statements of development policies setting forth objectives, principles, standards, and plan proposals. (Gov. Code, §§ 65300 and 65302.) As such, it sits atop the hierarchy of local government law regulating land use. It is the constitution for all future development. Subordinate to the general plan are zoning laws, which regulate the geographic allocation and allowed uses of land. Zoning laws must conform to adopted general plans. The amendment of a general plan is an activity undertaken by a public agency and as such is subject to CEQA. Section 15146 of the CEQA Guidelines states that an EIR on a project such as a general plan amendment should focus on secondary effects that can be expected to follow from the amendment, but the EIR need not be as detailed as an EIR on the specific construction projects that might follow. Thus, the environmental review focuses on the general plan amendment and the specific effects of the PD site plan.

Any future proposed development on the SPP parcel would require an amendment to the PD plan and further environmental review and discretionary approvals by Sutter County. However, the surrounding parcels remain in agricultural use by zoning and general plan designation. Therefore, Commission staff considers the secondary effects of the proposed general plan amendment to include conversion of agricultural land to non-agricultural uses, the potential for the SPP to conflict with existing and future land uses on adjacent parcels (unless proposed mitigation reduces the impacts of the SPP to less than significant levels), and the potential for further industrial development in an area designated for agricultural use in the Sutter County General Plan. These impacts are discussed below.

Conversion of Agricultural Land

When the original use permit was approved in 1984, the Sutter County Board of Supervisors determined that Greenleaf 1 was an agricultural-related use and therefore consistent with the AG zoning, and conformed to the general plan. At that time, Sutter County stated that the agricultural zoning designation of the plant site and pipeline route was not expected to change in the foreseeable future because of the county's commitment to preserve agricultural uses and discourage urban development within agricultural areas (Greenleaf 1984). The environmental documentation provided by Greenleaf Power Corporation stated that 5.8 acres would be developed and non plant-related facilities were expected to remain in agricultural use (Greenleaf 1984). In 1986, the Greenleaf 1 facility was constructed on about 12 acres of the 77-acre parcel. The parcel has not been farmed since 1986.

The 77-acre parcel is situated in an area designated by the California Department of Conservation as Farmland of Statewide Importance. This designation is considered to be land with a good combination of physical and chemical features for the production of agricultural crops. The 1992 US Census of Agriculture stated that for Sutter

County, 318,158 acres (out of a total of 388,358 acres) were held in farms. If the SPP site is zoned for industrial use, 77 acres would be taken permanently out of agricultural production. This amount of acreage is significantly less than one percent of the total county farmland.

Findings of Fact for the certification of the EIR for the Sutter County comprehensive general plan revision state that implementation of the general plan will result in a loss of agricultural lands (Sutter County 1996c). Policy 6.A-2 and corresponding implementation programs were incorporated into the general plan as mitigation for the loss of agricultural lands (Sutter County 1996c). Implementation programs to carry out Policy 6.A-2 give Sutter County discretion to allow conversion of agricultural lands to non-agricultural uses where the proposed zone change and general plan amendment are not detrimental to existing agricultural operations. On June 23, 1998, the Sutter County Board of Supervisors adopted Resolution 98-58: "Criteria for Agricultural Land Conversion" as part of the implementation program for the Agricultural Resources section of the General Plan. This resolution satisfies Implementation Program 6.3 which indicates how Sutter County will establish a process and criteria to allow limited conversion of agricultural land to urban and suburban uses. Please refer to **LAND USE APPENDIX A** for a copy of Resolution 98-58.

In an August 7, 1998 letter to Energy Commission addressing questions of how the county would apply Resolution 98-58 to the SPP, Sutter County determined that "...In the case of the Calpine project, County staff believes that the information generated by the "Criteria" is essentially superfluous because the land in question was converted to industrial use in 1984 when the Planning Commission approved the original use permit (#1207) for the existing Greenleaf facility based on a finding that the project was [...consistent with the General Plan by allowing full development of natural resources located in the county.]. As a result of that project approval, the project site was no longer used for agricultural production, and the current project, if approved, would merely assign a land use designation which is consistent with the current usage." Please refer to **LAND USE APPENDIX B** for a copy of August 7, 1998, Sutter County letter.

Potential for SPP to Conflict with Existing and Future Land Uses

Proposed Transmission Line Route

The proposed transmission lines present two potentially significant impacts to land use. First, the lines have the potential to significantly impact the agricultural use of the land over which they are constructed. Second, the transmission lines could present a safety hazard to aerial applicators, thereby causing less effectiveness in application of seed, fertilizer, and pesticides. Both potential impacts could be significant if they effect the agricultural viability of land in the project vicinity.

During several SPP workshops, landowners who live and farm in the immediate vicinity of the SPP site expressed strong concerns about their ability to farm their land due to the proposed placement of transmission lines that will interfere with agricultural

practices, and the irreversible industrial nature of the parcel if the general plan amendment and rezone are approved. Landowners have stated that because parcels cannot be farmed and sprayed efficiently and economically, the value of the land, and farming in general would decrease as farming becomes more restrictive due to land use incompatibilities and agricultural land conversion. The Sutter County General Plan does not address mitigation for placement of transmission lines in agricultural areas. The Sutter County General Plan 2015 Background Document states "The siting of new transmission lines is regulated by the Public Utilities Commission. Currently, there are no designated transmission line corridors in the county. Any new transmission facilities would need to be evaluated on a case by case basis."

Energy Commission staff researched available literature on agricultural practices and transmission lines (Yolo County 1990, CEC 1984) and found that impacts caused by the presence of transmission lines include incomplete or irregular spraying resulting in reduced coverage, less efficiency, especially on windy days because sprays must be applied from higher altitudes in order for aircraft to avoid lines, and additional costs due to the extra time and energy consumption required to treat fields properly. Transmission lines which cross agricultural land cause a variety of adverse impacts on agricultural operations, which include the following: removal of agricultural land from production under towers and from access roads; reduction of crop yields in and around the towers due to the difficulty of plowing, seeding, irrigating, and spraying; increase in operating expenses including wear and tear on equipment; more expensive and less effective aircraft operations; increased labor for irrigation operations; and increased labor for weed and pest control.

The evaluation of whether any of these impacts will result in this case is complicated by the fact that the exact location of the transmission line has not yet been determined. Calpine has proposed to route a portion of the transmission line within the Sutter Extension Water District's right-of-way. However, in their letter of August 11, 1998, and during public workshops, the District has indicated that they do not want transmission lines running through their right-of-way. In the August 11 letter, the District indicates that it must have the ability to maintain, repair, and replace its canal which requires access at all points for trucks, backhoes and other heavy equipment so that they can continue to provide irrigation water to 25,000 acres of farmland. According to the letter "[p]ermanent structures such as transmission towers would be incompatible with SEWD's operations."

If the transmission lines are not placed in the Sutter Extension Water District's right-of-way and not in the county road right-of-way, (which at this point has not been discussed) then the line will traverse land designated by the California Department of Conservation as Prime Farmland and Farmland of Statewide Importance. These designations are considered to be lands with the best combination of physical and chemical features for the production of agricultural crops, and lands with a good combination of physical and chemical features for the production of agricultural crops, respectively. If the transmission line cannot be placed within these rights-of-way, the entire line (5.7 miles long and 125 feet in width) would be situated on 86.36 acres of agricultural land consisting of rice, row crops, and orchards. Energy Commission staff

notes that even if the transmission line is placed within the Sutter Extension Water District's right-of-way and outside of the county's road right-of-way, the southern portion of the easement will traverse approximately 3.5 miles of farmland. Thus, the severity of the impact of the transmission line on individual farmers will depend on the route finally selected.

Western has stated that the permanent disturbance to agricultural land would be less than one-tenth of an acre (Western 1998). Although the entire easement would be on 86.36 acres, it is clear that most of the area within the transmission line right-of-way will remain farmable land. The land impacted the most will be that underneath and directly adjacent to the poles. These areas on fields with crops grown from seed applied by aerial application (i.e. rice fields between the project site and O'Banion Road) would have reduction in yields due to drift from aerial applications at higher elevations, and all of the fields along the transmission lines would experience difficulty in applying pesticides and fertilizers by air. Additionally, harvesting and irrigation would be complicated in the area around the poles due to the difficulty in maneuvering large equipment around obstacles.

The EIR prepared for the Sutter County General Plan 2015 identified standards of significance for impacts relative to agricultural land conversion. Impacts are considered significant if the Project will:

1) Result in the loss of substantial acreage of prime agricultural land and/or other farmlands designated as important farmlands by the State/Important Farmlands Directory; or

2) Change the type or intensity of land uses which are not compatible with existing agricultural land uses on or adjacent to the project site.

Calpine's supplement to the Application for Certification identified a transmission line route, which will cross Class III and Class III and IV soils. According to the EIR and the General Plan both classes are considered important farmlands in the State Important Farmland Inventory maintained by the Department of Conservation. The presence of the poles could result in a loss or reduction in production of "Important Farmlands" due to the complications they create. However, the loss will not be substantial, and therefore, will not be considered a significant impact. Even if the entire transmission line right-of-way was rendered not farmable as a result of the project, this would not be considered a significant impact to Sutter County in terms of agricultural land taken permanently out of production.

The transmission line right-of-way will encompass 86.36 acres of land. With nearly 270,897 acres of crop land in Sutter County (Sutter County 1996a) a loss of 86.36 acres (.03%) is not considered substantial due to its small percentage of the total agricultural land in the county. Plus, considering the actual number of acres lost will be significantly less than 86 acres, there will not be a substantial loss of important farmland.

The proposed transmission lines present hazards and complications to the farming operations along the transmission line route. To have a significant impact to land use under standard #2 above, the transmission lines would have to be incompatible with agriculture.

In the case of the SPP, the lines are not incompatible. It is clear that the transmission lines' presence will impair existing agricultural operations by reducing yields and altering practices. However, it is equally clear that the impact of the lines would not be so extensive as to completely preclude the land within the transmission line right-of-way from continuing to be farmed in a manner consistent with current practice. This is evident from the numerous other cultivated fields in the area of the project site and throughout the County with transmission lines running across them.

The second area of potential impact pertains to the safety hazard to crop dusters. Transmission lines can pose severe hazards to aerial operations, which in turn increases safety risks and costs to both aerial applicators and farmers (please refer to the section on **Transmission Line Safety and Nuisance** for a discussion of the safety aspects of aerial spraying and transmission lines). This could have a significant impact on land use if the crop dusting companies refuse to provide service to the fields encumbered by the lines due to safety concerns. This does not appear to be a likely consequence. First, for the obvious reason, crop dusters still continue to provide aerial application service around the existing PG&E and Western transmission lines west and south of the project site. The other reason is that crop dusters contacted as part of the **Transmission Line Safety and Nuisance** section, indicated that the poles and lines would present additional hazards but also acknowledged that the addition of the lines would increase the level of care that each pilot must exercise when flying in the area.

Since there will be no substantial loss of "important" farmland and since the transmission lines are not incompatible with agricultural uses, the proposed transmission lines, poles and route will not cause a significant impact to land use.

Other Potential Issues

Other issues discussed at the SPP workshops include the current noise levels from the Greenleaf 1 facility and truck traffic associated with deliveries to Greenleaf 1. Landowners stated concerns with Greenleaf 1's ability to comply with the county's noise ordinance, and future noise levels associated with the SPP if the project were approved. Unless mitigated to a level below significance, Commission staff considers these to be impacts that may conflict with existing and future land uses on adjacent parcels. Please refer to the **Noise** and **Traffic and Transportation** sections of the FSA for further discussion of these issues.

Project's Conformity with the Sutter County General Plan

Agricultural Land

Policy 1.F-1 "The county shall require that new development adjacent to agricultural areas be designed to minimize conflicts with adjacent agricultural uses."

To conform to this policy, the PD site plan should comply with the Sutter County buffer design and maintenance guidelines to minimize conflicts between the industrial nature of the site and adjacent agricultural uses. All mitigation proposed for the final PD site plan should be to the satisfaction of the Sutter County Board of Supervisors.

Policy 1.F-2 "The county shall require that all lands set aside or utilized for mitigation of development in Sutter County or the Natomas Basin demonstrate that its creation and existence will not adversely impact existing and/or future planned agriculture or urban development."

This policy addresses on-site and off-site mitigation measures for impacts associated with wetlands. Calpine is proposing off-site mitigation for the wetlands on the parcel. To conform to this policy, the PD site plan should comply with the Sutter County buffer design and maintenance guidelines to minimize conflicts between agricultural and non-agricultural uses. All mitigation proposed for the final PD site plan should be to the satisfaction of the Sutter County Board of Supervisors.

Policy 1.F-3 "The county shall continue to implement its Right to Farm Ordinance (Agricultural Operations Disclosure, Ordinance Code 1013, Chapter 1330 or its successor)."

This ordinance is concerned primarily with conflicts between residential development and agricultural uses. Sutter County has determined that it is not applicable to the project (Carpenter 1998).

Policy 1.F-4 "The county shall protect agricultural operations from conflicts with non-agricultural uses by requiring buffers between proposed non-agricultural uses and adjacent agricultural operations."

This policy applies to surrounding agricultural parcels that may be impacted during construction and operation of the proposed industrial facility. To conform to this policy, the PD site plan should comply with the Sutter County buffer design and maintenance guidelines to minimize conflicts between the industrial nature of the site and adjacent agricultural uses. All mitigation proposed for the final PD site plan should be to the satisfaction of the Sutter County Board of Supervisors.

Policy 6.A-1 "The county shall preserve agriculturally-designated areas for agricultural uses and direct non-agricultural development to areas designated for urban/suburban growth, or rural communities and/or cities."

Given the county's commitment to preserve agricultural lands as stated in the general plan and general plan EIR, the project does not appear to comply with this policy. However, the county has the discretion to amend the general plan and rezone parcels to allow for a limited conversion of agricultural lands to urban and suburban uses as specified under Resolution 98-58. The project's compliance with this policy is discussed under the **Criteria for Agricultural Land Conversion** heading, below.

Policy 6.A-2 "The county shall balance the needs of proposed urban and suburban development with the need to preserve agricultural lands."

During the comprehensive general plan revision, agriculture and the enhancement and preservation of the agricultural industry were identified as important goals in Sutter County (Sutter 1996b). In consideration of this goal and as a means for Sutter County to continue to support the majority of the county for agricultural uses, the county designated 10,500 acres in the county as the South Sutter County Industrial/Commercial Reserve (SSCI/C) (Sutter 1996c). Thus, the general plan includes policies and implementation programs that serve to balance the need for urban development with the need to preserve agricultural lands (Sutter 1996a). However, the county has the discretion to amend the general plan and rezone parcels to allow for a limited conversion of agricultural lands to urban and suburban uses as specified under Resolution 98-58. The project's compliance with this policy is discussed under the **Criteria for Agricultural Land Conversion** heading, below.

Industrial Land

Policy 1.D-1 "The county shall designate specific areas suitable for commercial and industrial development and reserve such lands in a range of parcel sizes to accommodate a variety of commercial and industrial uses."

As part of the comprehensive general plan revision, Sutter County created the South Sutter County Industrial / Commercial District (SSCI/C). The SSCI/C is an Industrial-Commercial Reserve that allows for 10,500 acres of industrial and commercial development in south Sutter County. Sutter County has determined that large scale industrial and commercial development in South Sutter County is appropriate because of the area's proximity to major transportation corridors. Given the county's goal to designate specific areas for industrial development, as stated in the general plan and general plan EIR, the project does not appear to comply with this policy. However, the county has the

discretion to amend the general plan and rezone parcels to allow for a limited conversion of agricultural lands to urban and suburban uses as specified under Resolution 98-58. The project's compliance with this policy is discussed under the **Criteria for Agricultural Land Conversion** heading, below.

Policy 1.D-2 "The county will discourage strip development, particularly along the Highway 20 corridor between the City of Yuba City and the east side of the Industrial area located southwest of the Community of Sutter. County actions will support retention of an agricultural atmosphere between Township Road and the Industrial area southwest of the Community of Sutter."

While the SPP parcel is located within the geographic area described in Policy 1.D-2, Sutter County has stated that this policy is directed towards preserving the viewshed of the Sutter Buttes and is not applicable to the project (Farhar 1998).

Policy 1.E-1 "New development that may be incompatible with adjacent uses shall be required to provide buffer zones consistent with county standards to reduce anticipated conflicts with existing and future land uses."

To conform to this policy, the PD site plan should comply with the Sutter County buffer design and maintenance guidelines to minimize conflicts between the industrial nature of the site and adjacent agricultural uses. All mitigation proposed for the final PD site plan should be to the satisfaction of the Sutter County Board of Supervisors.

Policy 1.E-3 "The county encourages industrial uses to be developed in contiguous or generally consolidated areas to reduce the potential for conflicts with surrounding uses."

Given the county's goal to designate specific areas for industrial development as stated in the general plan and general plan EIR, the project does not appear to comply with this policy. However, the county has the discretion to amend the general plan and rezone parcels to allow for a limited conversion of agricultural lands to urban and suburban uses as specified under Resolution 98-58. The project's compliance with this policy is discussed under the **Criteria for Agricultural Land Conversion** heading, below.

Criteria for Agricultural Land Conversion

The SPP requires two discretionary actions by Sutter County, a general plan amendment from Agriculture 80-acre minimum to Industrial, and zone change from AG to M-2 PD (General Industrial Combining Planned Development District). On June 23, 1998, the Sutter County Board of Supervisors adopted Resolution 98-58: "Criteria for

Agricultural Land Conversion" as part of the implementation program for the Agricultural Resources section of the General Plan. Resolution 98-58 specifies how Sutter County would consider an application for a general plan amendment and rezone to allow conversion of agricultural lands to urban and suburban uses.

In an August 7, 1998, letter to Energy Commission staff addressing staff's questions of how the county would apply Resolution 98-58 to the SPP project, Sutter County determined that "...In the case of the Calpine project, County staff believes that the information generated by the "Criteria" is essentially superfluous because the land in question was converted to industrial use in 1984 when the Planning Commission approved the original use permit (#1207) for the existing Greenleaf facility based on a finding that the project was["...consistent with the General Plan by allowing full development of natural resources located in the county."]. As a result of that project approval, the project site was no longer used for agricultural production, and the current project, if approved, would merely assign a land use designation which is consistent with the current usage".

Proposed Rezone

PD Combining District

Calpine's rezone application to Sutter County includes a site plan for all existing and proposed development for the entire 77-acre parcel, as required for the rezone to General Industrial Combining Planned Development District. A Planned Development (PD) is a zoning designation that is combined with a standard classification (M-2) to address development requirements that may not be applicable to other parcels with identical zoning classifications (the Sutter County Zoning Code does not list "powerplants" as permitted or conditional uses in the underlying M-2 district).

In Sutter County, a PD requires adoption of a development plan and allows modifications of all site development standards along with additional uses (Sutter County 1996b). Specialized development standards such as landscaping, agricultural buffers, parking, noise mitigation, etc. are developed specifically to address development on the parcels to which the PD designation has been applied. Thus, the PD, when combined with the base district (M-2) provides a kind of hybrid zoning that allows Sutter County more discretionary control over the parcel in terms of currently proposed (SPP) and future proposed industrial uses.

After the PD classification has been applied and a development plan adopted by the Sutter County Board of Supervisors, no development, land improvement, building construction or use of land is allowed which is not in conformity with the adopted development plan. Any proposed use that is not specifically stated in the application and site plan would require an amendment to the PD ordinance, and further environmental review and discretionary approvals by Sutter County. Thus, an analysis of the proposed rezone, as required by Sutter County under Division 63 of the Sutter County Zoning Code, together with the general plan amendment for the 77 acres would focus on a site plan which includes the following:

(a) A statement of the proposed usage of the area covered, including:

(1) Specific uses to be allowed in the area;

(2) Special design limitations to be imposed on the proposed development of the area; and

(3) Landscaping, screening, and aesthetic minimums for the proposed development; and

(b) A site plan, drawn to scale, showing:

(1) The boundaries of the property;

(2) The existing and proposed topography;

(3) The width, location, names and any proposed dedication and improvement of adjacent streets;

(4) The location, dimensions, floor areas, and uses of all existing and proposed buildings and structures in the area, including floor plans, as well as identification of all septic and well features;

(5) All proposed landscaping and associated maintenance facilities;

(6) The layout of the parking facilities and internal circulation;

(7) Any signing for the development, including its location, size, shape, and height;

(8) The location, dimensions, and composition of any fences or walls;

(9) The pedestrian and vehicular ways within and adjacent to the area: and

(10) Any other specific information deemed necessary by the Planning Commission for the review of the specific project.

Sutter County has indicated that Calpine's site plan satisfies all the requirements of §1500-6314 of Division 63 Combining Planned Development District (PD) of the Sutter County Zoning Code, with the exception of a landscaping plan that Calpine has agreed to provide (Carpenter 1998). In addition, Sutter County may require the site plan to include agricultural buffers that comply with the Sutter County buffer design and maintenance guidelines to minimize conflicts between the industrial nature of the site and adjacent agricultural uses (Carpenter 1998).

CUMULATIVE IMPACTS

Cumulative impacts can result from individually minor but collectively significant projects taking place over time. If the rezone and general plan amendment are approved, the parcel would be zoned for industrial uses, and would have the potential for further industrial development in an area designated for agricultural use in the Sutter County General Plan. Any potential cumulative impacts resulting from the reasonable, foreseeable buildout of the parcel would be determined by the restrictions in the underlying M-2 zone and the PD. Please refer to each technical section for a discussion on cumulative impacts.

FACILITY CLOSURE

Facility closure would have to comply with all applicable policies in the Sutter County General Plan and the Facility Closure conditions of certification contained in the Facility Closure section of the FSA.

MITIGATION

To minimize conflicts between the industrial nature of the site and adjacent agricultural uses and to comply with policies 1.F-1, 1.F-2, 1.F-4, and 1.E-1 of the Sutter County General Plan, the project would require additional on-site and off-site mitigation consistent with standards, guidelines, and implementation measures set forth in the Sutter County General Plan. Please refer to each technical section for a discussion of off-site and parcel-specific mitigation for the SPP. In addition, Sutter County may require that buffer design and maintenance guidelines be incorporated into the proposed mitigation and conditions of certification.

As a response to recommendations from Energy Commission and Sutter County staff regarding the SPP's potential for significant environmental impacts, Calpine has proposed mitigation in the areas of effluent discharge, groundwater usage, air quality, and the proposed transmission line route. Please refer to the FSA sections on **Air Quality** and **Water** for a discussion of the proposed mitigation for these technical areas.

Energy Commission and Sutter County staff sent letters to Calpine in September 1998, in which both agencies recommended to Calpine that they reconsider the "South Township Road to O'Banion Road" transmission line route. In the AFC Mitigation Program Supplement filed in October 1998, Calpine indicated that they re-evaluated the proposed transmission line route. As a result, Calpine proposed to re-route the line from south down South Township Road to the Sutter By-pass to south on South Township Road then west on the south side O'Banion Road to the switching station which would be on the south side of O'Banion Road on either the east or west side of the existing PG&E and Western Area Power Administration lines. This line route would run north of the Sutter Extension Water District's canal and south of the O'Banion Road travel lane. The existing PG&E line which currently runs along this route would either be removed or placed underground so that there would still be only one line along O'Banion Road.

The nature of the impacts to land use from the revised route would be similar to those of the proposed route described in the **PROJECT SPECIFIC IMPACTS** section. Specifically, the transmission lines, poles and switching station would still result in a portion of cultivated fields being removed from production, or production being limited; and the lines would present safety hazards to aerial applicators planting and spraying adjacent fields. However, the extent of the impacts would be lessened in two ways. First, the length of the transmission line will be reduced from 5.7 miles to 4 miles, thereby affecting less agricultural land. Second, the transmission lines and power poles would be located farther away from the cultivated fields.

Most of the properties south of O'Banion Road on the South Township Road route have fields with crops planted 20-30 feet from the edge of the South Township Road travel lane. If the transmission line is routed along this route, the poles would likely be placed within 15 to 20 feet from the orchards and cultivated fields (four to ten feet west of the South Township Road travel lane), or even in the field, depending on engineering requirements and the final route chosen.

The South Township to O'Banion Road route would not encounter the same situation along the south side of O'Banion Road. The poles and transmission lines would be placed north of the ditch and south of O'Banion Road which would place them approximately 100 feet away from the orchards and 75 to 80 feet away from the rice planted along the south side of O'Banion Road.

The revised line route will impact two existing crop duster runways located in the vicinity of Boulton Road and O'Banion Road and render them unusable. However, Calpine has indicated a willingness to work with area farmers to locate and pave or chip seal a new runway in the vicinity of the existing ones to provide for year round use by area farmers. Condition of certification Land Use-4 has been added to address this requirement. At present, neither Calpine or Sutter County Community Services Department have proposed a location for the new runway, therefore, the location of the runway will be to the satisfaction of the Sutter County Board of Supervisors.

In addition to the impact described above, conversations with Sutter Extension Water District and Energy Commission staff indicate that if the poles are placed between the canals and O'Banion Road, the transmission lines will extend into the Sutter Extension Water District's vertical air space and could impact their ability to maintain the canals (Russell 1998). When doing maintenance work, the district uses an excavator which extends vertically twenty-five feet. To avoid the dangers associated with high voltage transmission lines, a work crew must stay a minimum of seventeen feet from 230 kV lines (please refer to **TRANSMISSION LINE SAFETY AND NUISANCE** section of the FSA for a complete discussion of safety-related impacts). If the transmission lines extend into the Sutter Extension Water District's vertical air space, the lowest point of the line (mid-span where maximum sag occurs) would have to be a minimum of forty-two feet from the ground, therefore, pole height would have to be 120 feet. In their AFC, Calpine stated that using 100 foot poles, the lowest point of the line would be thirty feet from the ground. If the transmission poles are designed this way, it would

adversely impact the Sutter Extension Water District's ability to safely and adequately maintain their canals. To avoid this impact, Calpine should design the lines so that the lowest sag point of the line is a minimum of forty-two feet from the ground.

With the shorter transmission line route, the greater the setback between the transmission lines and poles and the cultivated fields, the relocation of the existing crop duster runways to one centralized location, and if the transmission line is designed to ensure that the lowest point of the line is at a minimum of 42 feet from the ground, the potential impacts will be lessened. Accordingly, the South Township Road to O'Banion Road option will lessen impacts to current agricultural operations and is a better option for minimizing potential land use impacts than the route proposed in the AFC.

Energy Commission staff has identified an alternative transmission line route that would reduce the potential visual impacts of the proposed transmission line to a less than significant level. Please refer to the **VISUAL RESOURCES** section of the FSA for a complete discussion of this route. The route proceeds south from the proposed switchyard at the power plant site approximately 0.3 mile to a dirt road that runs west from South Township Road. The route then turns west and proceeds to the existing PG&E 500 kV transmission line. The route then runs south parallel to the PG&E line to the proposed switching station on the south side of O'Banion Road. The route is approximately 3.8 miles long.

The nature of the impacts to land use from the west then south route would not be as significant as those of the mitigation route and the proposed route. The extent of the impacts would be lessened in three ways. First, the transmission lines and power poles would be located along a twenty-foot wide dirt road, resulting in very minimal disturbance (if any) to cultivated fields and agricultural practices. Second, instead of paralleling Sutter Extension Water District's property, the route would cross the District's canal at one point, thereby eliminating intrusion into the District's vertical air space, and safety hazards to maintenance workers. Third, this route would be substantially farther from residences and public roads than the mitigation and proposed route. Also, a route that parallels the PG&E transmission line would also follow a general criterion to have new transmission lines parallel existing transmission lines (CEC 1991). As stated above, because the proposed location of the new runway has not been identified, Energy Commission staff does not have information to determine if the west then south route would impact the accessibility of the proposed runway.

With the shorter transmission line route, minimal disturbance (if any) to cultivated fields, minimal impact (if any) to Sutter Extension Water District and maintenance crews, the potential impacts will be lessened. Thus, the west then south route will lessen impacts to current agricultural operations and is a superior option for minimizing potential land use impacts when compared with the mitigation and proposed routes.

CONCLUSION AND RECOMMENDATION

CONCLUSION

Commission staff considered the impacts of the SPP to include conversion of agricultural land to non-agricultural uses, the potential for the SPP to conflict with existing and future land uses on adjacent parcels, and the potential for further industrial development in an area designated for agricultural use in the Sutter County General Plan. Commission staff also analyzed the potential for impacts to prime and unique agricultural lands and the placement of the proposed transmission line route. Since there will be no substantial loss of farmland, and since the transmission lines are not incompatible with agricultural uses, the proposed transmission lines, poles and the west then south route will not cause a significant impact to land use.

The SPP will cause conversion of agricultural land to non-agricultural uses. To mitigate such impacts, the Sutter County comprehensive general plan revision includes policies and implementation measures to address agricultural land conversion and siting of industrial/commercial uses (Sutter County 1996c). Sutter County will consider these policies and implementation measures when addressing the above impacts to make the findings for a general plan amendment and rezone of the parcel.

In addition, a number of local approvals and discretionary actions would be required absent the commission's jurisdiction. They are summarized as follows:

- Colusa County would require a use permit for the dehydrator and that portion of the pipeline within its jurisdiction, and a grading permit for projects of five acres or more.

- Sutter County would require a use permit for the proposed utility transmission lines and switchyard.

RECOMMENDATION

If the Energy Commission certifies the proposed project, Energy Commission staff recommends that it adopt Energy Commission staff's west then south transmission line route and adopt the following conditions of certification.

CONDITIONS OF CERTIFICATION

LAND USE-1 Calpine's Planned Development (PD) site plan shall include agricultural buffers that comply with the Sutter County buffer design and maintenance guidelines to minimize conflicts between the industrial nature of the site and adjacent agricultural uses. Calpine's PD site plan shall be submitted to the satisfaction of the Sutter County Board of Supervisors.

Verification: At least 60 days prior to the start of construction, the project owner shall submit to the Energy Commission Compliance Project Manager (CPM) a copy of the adopted PD site plan.

LAND USE-2 Development and use of the property shall be limited as set forth in the Planned Development Plan adopted by the Sutter County Board of Supervisors. Additionally, that portion of the site which is part of the Sutter Power Project (SPP) and its ancillary facilities shall be used in conformance with the certification issued by the Energy Commission. Only that portion of the site which is part of the SPP and its ancillary facilities shall be under the authority and jurisdiction of the Energy Commission. Sutter County will maintain authority and jurisdiction on the remainder of the site. Any development, land improvement, building construction or use of the land (including that pertaining solely to existing Greenleaf 1) which is not in conformity with the adopted Planned Development Plan shall be subject to subsequent approval of a planned development amendment and environmental review by Sutter County. Any development, land improvement, building construction or use of the land which is not in conformity with the adopted Planned Development Plan and which relates to the SPP or its ancillary facilities, shall be reported to the CPM to determine whether a certification amendment is necessary.

Verification: At least 60 days prior to the start of construction, the project owner shall submit to the CPM a copy of the adopted PD site plan.

LAND USE-3 Calpine shall comply with all applicable criteria of Colusa County's use permit for the dehydrator and that portion of the pipeline within Colusa County. In addition, Calpine shall comply with all applicable criteria of Colusa County's grading permit criteria (Colusa County Code Chapter 9, Ordinance No. 414 - Land Grading and Leveling). Calpine shall provide a letter from the Colusa County Planning Director stating that all applicable criteria have been satisfactorily met.

Verification: At least 60 days prior to the start of construction, the project owner shall submit to the CPM a copy of the letter from Colusa County stating that all applicable criteria have been met to the satisfaction of the Colusa County Planning Director.

LAND USE-4 Calpine shall either pave or chip seal a new runway to allow for year round use by members of the local agricultural industry. The location of the new runway shall be to the satisfaction of the Sutter County Board of Supervisors.

Verification: At least 60 days prior to the start of construction, the project owner shall submit to the CPM a copy of a letter from the Sutter County Board of Supervisors stating that the location of the new runway, timing of construction, and method of paving have been agreed upon to the satisfaction of the Sutter County Board of Supervisors.

REFERENCES

California Energy Commission. CEC 1984. Geysers Power Line Issues and Alternatives Report, June 1984.

California Energy Commission. CEC 1991. Transmission System and Right of Way Planning for the 1990s and Beyond. 1991.

Calpine (Calpine Corporation). 1997. Application for Certification, Sutter Power Project (97-AFC-2). Submitted to the California Energy Commission, December 15, 1997.

Calpine (Calpine Corporation). 1998h. Supplemental Filing Changing Transmission Route. Submitted to the California Energy Commission, May 18, 1998.

Calpine (Calpine Corporation). 1998q. Calpine's Mitigation Measures, October 1998.

Calpine (Calpine Corporation). 1998. Letter to Commissioners Moore and Keese. Submitted to the California Energy Commission, July 15, 1998.

Carpenter, George. 1998. Associate Planner for Sutter County Community Services Department. Conversation with Energy Commission staff on May 21, and July 28, 1998.

Farhar, John. 1998. Senior Planner, Sutter County Community Services Department. Conversation with Energy Commission staff on May 21, 1998.

Greenleaf 1984. Environmental Information Document, Greenleaf Unit No. 1, prepared by Bechtel Power Corporation for Greenleaf Power Corporation, February 1984.

Guide To the Environmental Quality Act (CEQA). 1994 edition

Longtin, James. Longtin's California Land Use, second edition, 1987.

Russell, Paul. 1998. Manager, Sutter Extension Water District. Conversation with Energy Commission staff on October 7, 1998.

Sutter County 1996a. Sutter County General Plan, November 1996.

Sutter County 1996b. General Plan 2015 Background Document, November 1996.

Sutter County 1996c. General Plan 2015 Draft Environmental Impact Report, May 1996.

Sutter County 1984. Planning Commission Agenda Report, 1984.

Sutter County 1996. Resolution No. 96-105. *A RESOLUTION OF THE SUTTER COUNTY BOARD OF SUPERVISORS AMENDING THE SUTTER COUNTY GENERAL PLAN TO INCORPORATE GENERAL PLAN AMENDMENT # 96-01, THE COMPREHENSIVE GENERAL PLAN REVISION.*

Sutter County 1998. Sutter County Zoning Ordinance, adopted January, 1998.

Quisenberry, Mark 1998. Letter from Sutter County Agricultural Commissioner to Energy Commission staff, July 21, 1998.

Yolo County 1990. Transmission Line Element of the Yolo County General Plan.

LAND USE APPENDIX A - - RESOLUTION 98-58 - CRITERIA FOR AGRICULTURAL LAND CONVERSION

LAND USE APPENDIX B - -SUTTER COUNTY LETTER RE: SUTTER COUNTY BOARD OF SUPERVISORS' RESOLUTION NO.98-58

TRAFFIC AND TRANSPORTATION

Testimony of Gregory M. Newhouse

INTRODUCTION

The Traffic and Transportation Section of the Preliminary Staff Assessment addresses the extent to which the project may impact the transportation system within the vicinity of its proposed location. Because of the specific nature of this project, there are a number of roadways of concern in this analysis. The influx of large numbers of construction workers can, over the course of the construction phase, increase roadway congestion and also affect traffic flow. The undergrounded gas lines, proposed as part of this project, are located within road right-of-ways requiring trenching and other activities disruptive to traffic flows. In addition, the transportation of large pieces of equipment can require rail use and the alteration of traffic flows and roadway use. Operation related traffic does not tend to produce similar types of impacts. In all cases the transportation of hazardous materials will need to comply with federal and state laws.

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 Safety 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 rights-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, 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 hazard 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, 34501.3, 34501.4, 34501.10, 34505.5-.7, 34506, 34507.5 and 34510-11, regulates the safe operation of vehicles, including those which are used for the transportation of hazardous materials.

California Health and Safety Code, sections 25160 et seq., addresses the safe transport of hazardous materials.

California Vehicle Code, sections 2500-2505 authorizes 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 sections 35780 et seq., require permits for the transportation of oversized loads on county roads.

California Street and Highways Code, sections 660, 670, 1450, 1460 et seq., 1470, and 1480 regulates right-of-way encroachment and the granting of permits for encroachments on state and county roads.

LOCAL

Sutter County

The Sutter County General Plan, Policy Document - Section 2, includes the following policies which are pertinent to the proposed project:

The county shall strive to maintain a minimum Level of Service D in developing and maintaining its roadway system.

The county shall require all new development projects to analyze their contribution to increased traffic and implement improvements necessary to address the increase.

The Sutter County Public Works Department requires a transportation permit for oversized vehicles using a county road (see also California Vehicle Code sections above) and an encroachment permit for any opening or excavation in any county highway (see California Streets and Highways Code above).

SETTING

REGIONAL DESCRIPTION

Freeways and Highways

State Routes 20, 99 and 113 provide regional access to the proposed power plant site. State Route 20 runs east/west to the north of the project site. It is linked most directly to the project site by South Township Road. For much of its route State Route 20 is a two lane highway, expanding to a four land expressway prior to its intersection with South Township Road and continuing eastward to Yuba City. (See AFC Figure 8.10-1.) Daily traffic volumes range from 6,000 vehicles between South Township Road and Colusa County to the west to 12,000 vehicles between South Township Road and Yuba City. (SPP 1997, AFC page 8.10-11)

State Route 99 provides north/south access to the project site area from Sacramento and Yuba City. Between its intersection with State Route 70 to the south and Bogue Road, approximately 3 miles north of the project site, average daily traffic volumes along State Route 99 are approximately 13,225 vehicles. From that intersection to Yuba City average daily traffic volumes increase to about 24,000 vehicles. (SPP 1997, AFC page 8.10-11)

State Route 113 is a two-lane conventional highway, providing access from Yolo County. Average daily traffic volumes approach 5,800 vehicles at its intersection with State Route 99.

Railways

The north-south running Union Pacific Railroad line is the only active line in the vicinity of the proposed project. Essentially the closest site for offloading of heavy equipment is near Clark Road, just north of Yuba City.

SITE AND VICINITY DESCRIPTION

When assessing a projects' 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 levels of service range from A, free flowing traffic, to F, which is heavily congested with

stoppage of the flow. An LOS D threshold as noted above, is the minimum standard accepted by Sutter County. This level of service is generally considered marginally acceptable.

Tables 8.10-1, 8.10-2 and 8.10-3 in the SPP Application for Certification summarize the level of service, design classification and existing traffic volumes of the principal roadways in the project area. In essence all local roadways are operating at least at a level of service C. For regional highways, only State Route 99, between the Garden Highway and Lincoln road is experiencing a less than LOS C. That portion of State Route 99 can be subject to major congestion and variable traffic delays.

In addition traffic in the immediate vicinity of the existing Greenleaf project consists of truck traffic for both power plant deliveries and transportation for agricultural related products. During a workshop on the project, this truck traffic was identified as a cause of concern by local residents, both in terms of noise and the use of local roadways other than Oswald and South Township roads.

IMPACTS

POWER PLANT

Construction Phase

Commute Traffic

The construction workforce will peak at 250 persons and average about 150 persons over a 22 month period. Staff, in concurrence with Calpine, concludes that the construction workforce would likely come from the existing labor pool. As a result State Routes 99 and 20 and local roadways, principally George Washington Boulevard, Oswald Road, O'Banion Road and South Township Road, are likely to be the principal commute routes.

To determine the potential for impact, staff assessed whether, if all construction related vehicles travel the same route, levels of congestion could result in decreases of LOS standards below the threshold of LOS "D" for Sutter County roadways and for roadways of regional significance. The results of the analysis indicate that even if all construction workers were to use the same route, and that route included any of these roadways, the 250 round trips generated would not produce a decline in the level of service past the threshold level. (See also SPP 1997, AFC page 8.10-15)

While clearly local residents will experience a change in traffic conditions during commute periods and can experience delays or inconvenience associated with truck deliveries, the change in traffic does not produce a significant impact. Also, the potential for a worst case impact is further diminished in that:

1) 250 round trips is not likely, since some workers will commute together, and actual commutes will occur on a variety of regional and local roadways, except for South Township Road.

2) The 250 round trips represents the peak impact. Ongoing impacts will be lessened as an average of 150 commute round trips is likely for a 22 month schedule.

Finally, the mitigation proposed by Calpine and incorporated within the proposed Conditions of Certification will further limit the nature of construction traffic impacts.

Truck Traffic

The transportation and handling of hazardous substances associated with the project can increase roadway hazard potential. The handling and disposal of hazardous substances are addressed in the Waste Management Section, and the Hazardous Materials Section of this report. Potential impacts of the transportation of hazardous substances can be mitigated to insignificance by compliance with federal and state standards established to regulate the transportation of hazardous substances. Conditions of Certification that ensure this compliance are discussed under their respective subsection later in this analysis.

Transportation of equipment which will exceed the load size and limits of certain roadways will require special permits. The procedures and processes for obtaining such permits are fairly straightforward. Mitigation measures and Conditions of Certification that ensure this compliance are discussed later in this section.

Finally, product deliveries via truck traffic will produce localized impacts. While such traffic will average 8 deliveries per day, during intensive construction such activities as concrete pouring can require sufficient traffic to produce a noticeable impact on local roadways. Depending upon the timing of deliveries during the day, there can be localized traffic related noise and conflict with local traffic patterns. Truck traffic has been raised by local residents as an issue of concern. To lessen impacts and control deliveries to a few key roadways, the proposed Conditions of Certification indicate that the project owner shall require all truck deliveries using Highway 99 to use Oswald Road and South Township Road to the site and all truck deliveries using Highway 20 to use George Washington to Oswald Road and then South Township Road to the site. In consultation with Sutter County, Calpine's construction traffic control plan will address truck delivery periods.

Railways

Oversized equipment, such as combustion turbines, generators and the main transformers, will be transported to the region by rail and then transported by truck to the project site. Offloading can occur at Clark Road, and Calpine has committed to use the following route to the project site as recommended by Sutter County: Clark Road west to Broadway, south on Broadway to Nuestro Road, west on Nuestro Road

to North Township, south on North Township to the SPP site.(SPP 1997, AFC page 8.10-13) While the proposed Conditions of Certification allow for changing this route, such changes would only take place with the approval of Sutter County and the Energy Commission's Compliance Project Manager.

Operational Phase

Commute Traffic

The operational phase of this project will generate a total of 30 vehicle trips daily. This will not present any significant traffic impact.

Truck Traffic

The transportation and handling of hazardous substances associated with the project can increase roadway hazard potential. The handling and disposal of hazardous substances are addressed in the Waste Management Section, and the Hazardous Materials Section of this report. Potential impacts of the transportation of hazardous substances can be mitigated to insignificance by compliance with Federal and State standards established to regulate the transportation of Hazardous Substances. Mitigation measures and Conditions of Certification that ensure this compliance are discussed under their respective subsection later in this analysis.

Product deliveries via truck traffic can produce localized impacts. Depending upon the timing of deliveries during the day there can be localized traffic related noise and conflict with local traffic patterns. Truck traffic has been raised by local residents as an issue of concern. To lessen impacts and control deliveries to a few key roadways, the proposed Conditions of Certification indicate that the project owner shall require all truck deliveries using Highway 99 to use Oswald Road and South Township Road to the site and all truck deliveries using Highway 20 to use George Washington to Oswald Road and then South Township Road to the site.

LINEAR FACILITIES

Construction of the transmission lines can cause some disruption of traffic due to the transport of construction materials and transmission equipment and the actual construction near roadways. Either of these will at most have short-term and minimal impacts on the function of area roadways. Also, in staff's opinion, along existing roadways adjacent to the transmission route there is sufficient shoulder area available for construction vehicles. Use of typical signals, signs, or warnings will also notify motorists of construction activity. A possible exception to this would be for construction occurring near the Sutter Bypass as there exists limited shoulder area. Any exceptional needs for traffic control and signing for this area will be addressed in the construction traffic control plan as specified in condition of certification TRANS-6.

The construction of the underground natural gas pipelines will impact levels of service and functions for all roadways in which trenching is required within the established

right-of-way. However, such impacts will be short-term and not significant. Typically plating of roadways will be used to ensure emergency vehicle access and maintain some level of traffic flow. In addition, Calpine has agreed to repair roadways to original or as near original condition as possible.(SPP 1997, AFC page 8.10-16) Finally, Pacific Gas and Electric Company has committed to regulate access to vehicular traffic "...as required to protect the public, wildlife, and livestock from hazards associated with the construction of the pipeline."(SPP 1997, AFC page 8.10-16)

The operation of such facilities will not have an impact on area roadways except for short-term maintenance or unplanned difficulties. In either case the impacts create traffic flow difficulties which are typically limited in duration and not significant.

CUMULATIVE IMPACTS

The project, as part of an overall development, will add to cumulative traffic loads in the local area. However, its contribution will diminish significantly from the construction to the operation phase of the project. Key considerations then will be the transport of hazardous materials. The Conditions specified below will ensure that the transport of such materials is undertaken in compliance with applicable federal and state laws.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS AND STANDARDS

FEDERAL

Roadway and Rail Traffic

Calpine has stated its intention to comply with all federal LORS. A condition to ensure compliance is included below. Therefore, the project is considered consistent with identified Federal LORS.

STATE

Calpine has stated its intention to comply with all state LORS. A condition to ensure compliance is included below. Therefore, the project is considered consistent with identified state LORS.

LOCAL

For operational employees, trip reduction measures could be employed. But, since the number of trips per day is approximately 30, trip reduction measures for this project will have an insignificant effect.

FACILITY CLOSURE

The anticipated lifetime of the power plant is expected to be in excess of thirty years. Calpine has proposed preparation of a Decommissioning Plan and submittal to the Energy Commission for review and action, at least twelve months prior to the proposed decommissioning. At the time of closure all then-applicable LORS will be identified and the closure plan will address how these LORS will be complied with. The effects of project closure on traffic and transportation will be similar to those discussed for the project itself. Closure will involve a peak work period with commute traffic. The removal of waste and other materials will produce impacts from truck traffic. At this time no conclusions can be drawn on the effects of project closure on traffic and transportation.

MITIGATION

Calpine 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) to prepare "...a construction traffic control plan and implementation program which addresses timing of heavy equipment and building materials deliveries, signing, lighting and traffic control device placement, and establishing work hours outside of peak traffic periods." In addition, Calpine has committed to specific delivery routes for oversized equipment transported by rail and then roadway and for deliveries to the project site. Staff has incorporated these into the proposed Conditions of Certification and is not requiring additional mitigation for traffic and transportation impacts.

Finally, Calpine has proposed mitigation which would include: 1) dry cooling and thereby produce zero effluent discharge, and 2) further reduce NOx emissions. Also Calpine is prepared to re-route the transmission lines for the project. These measures would not change the impact assessment, nor any of the conclusions or recommendations below. The measures applicable to linear facilities would remain in effect should the re-routing of the transmission line occur.

CONCLUSIONS AND RECOMMENDATIONS

POWER PLANT

1. During the construction phase, increased roadway demand resulting from the daily movement of workers and materials, while noticeable, will not increase beyond thresholds established by local and regional authorities.

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

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

LINEAR FACILITIES

1. Construction of the transmission lines will have minimal impacts on the function of area roadways. Routine construction safety measures should be sufficient to ensure no impacts.

2. Because their construction requires trenching within public road rights-of-way, the underground natural gas line will impact both roadway function and levels of service. However, these impacts are expected to be short-term and not result in significant traffic and transportation impacts. Calpine has agreed to appropriate traffic control measures, and these are contained within the Conditions for Certification. In addition, all development will take place in compliance with California Department of Transportation and Sutter County limitations for encroachment into public rights-of-way.

CONDITIONS OF CERTIFICATION

TRANS-1 The project owner shall comply with California Department of Transportation (Caltrans) and Sutter 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 both rail and roadway use.

Verification: In monthly compliance reports, 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 the start of commercial operation.

TRANS-2 The project owner or its contractor shall comply with California Department of Transportation (Caltrans) and Sutter 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, the project owner shall submit copies of any encroachment permits received during that reporting period. In addition, the project owners shall retain copies of these permits and supporting documentation in its compliance file for at least six months after the start of commercial operation.

TRANS-3 The project owner shall ensure that all federal and state regulations for the transport of hazardous materials are observed.

Verification: The project owner shall include in its monthly compliance reports copies of all permits and licenses acquired by the project owner and/or subcontractors concerning the transport of hazardous substances.

TRANS-4 The project owner shall require all truck deliveries using Highway 99 to use Oswald Road and South Township Road to the site and all truck

deliveries using Highway 20 to use George Washington to Oswald Road and then South Township Road to the site.

Verification: The project owner shall include this specific route in its contracts for truck deliveries and maintain copies onsite for inspection by the CPM.

TRANS-5 All oversized equipment delivered by rail shall use the following route to the project site: Clark Road west to Broadway, south on Broadway to Nostra Road, west on Nostra Road to North Township, south on North Township to the SPP site. If the project owner finds another rail spur to be more advantageous, the project owner shall consult with Sutter County and request in writing approval for the use of that route from the CPM.

Verification: The project owner shall include this specific route in its contracts for oversized equipment delivery and maintain copies onsite for inspection by the CPM. If another route than that proposed in the Application for Certification is found advantageous by the project owner, the project owner shall request approval in writing for the use of that route at least 30 days in advance of the use date.

TRANS-6 Prior to the start of construction, the project owner shall consult with Sutter County and will prepare a construction traffic control plan and implementation program which includes addressing the timing of heavy equipment and building materials deliveries; signing, lighting and traffic control device placement for natural gas pipeline and transmission line construction; and establishing construction work hours outside of peak traffic periods.

Verification: Thirty days prior to construction, the project owner shall provide to the CPM and to Sutter County for review and approval a copy of its construction traffic control plan and implementation program.

TRANS-7 Based on determination of primary roadways to be used in the traffic control plan and implementation program and following construction of the power plant and all related facilities, Calpine shall repair those primary roadways to original or as near original condition as possible.

Verification: Thirty days prior to construction, the project owner shall photograph the primary roadways. The project owner shall provide the CPM and Sutter County with a copy of these photographs. Within 30 days of the completion of project construction, the project owner will meet with the CPM and Sutter County to determine and receive approval for the actions necessary and schedule to complete the repair of those roadways to original or as near original condition as possible.

REFERENCES

Calpine (Calpine Corporation). 1997 Application for Certification, Sutter Power Project (97-AFC-2). Submitted to the California Energy Commission, December 15, 1997.

Calpine (Calpine Corporation). 1998h. Supplemental Filing Changing Transmission Route. Submitted to the California Energy Commission, May 18, 1998.

Greenleaf 1984. Environmental Information Document, Greenleaf Unit No. 1, prepared by Bechtel Power Corporation for Greenleaf Power Corporation, February 1984.

Sutter County 1996a. Sutter County General Plan, November 1996.

Sutter County 1996b. General Plan 2015 Background Document, November 1996.

Sutter County 1996c. General Plan 2015 Draft Environmental Impact Report, May 1996.

NOISE

Testimony of Steve Baker

INTRODUCTION

The construction and operation of any power plant creates noise, or unwanted sound. The character and loudness of this noise, the times of day or night during which it is produced, and the proximity of the facility to any sensitive receptors combine to determine whether the 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 and examine the likely noise impacts from the project; and to recommend procedures to ensure that the resulting noise impacts will comply with applicable laws and ordinances, and will be adequately mitigated.

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

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

This analysis will determine:

- whether the facility can be constructed and operated in compliance with all applicable federal, state and local noise laws, ordinances, regulations and standards;
- whether any potentially significant noise impacts may result from the construction and operation of the facility; and if so,
- whether feasible mitigation measures can be employed to minimize or eliminate significant noise impacts resulting from construction and operation of the facility.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

The Occupational Safety and Health Act of 1970 requires federal regulations that establish maximum noise levels to which workers at a facility may be exposed. (See 29 C.F.R. § 1910 et seq.) 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. OSHA regulations also dictate hearing conservation program requirements and workplace noise monitoring requirements.

There are no federal laws governing offsite noise.

STATE

Similarly, there are no state regulations governing off-site (community) noise. Rather, state planning law requires that local authorities such as counties or cities prepare and adopt a general plan. Government Code section 65302(g) requires that a noise element be prepared as part of the general plan to establish acceptable noise limits.

The California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified, and that such impacts be eliminated or mitigated to the extent feasible. CEQA Guidelines (Cal. Code Regs., tit. 14, Appendix G, item (p)) define a significant effect on the environment as one that will "[i]ncrease substantially the ambient noise levels for adjoining areas...." CEQA Guidelines further require that the impacts of the project be considered cumulatively in conjunction with those of other projects planned for the area (Cal. Code Regs., tit. 14, § 15065(c)).

The California Occupational Safety and Health Administration (Cal-OSHA) has promulgated Occupational Noise Exposure Regulations (Cal. Code Regs., tit. 8, § 5095 et seq.) that set employee noise exposure limits. These standards are equivalent to the federal OSHA standards described above.

LOCAL

The Sutter Power Project (SPP) will lie chiefly within Sutter County.[1] The only local standard that applies to the project is the Noise Element (Section 8) of the Sutter County General Plan (Sutter County 1996a). Enforcement is the responsibility of the Sutter County Community Services Department.

Sutter County General Plan Noise Element

The purpose of the Noise Element of the General Plan is "...to establish policies and implementation programs to limit community exposure to excessive noise levels." (Sutter County 1996a, p. 70.) This is accomplished, in part, by implementation of Policy 8.A-2: "The County shall require that new non-transportation noise sources be mitigated to the noise level standards shown...." These standards are:

[1] Although a small portion of the natural gas pipeline will lie in Colusa County, that portion of the project is unlikely to produce any detectable noise impacts. Therefore, Colusa County LORS are not considered in this analysis.

NOISE: Table 1
Sutter County Noise Level Standards

New Non-Transportation Sources		
Noise Level Descriptor	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Hourly L_{eq}, dB	50	45
Maximum level, dB	70	65

Source: Sutter County 1996a, Table 7

The Noise Element further lists Land Use Compatibility Guidelines, which categorize as "acceptable" CNEL or L_{dn} noise levels up to 60 dBA for land uses that include such sensitive noise receptors as residences, schools, libraries, hospitals and churches (Sutter County 1996a, Table 8).[2] The Noise Level Standards listed in **NOISE: Table 1** above are more stringent, and thus govern.

Since a combined cycle power plant such as the Sutter Power Project can be expected to operate day and night, the plant must be constructed to meet the nighttime standard of 45 dBA, measured at the property line of the nearest sensitive receptor.[3] In this case, that receptor is a residence located approximately 1,800 feet to the northeast of the project site, identified in the AFC as noise monitoring location L1 (Calpine 1997, AFC Table 8.5-3).

SETTING

The site is located in the midst of agricultural property approximately seven miles southwest of Yuba City. The existing Greenleaf 1 cogeneration power plant, owned by Calpine, lies immediately to the east of, and adjacent to, the SPP site. The only sensitive noise receptors likely to be affected by the project are a number of rural residences, located to the northwest, north, east and south of the project. No schools, hospitals, churches, libraries or other sensitive receptors are located within a mile or more of the site.

In order to predict the likely noise effects of the project on the surrounding community, Calpine performed a noise survey of the area near the project site. The noise survey was performed in typical industry fashion, by a qualified consultant using appropriate monitoring and analysis equipment and methods (Calpine 1997, AFC § 8.5.1).

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[2] For explanation of such terms as "CNEL" and "L_{dn}," refer to NOISE: APPENDIX A immediately following this section.

[3] Sutter County 1996a, Policy 8.A-1, p. 71.

Calpine's noise survey included four monitoring sites located near residences lying in all directions from the project site; one was located near the residence closest to the project. The results of the survey showed (Calpine 1997, AFC § 8.5.1.3) a background noise level between 41 and 45 dBA, including noise from the existing Greenleaf 1 power plant, which was operating at the time of the noise survey. Noise levels rose above this background level due to vehicular traffic, agricultural operations and bird noise during the daytime, and frog and insect noise during the nighttime.

IMPACTS

Project noise impacts can be created by construction and by normal operation of the power plant.

PROJECT SPECIFIC IMPACTS — CONSTRUCTION

Community Effects

Construction noise is a temporary phenomenon; the project construction period is scheduled to last from 22 to 24 months (Calpine 1997, AFC § 2.2.13, § 8.5.2.1). Construction of an industrial facility such as a power plant is typically and unavoidably noisier than permissible under usual noise ordinances. In order to allow the construction of new facilities, construction noise during certain hours is commonly exempted from enforcement by local ordinances. The applicable LORS for the Sutter project, however, make no mention of construction noise. Noise impacts from construction, therefore, will be evaluated for significant impacts.

Calpine has predicted the noise impacts of project construction on the nearest sensitive receptors (Calpine 1997, AFC Table 8.5-3). Construction noise levels (other than pile driving and steam blows) are predicted to reach 57 dBA at the nearest receptor, the residence 1,800 feet to the northeast of the project site, and 50 to 53 dBA at residences farther away. This prediction is based on assumed noise levels produced by typical construction equipment; these assumed levels are taken from figures published by the EPA in 1971. Today's construction equipment is, however, somewhat quieter than that in use in 1971. Calpine's predicted construction noise levels are thus expected to be conservative, that is, higher than should be actually experienced. Further, in calculating noise levels at the receptors, the applicant has considered only distance in estimating noise level attenuation. In actuality, atmospheric conditions will yield actual noise levels slightly lower than predicted, lending more conservatism to the estimates.[4] To further reduce annoyance, noisy construction activities such as pile driving will be performed during daytime hours, when they are least likely to disturb the project's neighbors (Calpine 1997, AFC

[4] This correlates reasonably well with Sutter County's General Plan Background Report (Sutter County 1996b). The section of that document dealing with Construction Sites (pp. 12-17—12-19) suggests that typical construction noise levels at a distance of 1,920 feet will reach 60 dBA. While Calpine's estimate of 57 dBA at 1,800 feet is slightly quieter, it is not at all unreasonable to expect that proper construction practices will, in fact, limit noise to this level.

§ 8.5.2.1). Staff expects that construction noise impacts will present no significant adverse impacts.

Steam Blows

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

In order to prevent this, before connecting the steam system to the turbine, the steam line is temporarily routed to the atmosphere. Steam is then raised in the HRSG and allowed to escape to the atmosphere through the steam piping. This flushing action, referred to as a steam blow, is quite effective at cleaning out the steam system piping. A series of short steam blows, lasting two or three minutes each, is performed several times daily over a period of two or three weeks. At the end of this procedure, the steam line is connected to the steam turbine, which is then ready for operation.

These steam blows can produce noise as loud as 130 dBA at a distance of 100 feet; this would attenuate to about 100 dBA at the nearest residence, exceedingly disturbing. Steam blow piping can be equipped with mufflers, which can reduce noise levels to 100 dBA or so at 100 feet, or 70 to 80 dBA at the nearest residence (Calpine 1997, AFC § 8.5.2.1). Staff recommends that such mufflers be installed during steam blows on the Sutter project (see proposed Condition of Certification Noise-4 below).

Alternatively, Calpine may elect to employ a new, quieter steam blow process, variously referred to as QuietBlow™ or Silentsteam™. This method utilizes lower pressure steam over a continuous period of approximately 36 hours. Resulting noise levels reach only about 80 dBA at 100 feet, equivalent to 45 to 50 dBA at the nearest residences (Calpine 1997, AFC § 8.5.2.1). This is nearly in compliance with County LORS (which pertain to long-term noise impacts, rather than short-term construction noise), and should not significantly disrupt the project's neighbors. Staff proposes a notification process (see proposed Condition of Certification Noise-5 below) to make neighbors aware of impending steam blows; this should help render the process tolerable to the project's neighbors.

Worker Effects

Calpine recognizes the need to protect construction personnel from noise hazards (Calpine 1997, AFC § 8.5.5.1). Calpine predicts that construction noise levels (other than steam blows) will not reach levels that require worker protection, but will put in place a hearing conservation program for employees who may be exposed to high levels of noise. To ensure that workers are adequately protected, staff has proposed a condition of certification (see proposed Condition of Certification Noise-3, below).

Linear Facilities

Construction of the gas line and transmission line will produce noise. This noise will be noticeable, and possibly annoying, to persons outside their homes at those residences nearest the construction. This work, however, is only a temporary phenomenon; no one residence should suffer impacts for more than a few days. In addition, such work is customarily performed during daytime, and would cause no impacts at night, when quiet is most important. While no LORS are in effect to assure daytime-only construction, staff has proposed a noise complaint process (see proposed Conditions of Certification Noise-1 and Noise-2, below) that will allow any person suffering annoyance to address the problem with Calpine. Staff believes no significant adverse noise impacts are likely to occur due to construction of the linear facilities.

PROJECT SPECIFIC IMPACTS — OPERATION

During its operating life, the project will represent essentially a steady, continuous 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.

As described above (see "Laws, Ordinances, Regulations and Standards"), the applicable standard[5] establishes strict quantitative limits to the noise caused by project operation. In the absence of specific LORS, we would turn to CEQA for guidance. Compliance with CEQA requires that significant noise impacts from the project be mitigated to a level of insignificance, if feasible. The applicable standard, however, is effectively more stringent, limiting power plant noise levels to 45 dBA at the property line of the nearest sensitive receptor.[6]

Calpine commits to incorporating noise mitigation measures into the design of the project that will ensure that noise levels at the nearest receptor, the residence at 4879 South Township Road, will not exceed 45 dBA (Calpine 1997, AFC § 8.5.2.2). Since 45 dBA is such a low noise level, and in fact is quieter than the natural (frog, insect, bird) and manmade (vehicular traffic and agricultural operations) noises typically encountered in the neighborhood of the project, staff agrees that this is a feasible approach to assuring project noise impacts do not exceed legal limits, and will likely not present a significant adverse impact upon sensitive receptors.

The potential noise mitigation measures described by Calpine (Calpine 1997, AFC § 8.5.2.2) are typical for such an application. They include (to be employed as required):

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[5] Sutter County General Plan, Table 7 (Sutter County 1996a).

[6] Sutter County 1996a, Policy 8.A-1, p. 71.

- enclosing the turbine generators in acoustical enclosures equipped with ventilation silencers, installing air inlet silencers on the combustion turbines, and providing a shroud around the combustion turbine exhaust expansion joint;
- lagging the outside of the HRSG and installing a silencer in the transition duct between the combustion turbine and the HRSG;
- encasing the condensers in acoustical shrouds;
- employing low-speed cooling tower fans;
- purchasing quieter electrical transformers, or constructing acoustical barriers around them; and
- installing acoustical shrouds or barrier walls around the boiler feed pumps and circulating water pumps.

These sorts of noise attenuation measures have been employed for years on similar facilities, and their noise control abilities are well known. Calpine's estimates of the extent of noise control possible (Calpine 1997, Table 8.5-4) appear easily achievable, and should allow the project to be rendered sufficiently quiet to meet the applicable noise limit of 45 dBA at the property line of the nearest residence. Staff has proposed measures (see proposed Condition of Certification Noise-6 below) to ensure that these noise mitigation measures are carried out, and that they are effective.

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 project 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. Calpine has identified likely major noise generating sources within the project (Calpine 1997, AFC § 8.5.2.2 and Table 8.5-5). The only strong tonal frequency identified is a one kilohertz whine expected from the circulating water pumps. Since the noise contribution from these pumps should not exceed 31 dBA at the nearest receptor, considerably quieter than ambient noise levels, it is unlikely that any tonal noises will be heard. To ensure this, staff has proposed measures (see proposed Condition of Certification Noise-6, below) to ensure that tonal noises are not allowed to cause a problem.

Worker Effects

Calpine lists those locations in the plant and those pieces of equipment likely to produce hazardous noise levels (Calpine 1997, AFC § 8.5.2.2, Table 8.5-4), and has committed to complying with all applicable noise protection laws, regulations and requirements (Calpine 1997, AFC § 8.5.5.1). Administrative procedures and hearing protection measures will be put in place to ensure workers' hearing is adequately protected. Staff has proposed measures (see proposed Condition of Certification Noise-7, below) to ensure compliance.

Linear Facilities

The linear facilities, once placed in operation, will likely produce no audible noise. The gas line will be silent from any distance. The electric transmission line will normally be inaudible from any distance beyond 100 feet (Calpine 1997, AFC § 8.5.2.2). A humming from corona effect would occur in rainy or highly humid conditions, but would be practically unnoticeable, masked by traffic sounds and other ambient noises.

CUMULATIVE IMPACTS

Requisite to any discussion of cumulative impacts are nearby projects existing or planned for the future. The Sutter project is unlikely to adversely impact adjacent development; the Greenleaf 1 cogeneration power plant represents the only such development. The Sutter project is unlikely to raise noise levels at the Greenleaf 1 plant significantly above existing levels, thus it will present no significant adverse noise impacts to workers at Greenleaf 1.

When Calpine began planning for the Sutter project, conversations with neighboring residents revealed dissatisfaction with noise from the Greenleaf 1 plant. Neighbors complained that noise from steam releases was disturbing. Calpine responded by purchasing mufflers for all the plant's steam relief and vent stacks, installing them over the ensuing months as shutdowns and maintenance work allowed. Calpine believes the noise nuisance from Greenleaf 1 has now been abated (Horn 1998, pers. comm.). Staff expects such muffling will be required for the Sutter project, and has proposed measures to ensure that the noise from steam releases does not annoy neighbors (see proposed Condition of Certification Noise-6, below).

The Sutter project will not be adversely impacted by the noise from any adjacent future development, as no such development is foreseen. Since the Sutter project noise emissions will be controlled to low levels in order to comply with LORS, they will likely be nearly unnoticeable next to Greenleaf 1. The combined noise levels from the Sutter and Greenleaf 1 plants are thus expected to be undetectably louder than the existing noise levels from Greenleaf 1 alone.

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 LORS then in existence would apply; applicable Conditions of Certification included in the Commission Decision would also apply unless properly modified.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Staff concludes that the project will likely be built and operated to comply with all applicable noise laws, ordinances, regulations and standards. Staff further concludes that the project will likely present no significant adverse noise impacts, individually or cumulatively. The project will likely represent an unobtrusive, nearly undetectable addition to existing noise levels.

The incorporation of a dry cooling system and rerouting of the transmission interconnection line, to a switchyard on the south side of O'Banion Road near the Sutter Bypass (Calpine 1998), will have negligible effect on noise impacts. The dry cooling system can be designed and built to produce noise levels no greater than those from wet cooling towers, while the O'Banion Road interconnection line route was found, in staff's alternatives study, to produce noise impacts identical to the originally proposed project.

RECOMMENDATIONS

Staff recommends that the following proposed Conditions of Certification be adopted to ensure compliance with all applicable noise LORS, and implementation of Calpine's and staff's proposed mitigation measures.

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 one mile of the site, by mail or other effective means, of the commencement of project construction. At the same time, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction and operation of the project. If the telephone is not staffed 24 hours per day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This telephone number shall be posted at the project site during construction in a manner visible to passersby. This telephone number shall be maintained until the project has been operational for at least one year.

Verification: The project owner shall transmit to the 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, and describing the method of that notification. 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 project, the project owner shall document, investigate, evaluate, and attempt to resolve all project related noise complaints.

Protocol: The project owner or authorized agent shall:

- use the Noise Complaint Resolution Form (see next page for example), or functionally equivalent procedure acceptable to the CPM, to document and respond to each noise complaint;
- attempt to contact the person(s) making the noise complaint within 24 hours;
- conduct an investigation to determine the source of noise related to the complaint;
- if the noise is project related, take all feasible measures to reduce the noise at its source; and
- submit a report documenting the complaint and the actions taken. The report shall include: a complaint summary, including final results of noise reduction efforts; and if obtainable, a signed statement by the complainant stating that the noise problem is resolved to 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 the Sutter County Community Services Department 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 project construction, 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 If a traditional, high-pressure steam blow process is employed, the project owner shall equip steam blow piping with a temporary silencer that quiets the noise of steam blows to no greater than 100 dBA measured at a distance of 100 feet. The project owner shall conduct steam blows only during the hours of 7:00 a.m. to 8:00 p.m. weekdays, and 8:00 a.m. to 8:00 p.m. weekends and holidays.

NOISE COMPLAINT RESOLUTION FORM

SUTTER POWER PLANT PROJECT
(97-AFC-2)

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: _____ dBA Date: _____
Initial noise levels at complainant's property: _____ dBA Date: _____

Final noise levels at 3 feet: _____ 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.)

If a modern, low-pressure continuous steam blow process is employed, the project owner shall submit a description of this process, with expected noise levels and projected hours of execution, to the CPM.

Verification: At least 15 days prior to the first high-pressure steam blow, the project owner shall submit to the CPM drawings or other information describing the temporary steam blow silencer, and a description of the steam blow schedule. At least 15 days prior to the first low-pressure continuous steam blow, the project owner shall submit to the CPM drawings or other information describing the process, including the noise levels expected and the expected time schedule for execution of the process.

NOISE-5 The project owner shall conduct a public notification program to alert residents within one mile of the site prior to the start of steam blow activities. The notification shall include a description of the purpose and nature of the steam blow(s), the proposed schedule, the expected sound levels and the explanation that it is a one-time operation and not a part of normal plant operations.

Verification: At least 15 days prior to the first steam blow(s), the project owner shall notify all residents within one mile of the site of the planned steam blow activity, and shall make the notification available to other area residents in an appropriate manner. The notification may be in the form of letters to the area residences, telephone calls, fliers or other effective means. Within five (5) days of notifying these entities, the project owner shall send a letter to the CPM confirming that they have been notified of the planned steam blow activities, including a description of the method(s) of that notification.

NOISE-6 Upon the project 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. If the results from the survey indicate that operation of the power plant causes noise levels in excess of 45 dBA (l_{eq}) measured at the property line of the nearest residence, additional mitigation measures shall be implemented to reduce noise to a level of compliance with this limit. No single piece of equipment shall be allowed to stand out as a dominant source of noise.

Verification: Within 30 days after first achieving an output of 80 percent or greater of rated output, the project owner shall conduct the above described noise survey. Within 30 days after completing the survey, the project owner shall submit a summary report of the survey to the Sutter County Community Services Department 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-7 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 in full operation, 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 California and federal regulations.

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

REFERENCES

DHS (California Department of Health Services), Office of Noise Control. *Model Community Noise Control Ordinances*, 1977.

Salter (Charles M. Salter Associates, Inc.). *Guidelines for Preparing Environmental Impact Statements on Noise*. National Research Council/ National Academy of Sciences, 1977.

Cunniff, Patrick F., *Environmental Noise Pollution*. John Wiley & Sons, 1992.

Calpine (Calpine Corporation). 1997. Application for Certification, Sutter Power Project (97-AFC-2). Submitted to the California Energy Commission, December 15, 1997.

Calpine. 1998. Letter from Calpine to Paul Richins, CEC staff, re: Additional Environmental Mitigation for Calpine's Sutter Power Plant, September 11, 1998.

Horn, Mike. Plant Manager, Greenleaf 1 Cogeneration Plant. Conversation with Steve Baker (California Energy Commission), March 31, 1998.

Kryter, Karl D. *The Effects of Noise on Man.* Academic Press, N.Y., 1970.

Peterson and Gross (Peterson, Arnold P. G. and Ervin E. Gross, Jr.). *Handbook of Noise Measurement*, 7th ed. GenRad, Concord, Mass., 1974.

Suter, Alice H., "Noise Sources and Effects: A New Look." *Sound and Vibration*, January 1992.

Sutter County (Sutter County Community Services Department). 1996a. County of Sutter General Plan 2015 Policy Document, Section 8, Noise. November 25, 1996.

Sutter County (Sutter County Community Services Department). 1996b. County of Sutter General Plan Background Report. November 25, 1996, pp. 12-17— 12-19.

Thumann, Albert and Richard K. Miller, *Fundamentals of Noise Control Engineering*. Prentice-Hall, 1986.

EPA (U.S. Environmental Protection Agency). 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (55/9-74-004)*.

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 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		
	110	Rock Music Concert	Very Loud
Pile Driver (50')	100		
Ambulance Siren (100')	90	Boiler Room	
Freight Cars (50')			
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
	0		
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.

- Except under special conditions, a change in sound level of 1 dB cannot be perceived.
- Outside of the laboratory, a 3 dB change is considered a barely noticeable difference.
- A change in level of at least 5 dB is required before any noticeable change in community response would be expected.
- 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 3-dB increase (i.e., the resultant sound level is the sound level from a single passing automobile plus 3 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 regulations

VISUAL RESOURCES

Testimony of Gary D. Walker

INTRODUCTION

Visual resources are the natural and cultural features of the environment that can be viewed. Visual quality is the value of visual resources. Scenic resources are visual resources that contribute positively to visual quality.

This analysis describes laws, ordinances, regulations and standards (LORS) applicable to the Sutter Power Plant (SPP) project; assesses the visual setting of the SPP site and linear facility routes; evaluates the visual impacts of the SPP on the existing setting; evaluates compliance of the SPP with applicable laws, ordinances, regulations, and standards; and recommends measures needed to mitigate any potential significant adverse impacts of the SPP. For a more detailed explanation of staff's visual analysis methodology, see Visual Resources Appendix B. 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.[7] The determination of the conformance of the proposed project with applicable LORS is required by Public Resources Code section 25525.

The applicant's comments regarding the visual resources section of the Preliminary Staff Assessment (Calpine, 1998 cc) have been considered in preparing this analysis, and changes have been made as deemed appropriate..

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

FEDERAL AND STATE

The proposed project, including the transmission rights-of-way, is located on private lands and is thus not subject to federal or state land management requirements. Likewise, no roadway in the project vicinity is a designated or eligible State Scenic Highway (California Department of Transportation, 1992; AFC, p.5.9-1). Therefore, no federal or state regulations pertaining to scenic resources are applicable to the project.

[7] The California Energy Commission's power plant siting regulations.

LOCAL

County of Sutter

General Plan

The land use element of the Sutter County General Plan (November 1996) sets forth visual and scenic resources policies that are applicable to the project. They are as follows:

- The county shall require that new development be designed to use vegetation for screening structures and parking areas.

- The county shall require that design and development standards be applied to all industrial and commercial areas to improve the aesthetic appearance of those developments (Sutter County 1996a, p.17).

Zoning Code

Chapter 15 of the Sutter County Zoning Code sets forth landscaping and height requirements (Sutter County 1996b, Division 55 (PD District), pp. 41, 44, 62, and 63).

PROJECT DESCRIPTION

The SPP consists of a nominal 500 megawatt (MW) natural gas-fired power plant, a 230 kilovolt (kV) switchyard, a 230 kV transmission line, an electrical switching station, and a natural gas line.

POWER PLANT

Please see PROJECT DESCRIPTION Figure 3 for an artist's rendering of the power plant. The most visually prominent elements of the power plant would be the cooling tower banks, heat recovery steam generator (HRSG), and exhaust stacks (See VISUAL RESOURCES Figure 1). The dimensions of major power plant features are shown in VISUAL RESOURCES Table 1; also see VISUAL RESOURCES Figure 2. The AFC (p.8.11-21) states that project structures, stacks, buildings, and tanks will be painted in earth tones. However, the photosimulations use gray as the color for the power plant structures, and the applicant's consultant has confirmed that gray is the color now proposed for the power plant (Davey 1998). Therefore, this analysis assumes that gray is the proposed color for the plant..

ELECTRICAL TRANSMISSION LINE

The SPP would include 5.7 miles of new single-circuit 230 kV transmission lines (SPP 1998h). Towers would be pole structures (SPP 1997a, p.6-5). Each structure would be approximately 100 feet tall (See PROJECT DESCRIPTION Figure 4).

VISUAL RESOURCES Figure 1
Elevations of Proposed SPP

VISUAL RESOURCES Figure 2
Plan View Showing Dimensions of Major Facilities at the SSP

VISUAL RESOURCES Table 1
Dimensions of Major Structures of Proposed Power Plant

STRUCTURE	HEIGHT	LENGTH	WIDTH	DIAMETER
HRSG unit	90'	160'	31'	-
HRSG stack*	185'	-	-	20' top 30' bottom
Cooling Tower*	50'	360'	50'	-
Fire/service water storage tank	50'	-	-	60'
Demineralized water tank	50'	-	-	45'
Water treatment building	26'	100'	65'	-
Control/administration building	26'	120'	60'	-
Condenser	20'	20'	30'	-
Combustion turbine	20'	45'	30'	-
Air inlet filter w/evaporator cooler	40'	45'	73'	-
Pipe rack	35'	-	25'	-

Calpine's mitigation proposal (Calpine 1998q) reduces the stack height to 145 feet and changes the cooling tower to a dry cooling structure. These changes are addressed later in this analysis.

Source: SPP 1998f, Data Response 47.

SWITCHING STATION

The transmission line would terminate at a proposed switching station. The dimensions of the major structures in the switching station are shown in VISUAL RESOURCES Table 2 and VISUAL RESOURCES Figure 3.

NATURAL GAS PIPELINE

See the PROJECT DESCRIPTION section of the PSA.

VISUAL RESOURCES Table 2
Dimensions of Major Switching Station Structures

STRUCTURE	HEIGHT	LENGTH	WIDTH
Circuit breaker	20'	16'	12'
Disconnect switch	20'	24'	10'
Dead-end tower prior to switching station	65'	48'	17'
Dead-end tower at switching station	58'	48'	17'

Source: SPP 1998f, Data Response 47.

VISUAL RESOURCES Figure 3
Dimensions of Major Facilities at the Proposed Switching Station

SETTING

REGIONAL SETTING

The SPP site is located in the Sacramento Valley in central Sutter County, a rural area approximately seven miles southwest of Yuba City (see PROJECT DESCRIPTION Figure 1). The region is characterized by the flat Sacramento Valley, with views of the Sutter Buttes, the Coast Range, and the Sierra Nevada Mountains on the horizon. Vegetation is abundant, consisting primarily of agricultural crops, including orchards, row crops, and rice fields. Transmission lines exist in the region, but they are not visible in much of the region and appear as subordinate elements in the landscape of most of the area in which they are visible.

The most prominent and scenic landscape feature in the region is the Sutter Buttes, which are located approximately 9 miles north of the project site. The Buttes are a unique geological feature in the Sacramento Valley. The Buttes are visible from various locations in the region. However, because of the flat topography in most of the region and the presence of many trees, including orchards, a substantial portion of the area does not have views of the Buttes.

PROJECT AREA SETTING

The area surrounding the SPP site is agricultural and rural residential in nature. Agricultural uses (orchards, rice fields, and other field crops) are located to the north, south, and west of the project site. The Sutter Buttes are prominent in views to the northwest, and the trees of the Sutter Bypass are visible in views to the west. This mixture of landscape elements provides substantial variety in color, texture, and topography. Visual quality in the project area ranges from low-to-moderate for views of agricultural areas that include the existing Greenleaf 1 power plant in the foreground with no view of the Sutter Buttes, to high for views of agricultural areas dominated by the Sutter Buttes with no view of the Greenleaf 1 power plant.

Several electrical distribution lines on wood poles are in the project area. The distribution lines are all on wood poles. One distribution line runs along the east side of South Township Road. Another line runs along the south side of Best Road. A third line runs along the north side of O'Banion Road. A PG&E 500 kV transmission line and a 230 kV Western line, both on steel lattice towers, run northwest to southeast along the eastern edge of the Sutter Bypass about two miles west of the project site.

SITE

The proposed power plant site is located immediately west of the existing Greenleaf 1 power plant. Site topography is flat with an elevation of approximately 36 feet above sea level. Vegetation within the site consists of high growing grasses and young willow and cottonwood trees (up to 15 feet tall). There are no existing structures on the site.

VISUAL RESOURCES Table 3
Dimensions of Major Structures of Existing Greenleaf 1 Cogeneration Plant

STRUCTURE	HEIGHT	LENGTH	WIDTH	DIAMETER
HRSG unit	50'	55'	40'	-
HRSG stack	60'	30'	22'	-
Cooling tower	50'	100'	50'	-
Steam turbine	15'	120'	33'	60'
Steam turbine building	50'	90'	55'	45'
Storage building	15'	84'	65'	-
Process material area	15'	110'	50'	-
Control building	20'	60'	40'	-
Office building	15'	40'	20'	-
Dryers	15'	-	-	3'

Source: SPP 1998f, Data Response 49.

VISUAL RESOURCES Figure 4
Plan View Showing Dimensions of Major Facilities at the Existing Greenleaf 1 Cogeneration Plant

The Greenleaf 1 cogeneration plant is located immediately to the east of the proposed site, on the same parcel. The Greenleaf 1 plant includes a gas-fired combustion turbine and generator, a two-cell cooling tower, a steam turbine and steam turbine generator, and several agricultural dryers. The dimensions of the major structures of the Greenleaf 1 plant are shown in VISUAL RESOURCES Table 3 and VISUAL RESOURCES Figure 4. The existing Greenleaf 1 facility is visible from the project site and from areas surrounding the project site. The height of the cooling tower plume from the Greenleaf 1 facility is calculated to be 190 meters (623 feet) or greater approximately 10 percent of the daylight hours per year with a radius of 139 meters (457 feet). The plume with these dimensions is visible approximately 2.8 percent of the daylight hours per year. The Greenleaf 1 cooling tower plume is calculated to have a maximum height of 830 meters (2,723 feet) or greater five percent of the daylight hours per year. A plume this size is calculated to be visible 1 percent of the daylight hours per year, and obscured by fog the other four percent of the daylight hours per year. A plume 90 meters (311 feet) in height is calculated to be visible approximately 21 percent of the time (CEC 1998e).

VIEWSHED

Power Plant Site

VISUAL RESOURCES Figure 5 shows the approximate boundaries of the power plant site's viewshed. Some views of the power plant site from surrounding areas are screened by orchards. The existing Greenleaf 1 cogeneration plant would screen much of the proposed project from viewpoints directly east of the SPP.

The site is visible from portions of South Township, Best, Pierce, and O'Banion Roads, and from a number of residences along those roads. The clearest overall views of the site are along South Township Road southeast and northeast of the site and along Pierce Road north of the site.

Views in the viewshed are predominantly rural in character. Rice fields, row crops, and orchards are the most prevalent agricultural elements. The Sutter Buttes are visible in views to the northwest, rising dramatically at the horizon. The trees in the Sutter Bypass are visible in views to the west. Some views include the existing Greenleaf 1 cogeneration plant. Some views include the existing Western Area Power Administration 230 kV transmission line and the existing PG&E 500 kV transmission line where the lines run along the eastern edge of the Sutter Bypass. However, these lines are generally more than two miles from residences and most public roads in the viewshed, so they are subordinate visual elements. In addition, the trees in the Sutter Bypass provide a varied background into which the lower portions of the lattice towers visually blend. The 115 kV power line on wood poles that runs along the eastern side of South Township Road is in the foreground for residences on South Township Road. The 12 kV line on wood poles runs along the south side of Best Road. An electrical distribution line on wood poles runs along the south side of O'Banion Road. Nearby residences are located along South Township Road, Pierce Road, Best Road, and O'Banion Road.

VISUAL RESOURCES Figure 5
SPP Power Plant Site Viewshed

As previously discussed, views of the Sutter Buttes are screened in much of the region by existing vegetation. However, most of the viewshed of the proposed project has unobstructed views toward the Buttes because of the prevalence of low-growing rice and row crops in the area. In addition, most views in the viewshed also have views of the trees in the Sutter Bypass. Therefore, the landscape is not common in the region. Visual quality ranges from low-to-moderate for views in which the existing Greenleaf 1 plant is prominent with no scenic element in view, to high for clear views of the Sutter Buttes that do not include Greenleaf 1. The level of visual quality for the project area is generally higher than that of the larger regional landscape, much of which does not have unobstructed views of the Buttes.

Portions of the SPP are potentially visible to four types of viewers: 1) foreground or close-range residents northeast of the site, 2) middleground residents north, east, and southeast of the site, 3) background residents south and southeast of the site, and 4) rural arterial roadway motorists and passengers.

Three residences along South Township Road northeast of the site are within foreground distances of the proposed power plant site. Mid-range residences include two along South Township Road southeast of the site, three along Pierce Road north of the site, and three along Best Road east of the site. Residences within background distances include four along South Township Road southeast of the site and three along O'Banion Road south of the site. Surrounding orchards and mature landscaping partially screen some views from mid-range residences. Because residences are occupied for many hours per day and for many years, residents are particularly sensitive receptors in regard to visual resources.

Rural arterial roadway motorists consist of viewers traveling primarily on South Township Road, O'Banion Road, Oswald Road, George Washington Boulevard, Best Road, and Pierce Road. Foreground views toward the project site are visible upon approach from the north or south along South Township Road, from the east on Best Road, and from the east or west along Pierce Road. Travelers on O'Banion Road have background views. Views of the power plant site along Oswald Road and George Washington Boulevard are very limited because of obstructions, primarily orchards.

Electrical Transmission Line

The electrical transmission line would consist of 100-foot-tall steel poles located approximately 700 to 800 feet apart. The line would be visible from all of the view areas described for the project site, as well as from State Route 113 about a mile east of and parallel to the transmission line route for approximately two miles. VISUAL RESOURCES Figure 6 shows the viewshed for the southern portion of the transmission line. Views from State Route 113 would be intermittently blocked by trees and other vegetation. The existing transmission lines in the area are subordinate visual elements.

VISUAL RESOURCES Figure 6
Viewshed for Southern Portion of SPP Transmission Line

Natural Gas Pipeline

The natural gas pipeline would be placed under ground for its entire length, and therefore it would not be visible. Two dehydrator units would be located at existing Pacific Gas and Electric (PG&E) pipeline drip lots. The existing Sacramento Drip Lot, approximately 100 feet by 100 feet, surrounded on three sides by walnut trees and on the fourth side by a levee. The existing Poundstone Drip Lot, approximately 100 feet by 60 feet, is surrounded on three sides by field crops and on the fourth (east) side by an irrigation ditch and Poundstone Road. At each location, an additional 100 feet by 50 feet (5,000 square foot) area would be required. The tallest structure to be added to each station would be the contact towers at between 18 and 21 feet in height (SPP 1998f, Data Response 61). The fence surrounding the additional areas will be a continuation of the existing fencing, at least seven feet high with three rows of barbed wire on extension arms. The six feet of cyclone fencing would have green slats installed in the fencing material in order to provide visual screening. PG&E has no plans to surround the stations with vegetation because both are located within existing agricultural settings. (SPP 1998f, Data Response 54).

SCENIC FEATURES AND VIEW CORRIDORS

There are no designated scenic highways, roads, or corridors in the project vicinity. However, Sutter County states that roadways along the Sacramento River are "visually and aesthetically scenic." (Sutter County 1996). In addition, the County General Plan recognizes the scenic value of the Sutter Buttes, which are visible from the project vicinity. Views that include the Buttes are generally of high quality. Where industrial development is present the degree to which visual quality is reduced depends on the level of dominance by that development.

SENSITIVE RECEPTORS

Potentially sensitive receptors include residences along neighboring roads and travelers on those roads and on State Route 113.

KEY OBSERVATION POINTS

Visual resource effects on each group of sensitive receptors were evaluated from representative Key Observation Points (KOPs) (see VISUAL RESOURCES Table 4 and VISUAL RESOURCES Figures 5 and 6). Views from KOPs are shown both before project construction and with the project simulated in the view, at the end of the visual resources section. Photographs of the existing setting and photosimulations of the proposed project in the setting from each KOP are shown in VISUAL RESOURCES Appendix A. KOP 6 was eliminated from consideration because it was established to capture the view of the original transmission line route, which was subsequently changed. However, it is discussed later in this analysis in regard to a potential mitigation measure that would reroute the southern portion of the transmission line to a route along O'Banion Road. Staff's assessment of the visual quality, viewer sensitivity, visibility, and viewer exposure for the views represented by

VISUAL RESOURCES Table 4
Key Observation Points

KOP Number	Description
1	Taken from near closest residence: near the intersection of South Township Road and Best Road.
2	Taken from near residences on Best Road east of site.
3	Taken from near residences on Pierce Road northwest of site.
4	Taken from near residences on South Township Road southeast of site.
5	Taken from near residences near the intersection of South Township Road and O'Banion Road south of the site.
7	Taken from near the residence near the intersection of South Township Road and Tudor Road, looking south toward the proposed switching station site.
8	Taken from State Highway 113 just north of the Sutter Bypass, looking northwest toward the proposed transmission line route.

each KOP is presented in VISUAL RESOURCES Appendix C.

IMPACTS

PROJECT SPECIFIC IMPACTS

Operation Impacts

As discussed in Visual Resources Appendix B, Commission staff's impact assessment methodology considers the susceptibility to visual impact and the severity of impact together to determine the significance of impact for most factors. Both of these values are considered in regard to each of the view areas, represented by key observation points. Lighting and visible plume impacts as well as construction impacts are addressed separately.

Project Site and Transmission Line

VISUAL RESOURCES Table 5 shows the values for visual quality, viewer sensitivity, visibility, and viewer exposure (discussed in Appendix C) determined for each of the Key Observation Points analyzed and the resultant value for visual impact susceptibility assessed for each Key Observation Point.

VISUAL RESOURCES Table 6 shows the values for form, line, color, texture, and scale contrast; scale dominance; spatial dominance; and view blockage (discussed in Appendix D) determined for each of the Key Observation Points analyzed, and the resultant value for impact severity for each Key Observation Point.

VISUAL RESOURCES Table 5
Visual Impact Susceptibility - Key Observation Points

	VISUAL QUALITY	VIEWER SENSITIVITY	VISIBILITY	VIEWER EXPOSURE	VISUAL IMPACT SUSCEPTIBILITY
Key Observation Point 1	Low-to-Moderate	High	Moderate	Moderate-to-High	Moderate
Key Observation Point 2	Moderate	High	High	Moderate	Moderate-to-High
Key Observation Points 3	Low-to-Moderate	High	Moderate	Moderate-to-High	Moderate
Key Observation Point 4	Moderate-to-High	High	High	Moderate-to-High	Moderate-to-High
Key Observation Point 5	Moderate-to-High	High	High	Moderate-to-High	Moderate-to-High
Key Observation Point 7	Moderate	High	Moderate-to-High	Moderate-to-High	Moderate-to-High
Key Observation Point 8	Moderate-to-High	High	Moderate	Moderate	Moderate-to-High

VISUAL RESOURCES Table 6
Visual Impact Severity - Key Observation Points

	FORM CONTRAST	LINE CONTRAST	COLOR CONTRAST	TEXTURE CONTRAST	SCALE CONTRAST	SCALE DOMINANCE	SPATIAL DOMINANCE	VIEW BLOCKAGE	VISUAL IMPACT SEVERITY
Key Observation Point 1	Structures: L* Vegetation: L Land: L	Structures: L Vegetation: L Land: L	Structures: M Vegetation: L Land: L	Structures: L Vegetation: L Land: L	Structures: M Vegetation: L Land: L	***Co-Dominant***	Co-dominant	Negligible	Strong
Key Observation Point 2	Structures:L Vegetation: L Land: L	Structures: L Vegetation: L Land: L	Structures: L Vegetation: L Land: L	Structures: L Vegetation: L Land: L	Structures: L Vegetation: L Land: L	Subordinate	Subordinate to Co-dominant	Weak	Moderate
Key Observation Points 3	Structures: L Vegetation: L Land: L	Structures: L Vegetation: L Land: L	Structures: M Vegetation: M Land: M	Structures: L Vegetation: L Land: L	Structures: M Vegetation: L Land: L	***Dominant***	***Dominant***	Weak	Very Strong
Key Observation Point 4	Structures: L Vegetation: ***H*** Land: ***H***	Structures: L Vegetation: ***H*** Land: ***H***	Structures: M Vegetation: L Land: L	Structures: L Vegetation: L Land: L	Structures: H Vegetation: L Land: H	***Co-dominant***	Co-dominant	Moderate	Very Strong
Key Observation Point 5	Structures: M Vegetation: L Land: L	Structures: L Vegetation: L Land: L	Structures: M Vegetation: L Land: L	Structures: M Vegetation: L Land: L	Structures: M Vegetation: L Land: L	***Co-dominant***	Co-dominant	Weak	Strong
Key Observation Point 7	Structures: M Vegetation: ***H*** Land: ***H***	Structures: L Vegetation: ***H*** Land: ***H***	Structures: M Vegetation: M Land: M	Structures: M Vegetation: H Land: M	Structures: H Vegetation: L Land: H	***Dominant***	***Dominant***	Negligible	Very Strong
Key Observation Point 8	Structures: L Vegetation: ***H*** Land/Sky: ***H***	Structures: L Vegetation: ***H*** Land: ***H***	Structures: M Vegetation: ***H*** Land: ***H***	Structures: L Vegetation: L Land: L	Structures: L Vegetation: L Land: L	***Co-dominant***	Co-dominant	Moderate	Very Strong

* L = Low; M = Moderate; H = High

Factors shown in bold italic type contributed to visual severity ratings of strong or very strong.

Table B-1 in Appendix B shows the contribution to visual impact severity for each level of each factor.

VISUAL RESOURCES Table 7 shows for each Key Observation Point the values for visual impact susceptibility and visual impact severity and the resultant values for visual impact significance.

Key Observation Point 1: Nearest Residence

Visual Impact Susceptibility

Key Observation Point 1 is located near the closest residence to the proposed power plant site, near the intersection of South Township Road and Best Road (see VISUAL RESOURCES Figure 5). This Key Observation Point also represents another residence along South Township Road northeast of the proposed power plant site.

For Key Observation Point 1 visual quality is low-to-moderate, viewer sensitivity is high, visibility is moderate, and viewer exposure is moderate-to-high, so visual impact susceptibility is moderate (see VISUAL RESOURCES Table 5, Figure 7, and Figure B-3).

Visual Impact Severity

VISUAL RESOURCES Figure 8 shows the appearance of the project from Key Observation Point 1 (representing the closest residence).

Because scale dominance would be co-dominant, the project's visual impact severity from Key Observation Point 1 would be strong (see VISUAL RESOURCES Tables 6 and B-1).

Visual Impact Significance

Because visual impact susceptibility for Key Observation Point 1 is moderate and visual impact severity would be strong, visual impact would be less than significant (see VISUAL RESOURCES Tables 7 and B-2).

Key Observation Point 2: Residences on Best Road

Visual Impact Susceptibility

Key Observation Point 2 is located on Best Road, near residences east of the proposed project site (see VISUAL RESOURCES Figure 5).

For Key Observation Point 2 visual quality is moderate, viewer sensitivity is high, visibility is high, and viewer exposure is moderate, so visual impact susceptibility is moderate-to-high (see VISUAL RESOURCES Table 5, Figure 9, and Figure B-3).

Visual Impact Severity

VISUAL RESOURCES Figure 10 shows the appearance of the project from Key

VISUAL RESOURCES Table 7
Visual Impacts Before Proposed Mitigation - Key Observation Points

	VISUAL IMPACT SUSCEPTIBILITY	VISUAL IMPACT SEVERITY	ViSUAL IMPACT SIGNIFICANCE
Key Observation Point 1	Moderate	Strong	Less than significant
Key Observation Point 2	Moderate-to-High	Moderate	Less than significant
Key Observation Points 3	Moderate	Very Strong	Significant
Key Observation Point 4	Moderate-to-High	Very Strong	Significant
Key Observation Point 5	Moderate-to-High	Strong	Significant
Key Observation Point 7	Moderate-to-High	Very Strong	Significant
Key Observation Point 8	Moderate-to-High	Very Strong	Significant

Observation Point 2 (representing residences on Best Road).

Because a) the highest contrast rating would be moderate for color, b) scale dominance would be subordinate, c) spatial dominance would be co-dominant, and d) the severity of view blockage would be weak, the project's visual impact severity from Key Observation Point 2 would be moderate (see VISUAL RESOURCES Tables 6 and B-1).

Visual Impact

Because for Key Observation Point 2 visual impact susceptibility is moderate-to-high and visual impact severity would be moderate, visual impact would be less than significant (see VISUAL RESOURCES Tables 7 and B-2).

Key Observation Point 3: Residences on Pierce Road

Visual Impact Susceptibility

Key Observation Point 3 is located on Pierce Road, near four residences (see VISUAL RESOURCES Figure 5).

For Key Observation Point 3 visual quality is low-to-moderate, viewer sensitivity is high, visibility is moderate, and viewer exposure is moderate-to high, so visual impact

susceptibility is moderate (see VISUAL RESOURCES Table 5, Figure 11, and Figure B-3).

Visual Impact Severity

VISUAL RESOURCES Figure 12 show the appearance of the project from Key Observation Point 3 near residences on Pierce Road).

For Key Observation Point 3, because a) scale dominance would be dominant, and b) spatial dominance would be dominant, the project's visual impact severity would be very strong (see VISUAL RESOURCES Tables 6 and B-1).

Visual Impact Significance

Because visual impact susceptibility for Key Observation Point 3 is moderate to high and visual impact severity would be very strong, visual impact would be significant without mitigation (see VISUAL RESOURCES Table 7 and Figure B-5). The applicant has proposed mitigation to lessen the visual impacts from the area represented by Key Observation Point 3 (see below).

Key Observation Point 4: Residences On South Township Road

Visual Impact Susceptibility

Key Observation Point 4 is located on South Township Road, southeast of the proposed project site (see VISUAL RESOURCES Figure 5).

For Key Observation Point 4 visual quality is moderate-to-high, viewer sensitivity is high, visibility is high, and viewer exposure is moderate-to-high, so visual impact susceptibility is moderate-to-high (see VISUAL RESOURCES Table 5, Figure 13, and Figure B-3).

Visual Impact Severity

VISUAL RESOURCES Figure 14 shows the appearance of the project from Key Observation Point 4.

Because a) the project would cause a high level of contrast with vegetation in regard to form and line, b) the project would cause a high level of contrast with land in regard to form and line, c) scale dominance would be co-dominant, and d) the severity of view blockage would be strong, the project's visual impact severity from Key Observation Point 4 would be very strong (see VISUAL RESOURCES Tables 6 and B-1).

Visual Impact Significance

Because visual impact susceptibility for Key Observation Point 4 is moderate-to-high and visual impact severity would be very strong, visual impact without mitigation would be significant (see VISUAL RESOURCES Tables 7 and Figure B-5). The applicant has proposed mitigation to lessen the visual impacts from the area represented by Key Observation Point 4 (see below).

Key Observation Point 5: Residences at O'Banion Road and South Township Road

Visual Impact Susceptibility

Key Observation Point 5 is located near the intersection of O'Banion Road and South Township Road, and represents residences in the area and travelers on South Township Road and O'Banion Road (see VISUAL RESOURCES Figure 5).

For Key Observation Point 5 visual quality is moderate-to-high, viewer sensitivity is high, visibility is high, and viewer exposure is moderate to high, so visual impact susceptibility is moderate-to-high (see VISUAL RESOURCES Table 5, Figure 15, and Figure B-3).

Visual Impact Severity

VISUAL RESOURCES Figure 16 shows the appearance of the project from Key Observation Point 5.

Because the proposed transmission line would dominate the view from Key Observation Point 5, the project's visual impact severity for that view location would be strong (see VISUAL RESOURCES Tables 6 and B-1).

Visual Impact Significance

Because visual impact susceptibility for Key Observation Point 5 is moderate to high and visual impact severity would be strong, visual impact without mitigation would be significant (see VISUAL RESOURCES Tables 7 and B-5). The applicant has proposed mitigation to lessen the visual impacts from the area represented by Key Observation Point 5 (see below).

Key Observation Point 7: Residence near Tudor Road and South Township Road

Visual Impact Susceptibility

Key Observation Point 7 is located near a residence near the intersection of Tudor Road and South Township Road (see VISUAL RESOURCES Figure 5).

For Key Observation Point 7 visual quality is moderate, viewer sensitivity is high, visibility is moderate to high, and viewer exposure is moderate-to-high, so visual

impact susceptibility is moderate to high (see VISUAL RESOURCES Table 5, Figure 17, and Figure B-3).

Visual Impact Severity

VISUAL RESOURCES Figure 18 shows the appearance of the project from Key Observation Point 7.

Because a) contrast with vegetation would be high in regard to form and line, b) contrast with land would be high in regard to form and line, c) scale dominance would be dominant, and d) the overall spatial dominance would be dominant, the project's visual impact severity from Key Observation Point 7 would be very strong (see VISUAL RESOURCES Tables 6 and B-1).

Visual Impact Significance

Because visual impact susceptibility for Key Observation Point 7 is moderate-to-high and visual impact severity would be very strong, visual impacts without mitigation would be significant (see VISUAL RESOURCES Tables 7 and B-2). The applicant is considering a rerouting of the transmission line which would eliminate the visual impacts on the area represented by Key Observation Point 7 (see below).

Key Observation Point 8: State Route 113

Visual Impact Susceptibility

Key Observation Point 8 is located on State Route 113 and represents the views of northbound travelers on that highway. The view is toward the proposed transmission line and the power plant site (see VISUAL RESOURCES Figure 6).

For Key Observation Point 8 visual quality is moderate to high, viewer sensitivity is high, visibility is moderate, and viewer exposure is moderate, so visual impact susceptibility is moderate-to-high (see VISUAL RESOURCES Table 5, Figure 19, and Figure B-3).

Visual Impact Severity

VISUAL RESOURCES Figure 20 shows the appearance of the project from Key Observation Point 8, showing the transmission line as it would look from the State Route 113 looking northwest toward the Sutter Buttes.

Because a) contrast with vegetation would be high in regard to form, line, and color, b) contrast with land/sky would be high in regard to form, line, and color, and c) scale dominance would be co-dominant, the project's visual impact severity from Key Observation Point 8 would be very strong (see VISUAL RESOURCES Tables 6 and B-1).

Visual Impact Significance

Because visual impact susceptibility for Key Observation Point 8 is moderate-to-high and visual impact severity would be very strong, visual impacts without mitigation would be significant (see VISUAL RESOURCES Tables 7 and B-2). The applicant is considering re-routing as a mitigation that would eliminate the visual impacts on the area represented by Key Observation Point 8 (see below).

Lighting

The proposed project has the potential to substantially increase the amount of light visible from nearby residences and roads.

The applicant has proposed measures to reduce lighting impacts, and staff has expanded on these measures (see below).

Gas Pipeline

Because the gas pipeline would be buried and not be visible after construction is completed, it would not cause significant visual impacts. The two proposed dehydrator units would be placed in expansions of the existing drip lots. The existing Sacramento Drip Lot is surrounded on three sides by walnut trees and on the fourth side by a levee. The existing Poundstone Drip Lot is surrounded on three sides by field crops and on the fourth side by an irrigation ditch and Poundstone Road. The fence surrounding the additional areas will be a continuation of the existing fencing, at least seven feet high with three rows of barbed wire on extension arms. The six feet of cyclone fencing fabric would have green slats installed in the fencing material to provide visual screening. PG&E has no plans to surround the drip stations with vegetation because both are located within existing agricultural settings (SPP 1998_, Data Response 54). The tallest existing structures at the drip lots are approximately 12 feet tall. The tallest proposed and structures at the drip lots would be between 18 and 21 feet tall (SPP 1998_, Data Response 61). Because of the remote location and existing tree and levee screening at the Sacramento River Drip Lot, visual impacts are not expected to be significant. Because the Poundstone Drip Lot is near a county road it is more visible. However, because existing trees along the road screen the facility for all but a few seconds of driving time and the view angle is such that the travelers would be required to turn their heads to see the site, visual impacts are not expected to be significant. The applicant cites measures to minimize impacts (see below).

Visible Plumes

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. Visible plume formation is more frequent during the cooler seasons, when ambient conditions are less conducive to evaporation of the condensed water droplets.

Because of the greater water saturation in the exhaust plume of a cooling tower cell than in the plume of a combustion turbine generator or heat recovery steam generator, visible plumes are generally more frequent, larger, and of longer duration from cooling towers. Sacramento Cogeneration Authority had a modeling analysis performed for its Procter & Gamble cogeneration plant to evaluate the magnitude of any potential environmental impacts resulting from the operation of the proposed cooling tower. Characteristics of visible plumes that are important to an assessment of visual impacts include plume length (the distance over which a plume remains intact), plume height, and plume shadowing (the blocking of incident solar radiation by a plume). Energy Commission staff have used the results of this model and the design parameters for the Sutter Power Project to calculate the frequency and size of the cooling tower plume for the Sutter Power Project. The calculations indicate that for approximately five percent of the daylight hours per year the plume will be greater than 790 meters (2,592 feet) tall, 514 meters (1,686 feet) thick, and 712 meters (2,337 feet) wide. For approximately ten percent of the time the plume height will be greater than 180 meters (591 feet). For approximately 33 percent of the time the plume height will be 90 meters (296 feet) or greater (CEC 1998d). The same ambient meteorological conditions that result in a condensate plume formation from the cooling tower (cool temperatures and high relative humidity) will often also cause natural conditions of fog, haze, and precipitation which generally reduce visibility. Under such conditions the cooling tower plume would be less discernible. However, Energy Commission staff have observed that the cooling tower plumes for the SMUD Procter & Gamble cogeneration plant and the SMUD Campbell Soup cogeneration camp also occur on clear days, when the plumes are most visible and can be seen from several miles away. Energy Commission staff have also observed that the plumes can also be seen from several miles away on cloudy and rainy days. Considering that the size of the cooling tower plume from the SSP is calculated to be substantially larger than those from the Procter & Gamble and the Campbell Soup cogeneration plants, the SSP cooling tower plumes are likely to be visible from even farther away.

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 HRSG stacks, now proposed to be 185 feet tall. The maximum predicted height of the plume above the 50-foot tall cooling towers is over 790 meters (2,592 feet). The primary area of concern within the expanded viewshed is to the north and east, where rural residences and highly traveled public roads such as George Washington Boulevard and U.S.99 exist.

Visual Impact Susceptibility

VISUAL RESOURCES Appendix E discusses the factors contributing to visual impact susceptibility for the area from which the cooling tower plume would be visible.

Visual quality is low-to-moderate when the cooling tower plume from the existing Greenleaf 1 project is visible, which would coincide with when the cooling tower plume from the proposed project would be visible. Visual sensitivity is high. Visibility ranges from low to high. Viewer exposure is moderate. Considering these factors, visual impact susceptibility for cooling tower plumes from the proposed project is moderate (see VISUAL RESOURCES Figure B-3).

Visual Impact Severity

VISUAL RESOURCES Appendix F discusses the factors contributing to visual impact severity for the cooling tower plume.

Because a) contrast with the existing Greenleaf 1 cooling tower plume 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 high in regard to form, line, and color, and d) scale dominance would be co-dominant, the project's visual impact severity would be very strong (see VISUAL RESOURCES Table B-1).

Visual Impact Significance

Because visual impact susceptibility for the cooling tower plume is moderate and visual impact severity would be very strong, visual impacts without mitigation would be significant (see VISUAL RESOURCES Table B-2). The applicant has proposed mitigation that would eliminate these impacts (see below).

Construction Impacts

Project Site

Project staging and material storage would take place on a portion of the adjacent Greenleaf 1 site that is paved (SPP 1998f, Response to Land Use Data Request 23). These activities would be visually subordinate because they do not include prominent visual elements and they would be seen in the context of the adjacent Greenleaf 1 facility. Therefore, project staging and material storage are not expected to cause any significant impacts. Fugitive dust disturbances could be visually prominent, but due to their short-term nature they are not considered as causing significant impacts. Tall stack construction would be of short duration, so impacts are not expected to be significant.

Natural Gas Pipeline

Because construction of any specific section of the gas pipeline would be completed a short time, construction phase impacts from the pipeline are not expected to be significant.

FACILITY CLOSURE

Prior to closing the facility, the project owner shall submit to the CPM for review and approval a closure plan that includes measures to ensure that when closure is complete the project will not cause any significant visual impacts..

CUMULATIVE IMPACTS

The existing Greenleaf 1 power plant has caused significant visual impacts. The Greenleaf 1 plant appears as an industrial facility in an otherwise rural area. Its size, color contrast, cooling tower plume, and lighting cause much of this impact. The proposed project would add substantially to the visual impact already created by the Greenleaf 1 facility.

The proposed power plant would be larger than the Greenleaf 1 facility, so the incremental increase in impact caused by the proposed project would be substantial. The proposed project would substantially increase the industrial character of the vicinity.

Energy Commission staff estimates that the cooling tower plume from the existing Greenleaf 1 power plant is visible with a height of 90 meters (296 feet) or greater approximately 21 per cent of the yearly daylight hours. Staff considers this to be a significant visual impact. The cooling tower plume from the proposed project would be as tall for 20 per cent of yearly daylight hours under the same meteorological conditions, and would be noticeably wider than plume from the Greenleaf 1 power plant because the proposed project would have ten cells compared to two at the Greenleaf 1 plant. Therefore, the cooling tower plume from the proposed project would add substantially to the existing impact caused by the cooling tower plume from the Greenleaf 1 power plant. Methods to reduce the project's contribution to cumulative visual impacts due to cooling tower plumes are discussed below.

Existing lighting from the Greenleaf 1 power plant is visible from Key Observation Points 1, 2, 3, 4, and 5. The lights are sufficiently numerous and widespread so as to indicate the large mass of the power plant facility, adding an incongruous industrial element to the otherwise rural character of the area. The lights create substantial glare when viewed from nearby residences. Considering these factors, the lighting on the existing Greenleaf 1 facility causes a significant visual impact. Even if the lighting impacts for the proposed project are mitigated as recommended below, residual impacts due to the proposed project will occur, contributing to a significant cumulative visual impact. Methods recommended to reduce the cumulative lighting impacts are discussed below.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS AND STANDARDS

LOCAL

County of Sutter

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 the Sutter 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 Sutter County General Plan and Zoning Code.

MITIGATION

APPLICANT'S PROPOSED MITIGATION MEASURES

Powerplant

The AFC recommended the following mitigation measures to reduce the visual impacts of the proposed SPP.

- Structures, stacks, buildings, and tanks will be painted in earth tones. The colors will provide subtle variations and contrast. The selected colors will help the project features blend into the existing landscape. [The consultant for the applicant has since stated that the proposed project color is gray, because it would cause less contrast (Davey 1998)].

- All fencing will be constructed of non-reflective materials, treated, or painted to reduce visual effects from sensitive viewers.

- Glare will be minimized by use of non-reflective surfaces for plant equipment and structures.

The applicant has recommended the following mitigation measures to reduce the impacts created by lighting:

- Lighting on the project site will be limited to areas required for safety and will be shielded from public view to the extent possible.

- Lights will be directed on-site so that significant light or glare will not be created. Highly directional, high-pressure sodium vapor fixtures will be used.

- Nighttime backscatter illumination will be avoided by directional shielding of lights.

- Stacks and other tall project features will be lit in accordance to Federal Aviation Administration (FAA) guidelines.

Recently, the applicant has proposed to use dry cooling as a mitigation measure (Calpine 1998q). The applicant has also proposed to meet lower emission levels. This enables the applicant to use shorter HRSG stacks. The stacks are now proposed to be 145 feet tall instead of 185 feet tall as originally proposed.

In addition, the applicant has submitted a Visual Screening Mitigation Plantings Plan (Calpine 1998l). The plan recommends the use of a ditch irrigation system combined with an elevated planting berm, with 15 foot spacing between major trees. The plantings would be relevant to impacts from Key Observation Points 1, 2, 3, and 4. Impacts at Key Observation Points 1 and 2 would not be significant even without screening.

The plan states that the plantings will collectively provide "maximum" screening (p.3). However, none of the species proposed grows to be particularly tall. The upper portions of the heat recovery steam generators and most of the height of their stacks would be visible above the trees even at their maturity. Furthermore, the larger tree species listed are all deciduous, so they would not provide substantial screening even for the lower portion of the project structures from mid-Autumn to mid-Spring. Finally, it would take a number of years for the trees to achieve their maximum height. For at least the first five years the trees would not be close to their height at maturity. In summary, the proposed screening would not reduce the visual impacts of the proposed power plant on views represented by Key Observation Points 3 and 4 to less than significant levels.

Natural Gas Pipeline

The following mitigation measures are related to the construction and operation of the proposed natural gas pipeline:

- After construction, areas stripped of vegetation will be re-vegetated or vegetated to the same extent as the surrounding area.

- Directional drilling will be used to cross major streams, major irrigation ditches and canals, and the levees of the Sutter Bypass. A total of five borings have been identified along the gas pipeline route. Where practical, drill pits will be moved back from wooded areas in order to preserve trees and the aesthetic values of the area. The exact location of drill pits will be determined in final design and will consider mitigation of biological and visual impacts, among other factors.

- The dehydrator unit to be added to the existing drip station located west of the Sacramento River will increase the drip station area by approximately 5,000 square feet. Fencing and vegetation will be used to screen the dehydrator unit.

- The dehydrator unit at the western end of the proposed gas pipeline will be located at PG&E's existing drip station, increasing the drip station area by

approximately 5,000 square feet. Fencing and vegetation will be used to screen the dehydrator unit.

Electrical Transmission Line

The following mitigation measures proposed by the applicant are related to the construction and operation of the proposed electrical transmission line:

- The steel poles will be dulled to reduce reflectivity.
- Nonspecular conductors will be used to reduce reflectivity.
- Near residences, steel poles will not be placed directly in front of the residence.

In addition, the applicant has proposed to locate the switchyard at the west end of O'Banion Road and to use a transmission line route along South Township Road south to O'Banion Road then west to the switchyard site.

ADDITIONAL MITIGATION

Power Plant

Staff generally agrees with the applicant's proposed mitigation measures in regard to color and lighting for the power plant. However, staff's position is that these measures need to be more precisely developed in conditions of certification, which staff proposes below.

The use of a dry cooling system, as now proposed by the applicant, would eliminate visible cooling tower plumes. However, the system would require a larger cooling structure. Preliminary indications from the applicant are that the cooling structure would be approximately 200 feet long, 200 feet wide, and 100 feet tall. In contrast, the cooling tower originally proposed would have been approximately 360 feet long, 50 feet wide, and 50 feet tall. However, as discussed above, the HRSG stacks would be 145 feet tall instead of 185 feet tall as previously proposed. The increased visual impact due to the noticeably greater height of the dry cooling structure would be approximately offset by the reduced height of the HRSG stacks.

In addition, the following supplementary mitigation measures should be implemented.

Lighting

All lighting that is not required to be on during all nighttime hours should be controlled with sensors or switches operated such that the lighting will be on only when needed.

Landscaping

The tree species used for screening around the project boundaries should be the fastest growing of the tallest species that are suited to growing at the plant site. Generally an evergreen species would be recommended to provide maximum year-round screening. However, no substantial stands of evergreen trees exist in the viewshed or the surrounding rural area, so they would attract attention to the power plant. In addition, from the area represented by Key Observation Point 4 tall trees would block much of the view of the Sutter Buttes that would remain after the construction of the proposed power plant. The trees that are planted should not extend west of the westernmost proposed SPP structure, so as to minimize blockage of the view of the Sutter Buttes while maximizing screening of the proposed power plant. Shrub species should be used as in-fill around the trunks of the trees.

Electrical Transmission Line

Staff's Comments on Applicant's Proposed Mitigation Measures

Pole Color and Conductor Material

Staff agrees with the applicant's proposals to dull poles and use non-specular conductors to minimize contrast and glare.

Pole Placement

If the South Township Road - O'Banion Road route is used, staff recommends that the applicant's proposal to not place towers directly in front of residences be expanded to also not place towers in views of scenic features from the residences, particularly the Sutter Buttes.

Alternative Transmission Line Route

As discussed previously, the applicant has recently proposed using an alternative electrical transmission line route that would follow South Township Road south to O'Banion Road then turn west and proceed to a switching station at the east edge of the Sutter Bypass. This route would eliminate the potential significant visual impacts of the transmission line on the view areas represented by Key Observation Points 7 and 8. However, this route would not eliminate the significant visual impact to the view area represented by Key Observation Point 5. Indeed, because the alternative route would turn west at the intersection of South Township Road and O'Banion Road, a corner pole would be required at the intersection, precluding the use of the mitigation measure of placing poles to avoid interference with views of the Buttes at this location. In addition, the potential visual impact of paralleling O'Banion Road for the last portion of the route needs to be considered. Therefore, the following section addresses this topic.

Key Observation Point 6: O'Banion Road

Visual Impact Susceptibility

Key Observation Point 6 is located near the residence on the north side of O'Banion Road, west of South Township Road (see VISUAL RESOURCES Figure 21). It was chosen to represent the view of the transmission line if it is routed along O'Banion Road.

For Key Observation Point 6 visual quality is low-to-moderate, viewer sensitivity is high, visibility is moderate-to-high, and viewer exposure is low, so visual impact susceptibility is low (see VISUAL RESOURCES Appendix G and Figure B-3).

Visual Impact Severity

VISUAL RESOURCES Figure 22 shows the appearance of the project from Key Observation Point 6.

Because a) the project would cause a high level of contrast with existing structures in regard to form: b) the project would cause high contrast with vegetation in regard to form, line, and color; c) the project would cause high contrast with land and sky in regard to form, line, and color, the project's visual impact severity from Key Observation Point 6 would be very strong (see VISUAL RESOURCES Appendix H and Table B-1).

Visual Impact Significance

Because visual impact susceptibility for Key Observation Point 6 is low and visual impact severity would be very strong, visual impact without mitigation would be less than significant (see VISUAL RESOURCES Figure B-5).

In summary, the alternative transmission line route that follows O'Banion Road would not cause any significant visual impacts in addition to those that the proposed route would cause, and would avoid significant visual impacts from the view areas (represented by Key Observation Points 7 and 8 that the proposed route would cause. However, it would not mitigate visual impacts from the view area represented by Key Observation Point 5.

Additional Mitigation Measures Considered by Staff

Staff's Recommended Alternative Electrical Transmission Line Route

Staff has identified an alternative transmission line route that would reduce the potential visual impacts of the proposed transmission line to a less than significant level. The route proceeds south from the proposed switchyard at the power plant site approximately 0.3 mile to a dirt road that runs west from South Township Road. The route then turns west and proceeds to the existing PG&E 500 kV transmission line. The route then runs south parallel to the PG&E line to the proposed switching station on the south side of O'Banion Road. The route is approximately 3.8 miles long. This

route would be substantially farther from residences and public roads than the route along South Township Road and O'Banion Road.

Because the alternative transmission line route was identified primarily to reduce the visual impacts of the transmission line from the view area represented by Key Observation Point 5, that location is used in the following analysis of the potential visual impacts of using the alternative route.

Key Observation Point 5: Residences at O'Banion Road and South Township Road

Visual Impact Susceptibility

Key Observation Point 5 is located near the intersection of O'Banion Road and South Township Road, and represents residences in the area and travelers on South Township Road and O'Banion Road.

For Key Observation Point 5 visual quality is moderate, viewer sensitivity is high, visibility is high, and viewer exposure is moderate to high, so visual impact susceptibility is moderate-to-high (see VISUAL RESOURCES Table 5, Figure 15, Figure B-3, and Appendix C).

Visual Impact Severity

VISUAL RESOURCES Appendix I discusses the factors contributing to visual impact severity for this alternative transmission line route. Because a) all contrast ratings would be low, b) scale dominance would be subordinate, c) spatial dominance would be subordinate, and d) the severity of view blockage would be moderate, the project's visual impact severity from Key Observation Point 5 would be moderate (see VISUAL RESOURCES Table B-1 and Appendix I).

Visual Impact Significance

Because visual impact susceptibility for Key Observation Point 5 is moderate to high and visual impact severity would be moderate, visual impact would be less than significant (see VISUAL RESOURCES Table B-5).

In summary, the alternative transmission line route that proceeds west to the existing PG&E 500 kV transmission line then parallels that line south to the switching station at O'Banion Road would not cause any significant visual impacts.

Undergrounding

Staff received a response from the applicant to staff's request for a feasibility study of the placing the transmission line under ground to avoid potential significant visual impacts (Calpine 1998dd). The study indicates that placing the line underground would be technically feasible. However, the increase in cost of placing the line underground rather than aboveground would be substantial. Staff's evaluation of the

undergrounding option indicates that it would not be feasible (see staff's Transmission System Engineering testimony). Therefore, staff is not recommending this mitigation measure.

Alternative Power Plant Site

Staff received additional information from the applicant regarding use of an alternative power plant site to avoid potential significant visual impacts due to the transmission line. However, this information applied to the site at the west end of O'Banion Road that the applicant considered for the switching station, rather than the O'Banion Road site that the staff considered in its site alternatives analysis. Use of staff's O'Banion Road site would eliminate the need for a transmission line and therefore would eliminate its impacts. Use of that site would also reduce the visual impacts of the proposed power plant to a less than significant level because the plant would be substantially farther from public viewing areas and it would not impinge on views of the Sutter Buttes. The U.S. Fish and Wildlife Service has stated that it opposes the O'Banion Road site, partly due to concerns regarding visual impacts to users of the Sutter Wildlife Refuge. Staff does not consider the visual impacts on users of the wildlife refuge to be significant because the site is beyond the southern boundary of the planned expansion of the refuge and because the bypass levee and trees in the bypass would screen most of the project from users' views. Nevertheless, staff is not proposing this site as a feasible alternative to the proposed site because of several uncertainties regarding environmental impacts and site feasibility (see staff's Alternatives testimony).

Cumulative Impact Mitigation

Lighting

Despite proposed mitigation for lighting impacts due to the proposed project, residual lighting impacts will occur and will contribute to cumulative lighting impacts. Staff recommends that these impacts be offset by reducing lighting impacts at the adjacent Greenleaf 1 power plant. Staff has proposed a condition of certification to require such mitigation (see below).

Painting

The proposed power plant would be larger than the adjacent existing Greenleaf 1 power plant. The use of colors that minimize contrast would help reduce the obtrusiveness of the proposed project, but the proposed project will still cause adverse visual impacts. The use of similar colors on the existing Greenleaf 1 would reduce the cumulative visual impact of the two plants. Staff recommends that the major structures at the existing Greenleaf 1 power plant be repainted in the same colors as the proposed plant.

EFFECTIVENESS OF MITIGATION

Power Plant

Visible Plumes

Use of dry cooling as now proposed by the applicant will eliminate potential visible cooling tower plumes.

Lighting

Proper implementation of the applicant's proposed measures to minimize lighting impacts, as expanded and more precisely developed in staff's proposed condition of certification, is expected to reduce lighting impacts to less than significant levels.

Landscaping

The proposed vegetative screening, as modified by staff's recommendations, is expected to eventually screen most of the power plant structures from public view. However, the upper portions of the heat recovery steam generators and most of the height of the heat recovery steam generator stacks will not be screened. The residual impact will be greatest from Key Observation Point 4, because the power plant and the stacks block a portion of the view of the Sutter Buttes and appear to extend above the Buttes into the sky. However, only one residence has an unobstructed view of the Buttes with the power plant in front of them, and the few travelers on South Township Road will only see the power plant in front of the Buttes for a short time, so the residual visual impacts are not expected to be significant.

Electrical Transmission Line

Pole Placement

The applicant's proposed mitigation measure of not placing poles directly in front of residences, as expanded by staff's proposal not to place poles in front of residents' views of the Sutter Buttes, would avoid some potential visual impacts. However, this measure is not technically feasible for some residences because the residences are far enough from the poles such that pole placement cannot be far enough apart to achieve the mitigation objective. The need to put a corner pole at the intersection of South Township Road and O'Banion Road makes use of this mitigation infeasible at this critical location. Therefore, visual impacts due to the transmission line in the area represented by Key Observation Point 5 cannot be mitigated to a less than significant level by the use of pole placement.

Alternative Routes

The revised route proposed by the applicant (following South Township Road south to O'Banion Road then traveling west to the end of O'Banion Road) would eliminate the potential significant visual impacts of the transmission line on the view areas represented by Key Observation Points 7 and 8. However, it would not reduce the

significant visual impacts to the view area represented by Key Observation Point 5 (residences along O'Banion Road and travelers on O'Banion Road and South Township Road). The route proposed by staff (proceeding west from the power plant site to the existing PG&E 500 kV line then south to the O'Banion Road switching station site) would eliminate the visual impacts to the view areas represented by Key Observation Points 7 and 8 and in addition would reduce the visual impacts to the view area represented by Key Observation Point 5 to less than significant levels. This route is therefore preferable to the route following South Township Road to O'Banion Road then proceeding west. Staff recommends that the Commission approve the west-then-south route.

Cumulative Impact Mitigation

Lighting

Staff's proposed reduction in lighting impacts at the existing Greenleaf 1 power plant is expected to completely offset the contribution of the proposed project to cumulative lighting impacts.

Painting

Staff's proposed repainting of major structures at the existing Greenleaf 1 power plant is expected to offset some of the impact of the proposed power plant to cumulative visual impacts.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The project as proposed has the potential to cause significant adverse visual impacts. Effective implementation of applicant's proposed mitigation measures, as modified and expanded by staff's recommendations, is expected to achieve compliance with applicable laws, ordinances, regulations, and standards, and to reduce most impacts to less than significant levels. However, two potential project-specific impacts are not adequately addressed by the proposed mitigation measures. First, the proposed power plant would cause significant unmitigable visual impacts. Second, the proposed transmission line would cause significant visual impacts.

An electrical transmission line route that proceeds west from the power plant site to the existing PG&E 500 kV transmission line then south parallel to that line to the switching station site at O'Banion Roads would avoid the potential significant visual impacts of the transmission line. Staff is not aware of any feasible mitigation measures that would reduce the visual impacts of the power plant to less than significant levels.

The project has the potential to contribute substantially to significant cumulative visual impacts because it would add to the visual impacts of the existing Greenleaf 1 project.

Lighting and painting mitigation for the Greenleaf 1 project would help to compensate for the contribution of the proposed project to cumulative impacts.

RECOMMENDATIONS

Energy Commission staff recommends that alternative transmission line route proceeding west then south be approved rather than the route proceeding south then west. Staff also recommends that the Commission find that the power plant would result in visual impacts that are significant even after the application of all feasible mitigation. Staff recommends lighting and painting mitigation for the Greenleaf 1 project to compensate for the contribution of the proposed project to cumulative visual impacts. Staff also recommends that the Energy Commission adopt the following Conditions of Certification if it approves the project.

CONDITIONS OF CERTIFICATION

VIS-1 Prior to first electricity generation, the project owner shall treat the project structures, buildings, and tanks visible to the public in non-reflective colors to blend with the agricultural setting.

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:

- specification, and 11" x 17" color simulations, of the treatment proposed for use on project structures, including structures treated during manufacture;
- a detailed schedule for completion of the treatment; and,
- 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 60 days prior to ordering any structures that are to be 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 first electricity generation, 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: At least 30 days 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 60 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 first electricity generation, 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:

- 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;

- 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;

- 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 60 days before ordering the exterior lighting, the project owner shall provide the lighting 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.

The project owner shall notify the CPM within seven days of completing exterior lighting installation that the lighting is ready for inspection.

VIS-4 Within 60 days after first electricity generation, the project owner shall implement a landscape plan that meets the requirements of the Sutter County Zoning Code and provides a continuous screen of the proposed power plant from sensitive view areas. The screen shall be created along the northern and southern boundaries of the Calpine property and along the eastern boundary of the Calpine property parallel to South Township Road.

Protocol: The project owner shall submit to the CEC CPM for review and approval a specific plan describing its landscaping proposal, stating that it conforms to Sutter County's Zoning Code and has been approved by the County. 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. One objective shall be to provide year-round screening. To meet this objective evergreen species shall be used. This may require a berm to raise the tree roots above the water table. Another objective shall be to provide screening at least 75 feet tall for the total distance to be

screened, except where clearance beneath the proposed transmission line requires shorter trees. Another objective shall be to use species that grow rapidly. The plan shall propose species and spacing to achieve these objectives. Trees to be planted shall be the optimal size to reach full height as rapidly as possible.

- maintenance procedures, including any needed irrigation; and

- a procedure for replacing unsuccessful plantings.

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 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 of the project, the project owner shall submit the proposed landscape plan for the project 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 30 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 within seven days after completing the proposed planting that the planting is ready for inspection.

VIS-5 Prior to first electricity generation at the Sutter Power Project, to reduce the contribution of the Sutter Power Project to cumulative visual impacts, the project owner shall have the Greenleaf 1 facilities painted to match the colors of the Sutter Power Project.

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:

- specification, and 11" x 17" color simulations, of the treatment proposed for use on project structures.

- a detailed schedule for completion of the treatment; and,

- 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.

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 structures have been treated and the structures are ready for inspection.

Verification: At least 60 days prior to first commercial electricity generation at the Sutter Power Project, 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.

The project owner shall notify the CPM when all structures have been treated and are ready for inspection.

The project owner shall provide a status report regarding treatment maintenance in the Annual Compliance Report.

VIS-6 Prior to first electricity generation, to offset the contribution of the Sutter Power Project to cumulative lighting impacts, the project owner shall have the lighting at the Greenleaf 1 power plant modified 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 modification plan for the project to the CPM for review and approval. The lighting plan shall require that:

- Exterior light fixtures are hooded, with lights directed downward or toward the area to be illuminated and backscatter to the nighttime sky is minimized. The luminescence or light source shall be shielded to prevent light trespass outside the project boundary;

- High illumination areas not occupied on a continuous basis such as maintenance platforms or the main entrance shall be provided with switches or motion detectors to light the area only when occupied;

- 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 modifications shall not be made before the plan is approved. The project owner shall notify the CPM when the lighting modifications have been made and are ready for inspection.

Verification: At least 60 days prior to first electricity generation on the Sutter Power Project the project owner shall provide the lighting modification 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.

The project owner shall notify the CPM within seven days after completing exterior lighting modifications that the lighting is ready for inspection.

VIS-7 To minimize potential visual impacts, the project owner shall place all electrical transmission poles so as to not be directly in front of any residence and, to the extent possible, so as to not be directly in the view of the Sutter Buttes from any residence.

Protocol: At least 60 days 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 line route that have a view of the transmission line, and

the line of sight from each of the residences toward the Sutter Buttes.

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.

Transmission line pole placement 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.

The project owner shall notify the CPM within seven days after completing transmission line construction that the line is ready for inspection.

REFERENCES

CEC (California Energy Commission). 1998d. Memorandum from Joseph M. Loyer to Gary Walker. June 3.

Calpine (Calpine Corporation). 1997. Application for Certification, Sutter Power Project (97-AFC-2). Submitted to the California Energy Commission, December 15, 1997.

Calpine (Calpine Corporation). 1998a. Additional Data for Sutter Power Plant (97-AFC-2). Submitted to the California Energy Commission, January 8, 1998.

Calpine (Calpine Corporation). 1998f. Sutter Power Plant, Responses to February 2, 1998 Data Requests. Submitted to the California Energy Commission, March 4, 1998.

Calpine (Calpine Corporation). 1998h. Supplemental Filing Changing Transmission Route. Submitted to the California Energy Commission, May 18, 1998.

Calpine (Calpine Corporation). 1998i. Cooling Tower Information. Submitted to the California Energy Commission, May 22, 1998.

Calpine (Calpine Corporation). 1998l. Information Requested by Energy Commission Staff--Visual Screening Mitigation Planting Plan and Revised Figures VIS-1 and VIS-2. Submitted to the California Energy Commission, June 8, 1998.

Calpine (Calpine Corporation). 1998cc. Comments on Visual Resources Impact Assessment. Submitted to the California Energy Commission, August 14, 1998.

Calpine (Calpine Corporation). 1998dd. Underground Transmission Line Feasibility Study. Submitted to the California Energy Commission, August 14, 1998.

Calpine (Calpine Corporation). 1998q. Sutter Power Plant Mitigation Program Supplement, October 8, 1998.

Davey, Doug. 1998. Employee of Foster Wheeler, consultants to the applicant. Telephone conversation with Gary Walker, energy commission staff, August 27, 1998.

Loyer, Joe. 1998a. Memorandum to Gary Walker, California Energy Commission staff. July 3, 1998.

Sacramento Cogeneration Authority (SCA). 1994a. Responses to CEC Data Requests, Set 1. January 3.

Sutter County. 1996a. General Plan. November.

Sutter County. 1996b. Zoning Code.

ATTACHMENT 1

LIGHTING COMPLAINT RESOLUTION FORM

LIGHTING COMPLAINT RESOLUTION FORM

SUTTER POWER PROJECT
Yuba City, California

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 7 through 20

VISUAL RESOURCES Figure 7
Existing View from Key Observation Point 1

VISUAL RESOURCES Figure 8
Proposed Project from Key Observation Point 1

VISUAL RESOURCES Figure 9
Existing View from Key Observation Point 2

VISUAL RESOURCES Figure 10
Proposed Project from Key Observation Point 2

VISUAL RESOURCES Figure 11
Existing View from Key Observation Point 3

VISUAL RESOURCES Figure 12
Proposed Project from Key Observation Point 3

VISUAL RESOURCES Figure 13
Existing View from Key Observation Point 4

VISUAL RESOURCES Figure 14
Proposed Project from Key Observation Point 4

VISUAL RESOURCES Figure 15
Existing view from Key Observation Point 5

VISUAL RESOURCES Figure 16
Proposed Project from Key Observation Point 5

VISUAL RESOURCES Figure 17
Existing View from Key Observation Point 7

VISUAL RESOURCES Figure 18
Proposed Project from Key Observation Point 7

VISUAL RESOURCES Figure 19
Existing View from Key Observation Point 8

VISUAL RESOURCES Figure 20
Proposed Project from Key Observation Point 8

VISUAL RESOURCES Figure 21
Existing View from Key Observation Point 6

VISUAL RESOURCES Figure 22
Proposed Project from Key Observation Point 6

VISUAL RESOURCES APPENDIX B - COMMISSION STAFF'S VISUAL ASSESSMENT METHODOLOGY

INTRODUCTION

This appendix explains staff's approach to the treatment of visual resources in siting cases. Staff has used this general approach in several siting cases, including the SCA Procter and Gamble project and the SPAC Campbell Soup project. Staff used this specific approach in analyzing the San Francisco Energy Company project. The applicants for these projects reviewed the staff analyses, and the Commission incorporated staff's recommendations into the decisions on the projects.

Visual resources are the visible natural and cultural components of the environment. Natural components consist of landforms, water features, and vegetation. Cultural components result from modification of the natural landscape, and include buildings, roads, and transmission lines.

VISUAL ANALYSIS PROCESS

Figure B-1 depicts the process that staff used in its visual resources analysis of the proposed project. The first step is to assess the visual setting.

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.

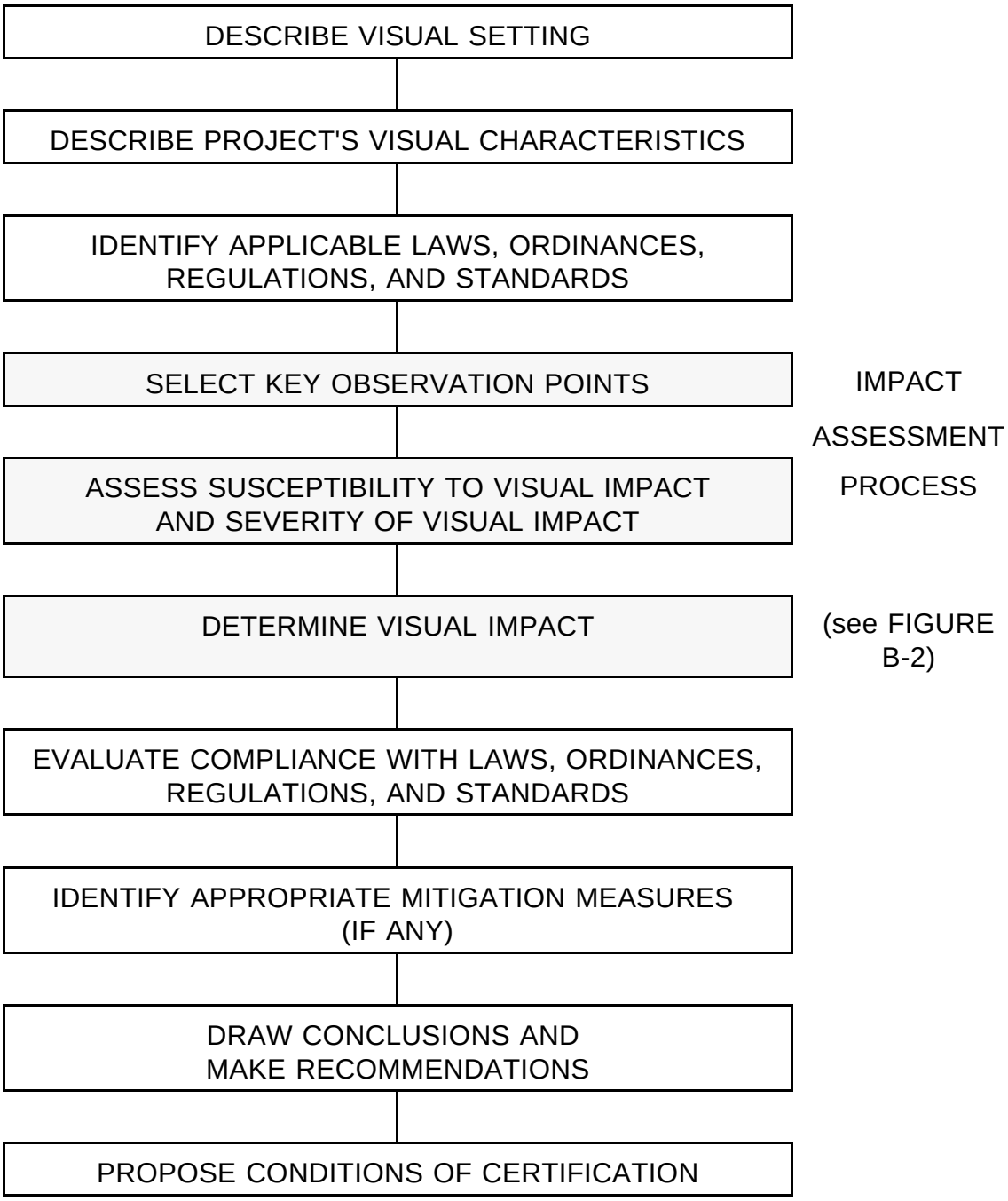
Visual Quality

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

VISUAL RESOURCES FIGURE B-1:

STAFF'S VISUAL ANALYSIS PROCESS



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. If only one residence is affected, visual susceptibility is considered to be low.

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.

Describe the Project's Visual Characteristics

The second step in staff's visual analysis process is to describe the proposed project's visual characteristics, based on the information provided by the applicant. These characteristics include the horizontal and vertical dimensions of the major project structures, the arrangement of the structures on the project site(s), the proposed color(s) of the structures, and lighting for the project.

Determine the Project's Visual Impacts

The third step in staff's visual analysis process is to determine visual impacts. This is accomplished by performing four tasks: 1) select key observation points (KOPs); 2) assess the susceptibility to visual impact of the view areas represented by each of the KOPs; 3) assess the severity of the project's impact on the view areas represented by each of the KOPs; and 4) consider visual susceptibility and visual severity to determine the visual impact on the view areas. Figure B-2 illustrates staff's visual impact assessment process.

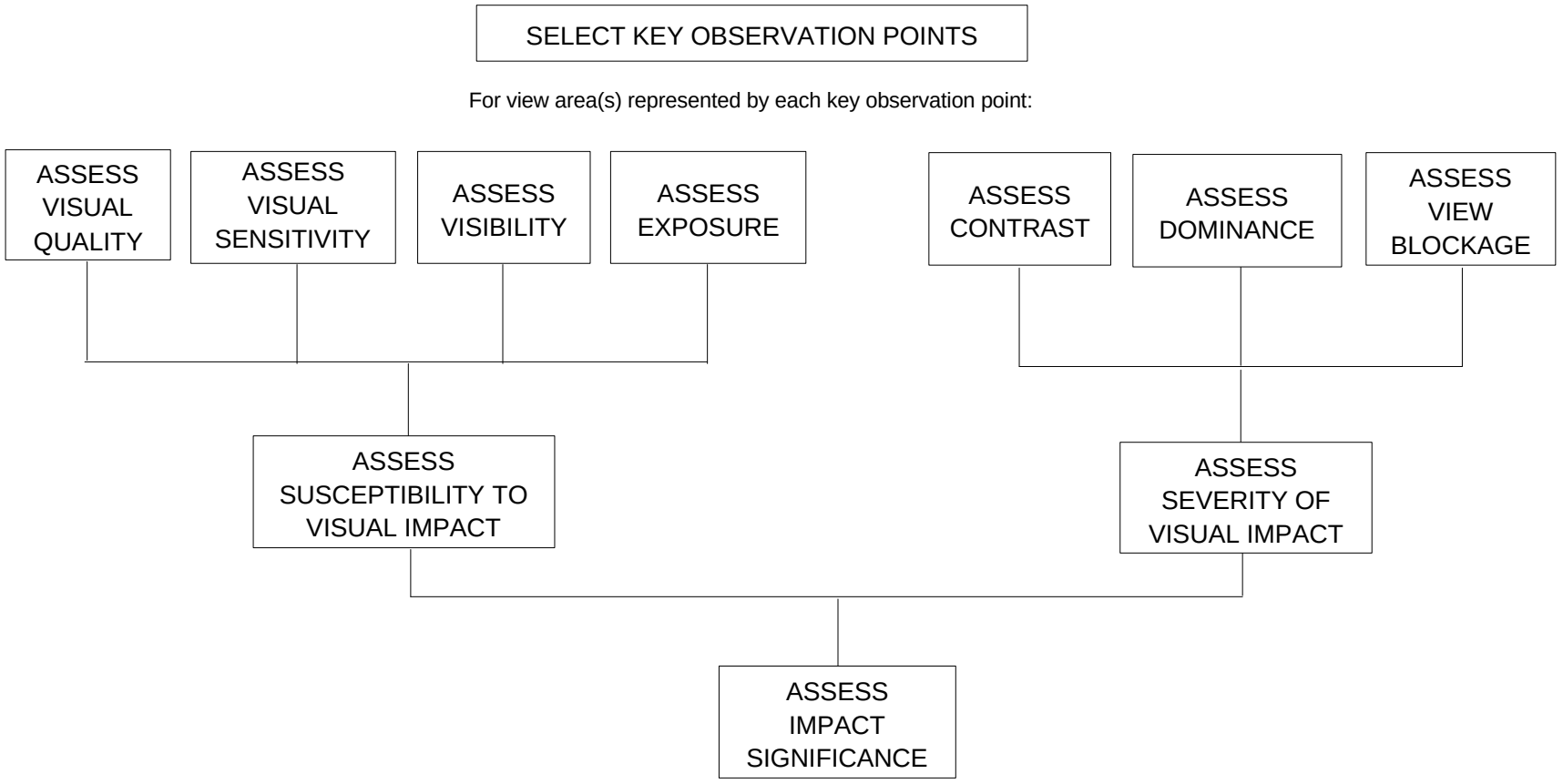
Select Key Observation Points

Key Observation Points are selected 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 are selected that represent typical views encountered in different classes of views within the viewshed, if they are not covered by critical viewpoints. Variables that are considered in selecting Key Observation Points include relative project size, season, and light conditions. 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. This approach has also been used by applicants for recent siting cases, including the SCA Procter and Gamble project, the SCA Campbell Soup project, the San Francisco Energy Company project, the High Desert Power Project, and the Sutter Power Plant project. The Visual Resource Management approach of the U.S. Bureau of Land Management, which is widely used, incorporates the concept of key observation points (BLM 1980b).

VISUAL RESOURCES FIGURE B-2:

STAFF'S VISUAL IMPACT ASSESSMENT PROCESS



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.

Assess Susceptibility to Impact

To determine the susceptibility to impact from each Key Observation Point, the elements of the existing visual setting (discussed previously), including visual quality, viewer sensitivity, visibility, and viewer exposure are considered. 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, as shown in Figure B-3. A low value for any of the four factors generally results in low susceptibility to impact.

Assess 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

VISUAL RESOURCES FIGURE B-3:

STAFF'S VISUAL IMPACT SUSCEPTIBILITY ASSESSMENT PROCESS

VISIBILITY	EXPOSURE	VISUAL QUALITY: HIGH / SENSITIVITY: H	VISUAL QUALITY: HIGH / SENSITIVITY: M	VISUAL QUALITY: HIGH / SENSITIVITY: L	VISUAL QUALITY: MEDIUM / SENSITIVITY: H	VISUAL QUALITY: MEDIUM / SENSITIVITY: M	VISUAL QUALITY: MEDIUM / SENSITIVITY: L	VISUAL QUALITY: LOW / SENSITIVITY: H	VISUAL QUALITY: LOW / SENSITIVITY: M	VISUAL QUALITY: LOW / SENSITIVITY: L
HIGH	H	H	H	L	H	M-H	L	L	L	L
	M	H	M-H	L	M-H	M	L	L	L	L
	L	L	L	L	L	L	L	L	L	L
MED	H	H	M-H	L	M-H	M	L	L	L	L
	M	M-H	M	L	M	M	L	L	L	L
	L	L	L	L	L	L	L	L	L	L
LOW	H	L	L	L	L	L	L	L	L	L
	M	L	L	L	L	L	L	L	L	L
	L	L	L	L	L	L	L	L	L	L

H = High
M-H = Medium-High
M = Medium
L-M = Low-Medium
L = Low

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 Figure B-4 shows how staff calculates impact severity from each Key Observation Point.

VISUAL RESOURCES TABLE B-4
Staff's Visual Impact Severity Assessment Process

	SEVERITY SCORE				
	Very Strong	**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 any of the above factors with a severity score of strong.				

Determination of Significance

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."

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, as shown in VISUAL RESOURCES Figure B-5. 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.

MITIGATION

Applicant Proposed Mitigation

When it is evident from preliminary studies that potential significant visual impacts will occur, it is usual for applicants to propose a variety of mitigation measures in their

VISUAL RESOURCES Table B-5
Staff's Visual Impact Significance Assessment Process

	VISUAL IMPACT SUSCEPTIBILITY				
	High	**Moderate to High**	**Moderate**	**Low to Moderate**	**Low**
VISUAL IMPACT SEVERITY					
Very Strong	Significant	Significant	Significant	Less than significant	Less than significant
Strong	Significant	Significant	Less than significant	Less than significant	Insignificant
Moderate	Significant	Less than significant	Less than significant	Insignificant	Insignificant
Weak	Less than significant	Less than significant	Insignificant	Insignificant	Insignificant
Negligible	Less than significant	Insignificant	Insignificant	Insignificant	Insignificant

application. These measures are then refined, as necessary, based on review by staff, other agencies, and the public.

Staff Proposed Mitigation

If staff's analysis concludes that potential significant visual impacts will occur and that any measures proposed by the applicant will not sufficiently reduce and mitigate those visual impacts, staff investigates whether additional mitigation measures exist. If staff identifies such measures and considers them feasible, staff recommends additional visual mitigation measures. If members of the public in the project vicinity have expressed concerns regarding the appearance of the project, staff solicits their input regarding appropriate mitigation.

Methods

Visual resource mitigation, as it has come to be practiced in the visual resources profession, can consist of several methods, including relocation, design, color/texture, landscaping, and lighting control. The aim of such mitigation is to reduce the size, mass, bulk, line, and contrast of the proposed facilities in order to achieve closer compatibility with the setting. Mitigation can be proposed by the project applicant, staff, an intervenor, an agency, or the public.

If required by the Commission's Decision, the plans referred to in the following sub-sections are prepared and submitted by the applicant after project approval. The plans contain the methods that the applicant proposes to use to accomplish required mitigation.

Relocation

Ideally, a project as proposed in the filing will be located so as to minimize or visual impacts. However, this may not happen due to competing considerations or other factors. If the project is expected to cause a significant visual impact as proposed, staff considers whether constructing the project on a different portion of the site, or relocating the project to a different site, has the potential to substantially reduce such an impact.

Design

Because power plant facilities normally involve large structures, design can be used to reduce the real or apparent mass, bulk, and line of the plant and thus its intrusiveness on the existing setting. This can be done by several methods, such as minimizing height, screening views of some project elements with other elements, enclosing project facilities in buildings, and using several buildings of varying dimensions rather than one large building.

Color/Texture

A judicious selection of color and textural treatment can help minimize the contrast that a project creates, whether in a human modified urban setting or a more natural one. Research has shown that white or very bright colors attract attention and can be seen from great distances. The use of specular, or reflective, materials or surfaces should be avoided, particularly in the construction of transmission lines. The use of color and textural treatments must be used on a case-by-case basis and must reflect the predominant character of the setting rather than a predetermined set of values. A highly urbanized, industrialized setting may call for colors and textures more typical of such a setting, while a project proposed in a rural and more natural setting should employ colors more appropriate to that area.

A specific color plan serves to ensure that the proposed colors will not unduly contrast with the surrounding landscape colors. The applicant submits such a plan as soon as possible so that any precolored buildings or structures can have colors approved and included in bid specifications for such buildings or structures.

Landscaping

Because of the need for open access within a power plant, landscaping as a mitigation measure is usually confined to the perimeter of, or approaches to, the plant. Use of berms and appropriate vegetation can reduce the contrast created by the perceived size, bulk, or line of the project. Typically, plant materials used are of a size such that the mitigation will be effective within approximately five years. Staff prefers the use of native evergreen vegetation, and, if appropriate, vegetation that is beneficial to wildlife. Vegetative species that may cause biological impacts or appear incongruous should be avoided. Whether and how landscaping is used depends on project-specific circumstances. For example, in an exceedingly open, relatively unvegetated area the application of massive amounts of landscaping can draw attention to a project and increase the contrast with the existing setting, even if the facilities are camouflaged. Many jurisdictions include requirements for fencing materials in landscaping plans.

Staff proposes landscaping if staff's analysis concludes that landscaping can reduce potential significant visual impacts of a project. A specific landscaping plan is prepared showing the location of such landscaping; the varieties and sizes of vegetation proposed to be used in such landscaping; the expected time to maturity and size at maturity for such vegetation; a discussion of the suitability of the vegetation for the site conditions and mitigation objectives; plan views and elevations from the direction of public view areas showing the location, size, and appearance of proposed berms and vegetation; maintenance procedures, including any needed irrigation; and a procedure for replacing unsuccessful plantings.

Lighting

Staff proposes mitigation if staff's analysis concludes that lighting will potentially result in an appreciable increase in direct light and glare or backscatter to the nighttime sky, visible to surrounding areas. This is particularly true where there are nearby residences or when the plant is sited in remote rural areas.

A specific lighting plan serves to ensure that project lighting is adequately designed, shielded, and placed so that off-site light and glare will be insignificant. This plan is designed to minimize backscatter to the nighttime sky, and includes provisions to minimize lighting of plant areas, consistent with operational and worker safety needs. A procedure to resolve any lighting complaints is implemented as part of the Commission's compliance procedures.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Staff reviews applications to determine whether they are in compliance with applicable laws, ordinances, regulations, and standards. If a project will not conform, staff investigates whether feasible means exist to achieve conformance. If such means exist, staff recommends them in its analysis.

STAFF PROPOSED CONDITIONS OF CERTIFICATION

When mitigation is needed to eliminate or reduce potentially significant visual impacts, staff develops proposed conditions of certification. These conditions of certification are designed to ensure that proposed mitigation measures are successfully accomplished and that the project is in compliance with applicable laws, ordinances, regulations, and standards.

OTHER POSITIONS/POLICIES

Two notable examples of detailed visual analysis procedures have been developed by federal agencies, the U. S. Bureau of Land Management (BLM) and the U. S. Forest Service (USFS). These procedures are designed to apply to the various types of environmental conditions that exist within the land under these agencies' jurisdiction. These conditions range from natural settings where cultural modifications must not attract attention to settings where contrast attracts attention and is a dominant feature of the landscape in terms of scale, and to settings where the natural character of the landscape has been disturbed to a point where rehabilitation is needed (BLM 1980). The environmental conditions of the land administered by these agencies do not include urban conditions.

US BUREAU OF LAND MANAGEMENT (BLM)

The BLM has developed its Visual Resource Management (VRM) Program, an attempt at an objective-based visual analysis procedure, which it applies to projects proposed on BLM land. The VRM process uses an inventory/evaluation step to identify Scenic Quality, Sensitivity Level and Distance Zones and apply numerical values to them. These are then combined into Management Classes which determine the different degrees of modification which will be allowed. This is then compared to a Contrast Rating which measures the degree of contrast between the proposed activity and the existing landscape. This determines whether mitigation will be required.

The concept of breaking the landscape down into elements did not originate with the BLM, but underlies the VRM process. Staff, as well as much of the visual professional community, recognizes the value of identifying specific discrete elements which go to comprise the landscape. However, because virtually all the BLM lands are located in remote, rural areas the VRM process is heavily weighted toward natural undisturbed

values. The VRM process in its entirety does not work well in more urbanized areas. However, staff believes that the underlying elements of the landscape, adopted by the BLM from existing methods of analyzing the visual resources, can be effectively used to analyze urban, rural, or natural landscapes.

US FOREST SERVICE (USFS)

The USFS has developed a process that to some extent parallels the VRM process in that it uses an inventory of the landscape and viewer awareness and sensitivity, and applies these to Management Classes to project impacts in National Forest lands.

The USFS process is exclusively weighted to rural lands with natural landscape values, and is not easily adaptable to urbanized, urbanizing, or fringe rural lands. In addition, the process is primarily designed for land management rather than specific project review. Therefore, staff does not believe the process is appropriate for power plant siting.

REFERENCES TO APPENDIX B

Andrews, Richard N.L. 1980. "Landscape Values in Public Decisions." In *Proceedings of Our National Landscape: A Conference on Applied Techniques for Analysis and Management of the Visual Resourc*e, pp. 686-692, April 23-25, 1979, Incline Village, Nevada. General Technical Report PSW-35. U.S. Dept. of Interior, Forest Service, Pacific Southwest Forest and Range Experiment Station. Berkeley, CA. NTIS PB81-157620.

Blair, William G. 1980. "Visual Resource Management." In *Environmental Comment*.

Blair, William G. 1986. "Visual Impact Assessment in Urban Environments." In *Foundations for Visual Project Analysis*, Richard C. Smardon, James F. Palmer, and John P. Felleman, eds. PP.223-244. John Wiley & Sons. New York.

Felleman, John P. 1986. "Landscape Visibility." In *Foundations for Visual Project Analysis*, Richard C. Smardon, James F. Palmer, and John P. Felleman, eds. Pp.47-62. John Wiley & Sons. New York.

Grinde, Kate and Al Kopf. 1986. "Illustrated Glossary." In *Foundations for Visual Project Analysis*, Richard C. Smardon, James F. Palmer, and John P. Felleman, eds. Pp.307-333. John Wiley & Sons. New York.

Smardon, Richard C., Tony Costello, and Harry Eggink. 1986. "Urban Visual Description and Analysis." In *Foundations for Visual Project Analysis*, Richard C. Smardon, James F. Palmer, and John P. Felleman, eds. Pp.21-35. John Wiley & Sons. New York.

U.S. B.L.M. 1980a. United States Bureau of Land Management. Visual Resource Management Program.

U.S. B.L.M. 1980b. United States Bureau of Land Management. Visual Simulation Techniques.

U.S. F.S. 1973. United States Forest Service. National Forest Landscape Management. Volume 1.

U.S. F.S. 1974. United States Forest Service. National Forest Landscape Management. Volume 2.

VISUAL RESOURCES APPENDIX C - COMMISSION STAFF'S ASSESSMENT OF VISUAL SUSCEPTIBILITY FACTORS FOR EACH KEY OBSERVATION POINT

Key Observation Point 1: Nearest Residence

Key Observation Point 1 is located near the closest residence to the proposed power plant site, near the intersection of South Township Road and Best Road (see VISUAL RESOURCES Figure 5). This Key Observation Point also represents another residence along South Township Road northeast of the proposed power plant site.

Visual Quality

From Key Observation Point 1 the view toward the project site is dominated by the existing Greenleaf 1 power plant to the immediate left of the site (see VISUAL RESOURCES Figure 7). The Coast Range is visible on the horizon beyond the trees in the Sutter Bypass, in views partially blocked by the existing power plant and foreground vegetation. The view of the mountains and agricultural features is of moderate to high quality, but because of the existing power plant overall visual quality is low to moderate.

Viewer Sensitivity

Because Key Observation Point 1 represents residences, viewer sensitivity is considered high.

Visibility

A small portion of the view of the project site is obstructed by the storage building for the Greenleaf 1 project and existing trees. Views of the proposed power plant site from the closest residence are partially screened by vegetation, so visibility is moderate. From the other residence in this view area the closest residence and trees surrounding the closest residence partially screen the proposed power plant site from view, so visibility is moderate. Because visibility from both residences in the view area is moderate, visibility from the area represented by Key Observation Point 1 is moderate.

Viewer Exposure

Distance

This view area is within foreground distance of the project site.

Number of Viewers

This view area contains two residences. Average daily traffic on South Township Road is 113 (Calpine 1997, p.8.10-5). Considering these facts, the number of viewers is small.

Duration of View

Because the view area represents residences, duration of view is long.
Motor vehicle traffic on South Township Road would be driving at moderate speeds for several miles with open views of the project, so duration of view would be several minutes, a long duration for motorists.

Overall Viewer Exposure

Considering a) the foreground distance, b) the small number of viewers, and 3) the long duration of view, viewer exposure is moderate to high for Key Observation Point 2.

Key Observation Point 2: Residences on Best Road

Key Observation Point 2 is located on Best Road, near residences east of the proposed project site (see VISUAL RESOURCES Figure 5).

Visual Quality

The view toward the site is panoramic, with the Coast Range visible on the horizon on clear days beyond the trees in the Sutter Bypass (see VISUAL RESOURCES Figure 9). However, the view includes an electric distribution line on wood poles along the south side of Best Road and the Greenleaf 1 power plant is visible on the horizon, factors that reduce the visual quality to moderate.

Viewer Sensitivity

Because Key Observation Point 2 represents a group of residences, viewer sensitivity is considered high.

Visibility

Because views toward the project site are largely unobstructed, visibility from the area represented by Key Observation Point 2 is high.

Viewer Exposure

Distance

This view area is within midrange distance of the project site.

Number of Viewers

This view area contains five residences (Calpine 1997, Figure 8.12-1b). Data on the number of daily travelers on Best Road is not available (Calpine 1997, p.8.10-5).

Duration of View

Because the view area represents residences, duration of view is long. Westbound motor vehicle traffic on Best Road would be driving at moderate speeds for over a mile with open views of the project, so duration of view would be several minutes, a long duration for motorists.

Overall Viewer Exposure

Considering the midrange distance, the moderate number of viewers, and the long duration of view, viewer exposure is moderate for Key Observation Point 2.

Key Observation Point 3: Residences on Pierce Road

Key Observation Point 3 is located on Pierce Road, near four residences (see VISUAL RESOURCES Figure 5).

Visual Quality

From Key Observation Point 3 the view toward the project site consists of flat agricultural fields of little visual interest (see VISUAL RESOURCES Figure 11). In addition, the existing Greenleaf 1 power plant is visible to the immediate left of the site. Therefore, visual quality for Key Observation Point 3 is low to moderate.

Viewer Sensitivity

Because Key Observation Point 3 represents a group of residences viewer sensitivity is considered high.

Visibility

The project would be skylined with no intervening obstructions. However, the primary views from the homes along Pierce Road face north, away from the project site, and

vegetation near the homes partially screens views toward the project site. Therefore, visibility is moderate.

Viewer Exposure

Distance

This view area is within middleground distance of the project site.

Number of Viewers

This view area contains four residences (SPP 1997, Figure 8.12-1a). The number of travelers on Pierce Road is estimated to be low.

Duration of View

Duration of view is long due to the residents represented by this KOP.

Overall Viewer Exposure

Considering the middleground distance, the moderate number of viewers, and the long duration of view, viewer exposure is moderate to high for Key Observation Point 3.

Key Observation Point 4: Residences on South Township Road

Key Observation Point 4 is located on South Township Road, southeast of the proposed project site (see VISUAL RESOURCES Figure 5).

Visual Quality

The view toward the proposed plant site is panoramic, dominated by the Sutter Buttes on the horizon (see VISUAL RESOURCES Figure 13). Trees are visible in the middleground, while field crops are in the foreground. The existing Greenleaf 1 facility is visible to the right, but it does not block the view of the Sutter Buttes. The presence of the Greenleaf 1 facility reduces visual quality from high to moderate-to-high for KOP 4.

Viewer Sensitivity

Because Key Observation Point 4 represents residences, viewer sensitivity is considered high.

Visibility

The proposed plant as well as proposed transmission poles and conductors would be in full view, so visibility is high.

Viewer Exposure

Distance

The proposed power plant would be seen in the middleground from KOP 4, and the proposed transmission line along South Township Road would be within foreground distances.

Number of Viewers

This KOP represents two residences and northbound travelers on South Township Road, so the number of viewers is small.

Duration of View

Because this KOP represents residences, duration of view is long.

Overall Viewer Exposure

Considering the foreground distance for the transmission poles and lines, the middleground distance for the power plant site, the small number of viewers, and the long duration of view, viewer exposure is moderate to high for Key Observation Point 4.

Key Observation Point 5: Residences at O'Banion Road and South Township Road

Key Observation Point 5 is located near the intersection of O'Banion Road and South Township Road, and represents residences in the area (see VISUAL RESOURCES Figure 5).

Visual Quality

The view from Key Observation Point 5 toward the project site includes the Sutter Buttes on the left horizon with agricultural uses in the middleground and foreground (see VISUAL RESOURCES Figure 15). An existing electrical distribution line is visible on the east side of South Township Road and a similar line runs west across the view in the middle ground along O'Banion road. The Greenleaf 1 power plant is visible but not prominent on the horizon east of the Sutter Buttes. Considering all of these factors, visual quality for KOP 5 is moderate-to-high.

Viewer Sensitivity

Because of the residences in the area of Key Observation Point 5, viewer sensitivity is high.

Visibility

The proposed power plant would be visible on the skyline, but from South Township Road a young orchard will soon obstruct the view of the plant site as well as of the Sutter Buttes. However, from the nearby residences along O'Banion Road that this Key Observation Point also represents, the Sutter Buttes, the proposed powerplant site, and the Greenleaf 1 facility are visible, and the transmission poles proposed to run adjacent to the west side of South Township Road would be visible, so visibility for KOP 5 is high.

Viewer Exposure

Distance

The proposed transmission line would be within foreground views for residences in the area of Key Observation Point 5.

Number of Viewers

Five residences are in the area represented by Key Observation Point 5. Views from two of the residences are screened by existing vegetation. Average daily traffic on South Township Road is 113 (SPP 1997, p.8.10-5). Considering these facts, the number of viewers is small.

Duration of View

Because residences are present, duration of view is long.

Overall Viewer Exposure

Considering the foreground distance to the proposed transmission line, the small number of viewers, and the long duration of view, viewer exposure is moderate to high for Key Observation Point 5.

Key Observation Point 7: Residence near Tudor Road and South Township Road

Key Observation Point 7 is located near a residence near the intersection of Tudor Road and South Township Road (see VISUAL RESOURCES Figure 5).

Visual Quality

The view from Key Observation Point 7 south to the proposed substation site is characterized by flat agricultural fields in the foreground and middleground, with the levee and trees of the Sutter Bypass in the background on the horizon (see VISUAL RESOURCES Figure 17). An existing farm structure and trees are visible in the foreground. Existing transmission lines parallel to the Sutter Bypass are visible on the horizon but are visually subordinate because of their background distance. Considering these factors, visual quality for Key Observation Point 7 is moderate.

Viewer Sensitivity

Because this KOP represents residences, viewer sensitivity is high.

Visibility

From this KOP a tree partially obstructs the site for the closest proposed transmission pole. However, for one of the applicant's proposed routes, this tree would be removed (Calpine 1998h, p.S-20). Existing vegetation partially screens the view from the closest residence to the transmission line. The transmission line would be clearly visible to travelers on Tudor Road and South Township Road. Considering these factors, visibility for the area represented by Key Observation Point 7 is moderate to high.

Viewer Exposure

Distance

The proposed transmission line would be within foreground viewing distance.

Number of Viewers

Two residences are in the view area represented by Key Observation Point 7. Eastbound travelers on Tudor Road and travelers on South Township Road are also in the view area represented by Key Observation Point 7, but both of these roads are lightly traveled. Considering these facts, the number of viewers is small.

Duration of View

For the residences represented by Key Observation Point 5 duration of view is long. Westbound travelers on O'Banion Road, traveling at moderate speed for over a mile, would see the transmission line for several minutes. Considering these factors, duration of view is long.

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Overall Viewer Exposure

Considering the foreground distance, the small number of viewers, and the long duration of view, viewer exposure is moderate to high for Key Observation Point 7.

Key Observation Point 8: State Route 113

Key Observation Point 8 is located on State Route 113 and represents the views of northbound travelers on that highway. The view is toward the proposed transmission line and the power plant site (see VISUAL RESOURCES Figure 6).

Visual Quality

The Sutter Buttes dominate the horizon from this view, with agricultural uses in the foreground and middleground (see VISUAL RESOURCES Figure 19). An electrical distribution line is located on the west side of State Route 113. The poles are in the foreground and are seen intermittently in the view toward the proposed transmission line route as the traveler proceeds northbound. The existing distribution line detracts somewhat from the high visual quality of the Sutter Buttes, so visual quality from the view area represented by Key Observation Point 8 is moderate-to-high.

Viewer Sensitivity

Because the Sutter Buttes are well known in the area, many travelers on State Route 113 are accustomed to seeing this scenic feature, so viewer sensitivity is high.

Visibility

The southern portion of the transmission line route is visible from this KOP. However, trees and other vegetation intermittently screen travelers' views. In addition, the viewing angle is somewhat to the left of center. Therefore, visibility is moderate.

Viewer Exposure

Distance

The proposed transmission line would be within background distances for travelers on State Route 113.

Number of Viewers

The Average Daily Travel on State Route 113 at Key Observation Point 8 was counted at 4,800 in 1994 (SPP 1997,p.8.10-5). Assuming that approximately half of this traffic was northbound, the direction in which the project would be readily visible, travelers in about 2,400 vehicles per day would see the view represented by Key Observation Point 8. Therefore, the number of viewers is high.

Duration of View

Travelers on State Route 113 would have intermittent views of the proposed transmission line for about two minutes, so duration of view is moderate..

Overall Viewer Exposure

Considering the background distance, the high number of expected viewers, and the moderate duration of view, viewer exposure is moderate for Key Observation Point 8.

VISUAL RESOURCES APPENDIX D - COMMISSION STAFF'S ASSESSMENT OF VISUAL IMPACT SEVERITY FACTORS FOR EACH KEY OBSERVATION POINT

KEY OBSERVATION POINT 1: NEAREST RESIDENCE

VISUAL RESOURCES Figure 8 is a photosimulation of the project as seen from Key Observation Point 1.

Contrast with Structures

In the view from Key Observation Point 1 the project would cause a low level of contrast with existing structures in regard to form, line, and texture because it would be similar in these respects to the existing Greenleaf 1 structures that can be seen from this Key Observation Point (see VISUAL RESOURCES Figure 8). The earth tones proposed for the SPP structures would contrast moderately with the beige and blue colors of the existing structures. Because the proposed exhaust stacks would appear somewhat larger than the existing structures, the project would cause moderate scale contrast.

Contrast with Vegetation

Vegetation visible in the view from Key Observation Point 1 toward the site consists of a variety of seasonal grasses in the direct foreground and deciduous trees at the right side of the view. The project appears generally as a group of rectangles of varying proportions which would create a high level of contrast in regard to form and line with the irregular shapes of the grassy vegetation and the generally rounded shapes of the trees. The proposed earth tone colors of the project would create a low level of contrast with the seasonally green or tan tones of the vegetation in this view. The contrast between the flat surfaces of project elements and the varied texture of existing vegetation would cause a high level of contrast in regard to texture. Because the vegetation is closer to the KOP than the proposed structures would be, the masses of vegetation would appear larger than the project structures, so scale contrast would be low. In summary, if no existing structures were visible, contrast with vegetation would be high in regard to form, line and texture, and low in regard to color and scale. However, because the existing Greenleaf 1 structures are similar to the proposed structures in regard to form, line, texture, and scale, the increment of contrast with vegetation added by the proposed structures would be small, and contrast with vegetation would be low.

Contrast with Land/Water

No water is visible in this view. The landform appears generally flat, with a rounded berm in the foreground, so the rectangular shapes and straight lines of the project structures would cause a high level of contrast in regard to form and line. No

unvegetated land is visible, so the project would not cause contrast with land in regard to color or texture. The project would appear similar in size to the berm in the foreground, so scale contrast would be low. In summary. if no existing structures were visible, contrast with land would be high in regard to form and line, low in regard to scale and nonexistent in regard to color and texture. However, because the existing Greenleaf 1 structures visible in this view appear similar to the proposed structures, the increment of contrast with land added by the proposed structures would be small, and contrast with land would be low.

Scale Dominance

The project would appear of moderate size in comparison to the wide field of view, similar to existing Greenleaf 1 structures, and would occupy a moderate part of the setting. Therefore, scale dominance from Key Observation Point 1 would be co-dominant.

Spatial Dominance

Because the spatial composition of the view from Key Observation Point 1 is panoramic, the project would be subordinate in regard to composition. Because the project site is in the central portion of the view, spatial dominance would be co-dominant in regard to position. Because all of the project will be backdropped by sky, spatial dominance in regard to backdrop would be prominent. The overall spatial dominance rating would be co-dominant.

View Blockage

From Key Observation Point 2 the project will block the view of a moderate part of the cropland view that can now be seen. Because this view is not particularly scenic, the severity of view blockage would be weak (see VISUAL RESOURCES Table B-1).

KEY OBSERVATION POINT 2: RESIDENCES ON BEST ROAD

VISUAL RESOURCES Figure 10 is a photosimulation of the project as seen from Key Observation Point 2.

Contrast with Structures

From Key Observation Point 3 the proposed power plant would look similar in form, line, texture, and scale to the existing Greenleaf 1 power plant, so contrast in regard to these factors would be low. The proposed plant would contrast moderately with the existing Greenleaf plant in regard to color. The proposed transmission line poles would appear similar to the existing poles visible along Best Road in regard to form, line, color, and texture, so contrast with the existing poles would be low in regard to

these factors. The proposed poles would appear smaller than the existing poles from this view, so scale contrast would be low.

Contrast with Vegetation

Vegetation visible in the view from Key Observation Point 2 toward the site consists of grasses, shrubs, a young orchard, and mature trees near residences. The project would appear as a group of rectangles, with small vertical elements created by the transmission poles. The grass and shrubs in the view appear as irregular masses, and the mature trees appear as rounded masses. The new orchard trees appear as short vertical elements, but by the time the power plant would be constructed the young trees will have a roughly rounded appearance.

As a whole, the project would contrast strongly in form and line with vegetation. The proposed earth tone colors of the project would cause low contrast with the seasonally green or green and tan colors of the vegetation in this view. The flat surfaces of project elements would not be discernible from this view distance, so the contrast with vegetation would be low in regard to texture. Because the project would appear similar in size to some of the existing vegetation due to its distance from the key observation point, scale contrast would be low. In summary, if no existing structures were visible from Key Observation Point 2, contrast with vegetation would be strong in regard to form and line, and low in regard to color, texture, and scale. However, because the existing Greenleaf 1 power plant will be visible near the proposed plant, the increment of contrast with vegetation that the proposed project would cause would be small, so contrast with vegetation would be low.

Contrast with Land/Water

No water is visible in this view. The landform in the foreground and middleground is generally flat. The project would appear as a group of rectangles, with small vertical elements created by the transmission poles. As a whole, contrast in regard to form and line would be moderate. The proposed earth tones of the project would create low contrast with the earth tones of the land visible from this Key Observation Point. The flat surfaces of project elements would not be discernible from this view distance, so the contrast with land would be low in regard to texture. The project would appear smaller than major land elements in the view, so scale contrast would be low. In summary, if no existing structures were visible from Key Observation Point 2, contrast with land would be moderate in regard to form and line, and low in regard to color, texture, and scale. However, because the existing Greenleaf 1 power plant will be visible near the proposed plant, the increment of contrast with land that the proposed project would cause would be small, so contrast with vegetation would be low.

Scale Dominance

The project would appear small to moderate in comparison to the wide field of view, and would occupy a small part of the setting. Therefore, scale dominance from Key Observation Point 2 would be subordinate.

Spatial Dominance

Because the spatial composition of the view from Key Observation Point 3 is panoramic, the project would be subordinate in regard to composition. Because the project site is in the central portion of the view and appears slightly elevated in relation to the key observation point, spatial dominance would be co-dominant in regard to position. Because all of the project would be backdropped by sky, spatial dominance in regard to backdrop would be prominent. The overall spatial dominance rating would be co-dominant.

View Blockage

From Key Observation Point 2 the project would block the view of a small part of the background mountains that can now be seen. However, the existing Greenleaf 1 power plant blocks a similar amount of the background mountains, so the visual quality of the view is moderate rather than high. The blockage of a minor portion of this moderate quality view would constitute weak view blockage.

KEY OBSERVATION POINT 3: RESIDENCES ON PIERCE ROAD

VISUAL RESOURCES Figure 12 is a photosimulation of the project with Calpine's proposed dry cooling mitigation as seen from Key Observation Point 3. See the AFC or the Preliminary Staff Analysis for the simulation of the project without the applicant's proposed dry cooling mitigation.

Contrast with Structures

From Key Observation Point 3 the proposed power plant would be visible in the foreground, with the existing Greenleaf 1 power plant to its left in the middleground. The proposed power plant would be similar in form, line and texture to the existing Greenleaf 1 power plant, so contrast in regard to these factors would be low. The gray color proposed for the power plant would contrast moderately with the white and blue colors of the existing power plant. Because the proposed HRSG stacks are substantially taller than the stack for the existing power plant and because the proposed power plant is closer to KOP 3 than the existing power plant is, the proposed power plant would appear somewhat larger than the existing power plant. Therefore, scale contrast would be moderate.

Contrast with Vegetation

Vegetation visible in the view from Key Observation Point 3 toward the site consists of a variety of seasonal grasses in the foreground and middleground, with some trees barely discernible on the horizon. The project appears generally as a group of rectangles of varying proportions which would create a high level of contrast in regard to form and line with the irregular shapes of the grassy vegetation. The proposed gray color of the project would create a moderate level of contrast with the seasonally green or tan tones of the vegetation in this view. The contrast between the flat surfaces of project elements and the varied texture of existing vegetation would cause a high level of contrast in regard to texture. Because the vegetation is closer to the KOP than the proposed structures would be, the masses of vegetation would appear larger than the project structures, so scale contrast would be low. In summary, if no existing structures were visible, contrast with vegetation would be high in regard to form, line and texture, moderate in regard to color, and low in regard to scale. However, because the existing Greenleaf 1 structures are similar to the proposed structures in regard to form, line, texture, and scale, the increment of contrast with vegetation added by the proposed structures would be small, and contrast with vegetation would be low.

Contrast with Land/Sky

No water is visible in this view. The landform appears generally flat, with a rounded berm in the foreground, so the rectangular shapes and straight lines of the project structures would cause a high level of contrast in regard to form and line. No unvegetated land is visible, so the project would not cause contrast with land in regard to color or texture. The proposed gray color for the project would cause moderate contrast with the light blue color of the sky. The project would appear similar in size to the berm in the foreground, so scale contrast would be low. In summary, if no existing structures were visible, contrast with land would be high in regard to form and line, low in regard to scale and nonexistent in regard to color and texture. However, because the existing Greenleaf 1 structures visible in this view appear similar to the proposed structures, the increment of contrast with land and sky added by the proposed structures would be small, and contrast with land would be low.

Scale Dominance

The proposed power plant would take up a substantial portion of the field of view from KOP 3, so scale dominance would be dominant.

Spatial Dominance

The spatial composition of the view from Key Observation Point 3 is panoramic, but due to the extensive visible length of the project (including the transmission line) the project would be prominent in regard to composition. Because the project site and the transmission line would be in the central portion of the view, spatial dominance would be prominent in regard to position. Because the project, including the transmission lines, would be backdropped by sky, spatial dominance in regard to backdrop would be prominent. Therefore, the overall spatial dominance rating would be dominant.

View Blockage

From Key Observation Point 3 the project would block the view of a moderate part of the cropland and horizon that can now be seen. Because the visual quality of these visual elements is of moderate quality, the severity of view blockage would be weak (see VISUAL RESOURCES Table B-1).

KEY OBSERVATION POINT 4: RESIDENCES ON SOUTH TOWNSHIP ROAD

VISUAL RESOURCES Figure 14 is a photosimulation of the project Calpine's proposed dry cooling mitigation as seen from Key Observation Point 4. See the AFC or the Preliminary Staff Analysis for the simulation of the project without the applicant's proposed dry cooling mitigation.

Contrast with Structures

The existing Greenleaf 1 project structures are visible in the right portion of this view. The proposed power plant would appear in the middle of the view toward the Sutter Buttes. The specific location of the transmission poles along South Township Road has not been determined, but it may be possible to place them so as to not be in the middle of the view toward the Sutter Buttes from residences (see staff's proposed mitigation measures). The proposed power plant would be similar in form, line, and texture to the existing Greenleaf 1 power plant, so contrast in regard to these factors would be low. The earth tone colors for the proposed power plant would contrast moderately with the white and blue colors of the existing power plant. Because the proposed HRSG stacks would appear substantially taller than the stack for the existing power plant, the proposed power plant would appear substantially larger than the existing power plant. Therefore, scale contrast would be high. The proposed poles would be on the periphery of views from Key Observation Point 4, so they would not contribute substantially to the assessment of visual impacts. In summary, from Key Observation Point 4 contrast with structures would be high in regard to scale, moderate in regard to color, and low in regard to form, line, and texture.

Contrast with Vegetation

Vegetation visible in the view from Key Observation Point 4 consists of cropland with trees in the distance backdropped by the Sutter Buttes. The rectangular forms and straight lines of the proposed power plant would contrast strongly with the irregular shapes of the vegetation. The earth tones proposed for the power plant would create a low level of color contrast with the existing vegetation, which varies seasonally from green to tan. The texture of the power plant structures would not be discernible from this distance, so texture contrast would be low. The power plant would be large in comparison to individual trees or plans, but small in comparison to the visible mass of vegetation, so scale contrast with vegetation would be low. In summary, from KOP 4 the project would cause high levels of contrast with vegetation in regard to form and line, and low levels of contrast with vegetation in regard to color, texture, and scale. Because from Key Observation Point 4 the proposed project would appear in the view of the Sutter Buttes, which the Greenleaf 1 project does not, the project's contrast with vegetation is more than an incremental addition to that of the Greenleaf 1 project.

Contrast with Land/Water

No water is visible in this view. The landform consists of flat cropland in the foreground and middleground, with the Sutter Buttes visible on the horizon. The proposed power plant's rectangular elements would contrast highly in regard to form and line with the irregular shapes of the Sutter Buttes that would form the backdrop for the power plant. The earth tones proposed for the power plant would create a low level of color contrast with the seasonally green or green and tan color of the Sutter Buttes. The texture of the proposed power plant structures would not be readily discernible from this KOP, so texture contrast would be low. The exhaust stacks proposed power plant would appear substantially taller than the Sutter Buttes, so scale contrast with landforms would be high. In summary, contrast with land would be high in regard to form, line, and scale; and low in regard to color and texture. Because from Key Observation Point 4 the proposed project would appear in the view of the Sutter Buttes, which the Greenleaf 1 project does not, the project's contrast with land is more than an incremental addition to that of the Greenleaf 1 project.

Scale Dominance

The proposed power plant would be moderate in size compared to the wide field of view and would occupy a moderate part of the setting. Therefore, scale dominance from Key Observation Point 8 would be co-dominant.

Spatial Dominance

Because the spatial composition of the view from Key Observation Point 4 is panoramic, the proposed power plant would be subordinate in regard to composition. Because the proposed power plant would be in the right central portion of the view, spatial dominance would be prominent in regard to position. Because the transmission towers would be partially backdropped by sky, spatial dominance in regard to backdrop would be prominent. The overall spatial dominance rating would be to co-dominant.

View Blockage

From Key Observation Point 4 the proposed power plant would block a moderate portion of the view of the scenic Sutter Buttes, so the severity of view blockage would be strong.

KEY OBSERVATION POINT 5: RESIDENCES AT O'BANION ROAD AND SOUTH TOWNSHIP ROAD

VISUAL RESOURCES Figure 16 is a photosimulation of the project as seen from Key Observation Point 5.

Contrast with Structures

From Key Observation Point 5 the most prominent existing structures are the poles of the electrical distribution line along the east side of South Township Road. Poles along O'Banion Road are also visible. The Greenleaf 1 power plant is visible on the horizon but is subordinate due to the background distance. The proposed power plant would also be visually subordinate due to the distance (see VISUAL RESOURCES Figure 16). The proposed transmission line poles would appear substantially taller and wider and would have a noticeably different conductors and conductor support structures than the existing lines. Visual Resources Figure 16 does not show the conductors that would be strung from the poles. Six conductors would be hung from the poles. In addition, the conductors would be much larger in diameter than the conductors on the existing distribution line. Therefore, the conductors would be much more noticeable than the existing conductors. The proposed poles are shown at 100 feet tall. If the line is placed over the property of the Sutter Extension Water District that is located on the west side of South Township Road, the poles may be taller to avoid conflicts with water district maintenance equipment (see the Land Use section of the Final Staff Assessment). From South Township Road the addition of the proposed poles would cause a tunnel view effect, as shown in Visual Resources Figure 16. The poles would be of galvanized steel, which would contrast moderately in color with the existing wood poles. The flat texture of the steel poles would contrast moderately with the more rough texture of the existing wood poles. In summary, in regard to existing structures the proposed poles would cause high contrast in regard to form and scale, moderate contrast in regard to color and texture, and low contrast in regard to line.

Contrast with Vegetation

Vegetation visible in the view from Key Observation Point 5 toward the site consists of young orchard trees, grass, and a few trees. The vertical form of the poles would contrast highly to the low, irregular form of the grass and the rounded form of the trees. The straight lines of the poles would similarly contrast highly with the existing vegetation. The grey color of the towers would contrast moderately with the variety of green tones of the vegetation. The texture of the towers as a whole would appear varied because of the complexity of the lattice design, and 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 line would only add incrementally to the contrast with vegetation caused by the existing poles, which are closer to the residences, so contrast with vegetation would be low.

Contrast with Land/Water

No water is visible in this view. The landform consists of flat cropland with the Sutter Buttes visible to the left on the horizon. The proposed transmission poles would contrast highly with this land surface in regard to form and line. The grey color of the line would cause moderate contrast with the dirt surface of South Township Road and with other land visible from this viewpoint. The flat texture of the poles would cause moderate contrast with the rougher texture of the land. No landforms appear large from this view, so the poles would create a high level of scale contrast. In summary, if no existing structures were visible, contrast with land would be high in regard to form, line, and scale, and moderate in regard to color and texture. However, the proposed line would only add incrementally to the contrast with land caused by the existing poles, which are closer to the residences, so contrast with vegetation would be low.

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 poles would be subordinate in regard to composition. Because one pole would be in the central portion of the view, spatial dominance would be prominent in regard to position. Because the transmission poles would be almost completely backdropped by sky, spatial dominance in regard to backdrop would be prominent. The overall spatial dominance rating would be to co-dominant, similar to the existing poles.

View Blockage

Since the photograph from Key Observation Point 5 was taken, the young orchard on the left has blocked the view of the scenic Sutter Buttes from this portion of South Township Road. However, the orchard does not block the view of the Sutter Buttes and the proposed power plant site from the residences along O'Banion Road. The proposed poles along South Township Road would block a small portion of the scenic view of the Sutter Buttes from those residences. Therefore, the severity of view blockage would be moderate.

KEY OBSERVATION POINT 7: RESIDENCES NEAR TUDOR ROAD AND SOUTH TOWNSHIP ROAD

VISUAL RESOURCES Figure 18 is a photosimulation of the project as seen from Key Observation Point 7.

Contrast with Structures

From Key Observation Point 7 the most prominent existing structures are the poles of the electrical distribution line along Tudor Road. The lattice type transmission towers of two existing electrical transmission lines are visible on the horizon, but due to their background distance they are visually subordinate. The proposed transmission line would have noticeably different conductor support structures and insulators than the existing distribution line, so the proposed line would cause moderate contrast with that line in regard to form. Line contrast with the existing distribution line would be low because the poles of both electrical lines would be characterized as having straight line elements and the conductors of each line would have similar slightly curved line. The proposed grey galvanized color of the poles would contrast moderately in color with the brown color of the existing wood poles. The smooth texture of the proposed steel poles would contrast moderately with the existing wood poles. The poles simulated in Figure 18 are 80 feet tall, 20 percent shorter than they are actually proposed to be (Davey 1998b). The poles of the proposed transmission line would be substantially taller than the poles of the existing distribution line, so scale contrast would be high. In summary, contrast with existing structures would be high in regard to scale, moderate in regard to form, color, and texture, and low in regard to line.

Contrast with Vegetation

Vegetation visible in the view from Key Observation Point 7 consists cropland with a large tree in the foreground and the trees in the Sutter Bypass on the horizon. The applicant proposes to remove the large tree. The vertical form of the poles would contrast highly with the areal form of the cropland and the roughly horizontal band of the trees in the Sutter Bypass. The straight lines of the poles would similarly contrast

highly with the existing vegetation. The grey color of the poles would contrast moderately with the variety of seasonally green or tan tones of the vegetation. The flat texture of the poles would contrast highly with the strong texture of the tree in the foreground, and moderately with the lower level of texture of the cropland. The texture of the trees in the Sutter Bypass is not discernible from this view distance. The poles would appear similar in height to the foreground tree, so scale contrast in regard to vegetation would be low. Because the proposed poles would differ from the existing poles in form and would appear noticeably larger than the existing poles, the poles would add a substantial increment to the contrast caused by the existing structures. Therefore, contrast with vegetation would be high in regard to form, line, and texture, moderate in regard to color, and low in regard to scale from Key Observation Point 7.

Contrast with Land/Water

No water is visible in this view. The landform is flat. The straight, narrow, and vertical appearance of the proposed transmission poles would contrast highly with this landform in regard to form and line. The grey color of the proposed poles would contrast moderately with the earthtones of the land. The flat texture of the poles would create a moderate level of contrast with the moderate texture of the land. The poles would appear substantially taller than any existing landforms, so scale contrast in regard to land would be high. Because the proposed poles would appear noticeably larger than the existing poles, the proposed poles would add a substantial increment to the contrast caused by the existing poles. Therefore, contrast with land would be high in regard to form, line, and scale, and moderate in regard to color and texture.

Scale Dominance

The transmission poles would be prominent in size compared to the field of view and would occupy a moderate part of the setting. They would appear noticeably taller than the existing poles. Therefore, scale dominance from Key Observation Point 7 would be dominant.

Spatial Dominance

Because the spatial composition of the view from Key Observation Point 7 is panoramic, the poles would be somewhat prominent in regard to composition. Because the poles would appear to converge near the center of the view, spatial dominance would be prominent in regard to position. Because the transmission poles

would be mostly backdropped by sky, spatial dominance in regard to backdrop would be prominent. The overall spatial dominance rating would be dominant.

View Blockage

From Key Observation Point 7 the poles would block a moderate portion of the moderate quality view of the cropland and the trees of the Sutter Bypass on the horizon. Therefore, the severity of view blockage due to the poles would be negligible.

KEY OBSERVATION POINT 8: STATE ROUTE 113

VISUAL RESOURCES Figure 20 is a photosimulation of the project as seen from Key Observation Point 8, showing the proposed transmission line as it would look from State Route 113 looking northwest toward the Sutter Buttes..

Contrast with Structures

The towers of the PG&E 500 kV transmission line and the 230 kV Western Area Power Administration line are visible in this view, but they are on the periphery and they are at background distances, so they are subordinate. An existing electrical distribution line using wood poles runs along the west side of State Route 113, so it forms the basis of comparison for contrast of the proposed transmission line with existing structures. The greater complexity of the crossarm structures on the proposed poles would contrast with the existing poles in regard to form, but due to the distance of the proposed line from the view location that difference would not be prominent so contrast in regard to form would be low. The proposed poles would be similar to the existing poles in regard to line and therefore they would cause a low level of contrast with the existing poles in regard to line. The proposed grey color of the poles would cause moderate contrast with the dark brown color of the existing wood poles. The texture of the proposed poles would not be discernible from this distance, so texture contrast would be low. The proposed poles would appear smaller than the existing poles along State Route 113, so scale contrast would be low. In summary, contrast with structures would be moderate in regard to form and color and low in regard to line, texture, and scale.

Contrast with Vegetation

Vegetation visible in the view from Key Observation Point 8 consists of cropland in the foreground and middleground, intermittent trees along the west side of State Route 113, and orchards and trees in the Sutter Bypass on the horizon. The vertical form of the poles would contrast highly with the relatively flat appearance of the cropland, the

rounded form of the trees along State Route 113, and the horizontal bands formed by the orchard trees and the trees in the Sutter Bypass. The straight line of the poles would create low contrast with the linear rows of the cropland, high contrast with the generally rounded form of the trees along State Route 113, and moderate contrast with the horizontal bands of trees in the Sutter Bypass. The grey color of the proposed poles would contrast moderately with the seasonally green to tan colors of the crops and the seasonally green color of the trees. During the afternoon, the poles would be in shadow and would therefore appear very dark, so color contrast would be high. The difference between the flat texture of the poles and the moderate level of texture of the vegetation would not be noticeable because of the distance of the poles from the viewpoint, so contrast in regard to texture would be low. The poles would appear much taller than the row crops and somewhat taller than the trees on the horizon, but shorter than the trees along State Route 113, so scale contrast with vegetation would be low. In summary, the poles would cause high contrast with vegetation in regard to form, line, and color, and low contrast in regard to texture and scale.

Contrast with Land/Sky

No water is visible in this view. The foreground and middleground landform is flat, with the irregular Sutter Buttes visible on the horizon. The straight, narrow, and vertical appearance of the proposed transmission poles would contrast highly with these landforms in regard to form and line. The grey color of the poles would contrast moderately with the earthtones of the land. In the afternoon the poles would be in shadow and therefore would appear very dark; those that would be backdropped by sky would cause high contrast in regard to color. The flat texture of the poles would create a moderate level of contrast with the moderate texture of the land, but due to the distance of the transmission line route from this viewpoint the difference in texture would not be noticeable, so contrast in regard to texture would be low. The poles would appear similar in height to the more distant Sutter Buttes, so scale contrast would be low. In summary, contrast with land and sky would be high in regard to form, line, and color; and low in regard to texture and scale.

Scale Dominance

The transmission line poles would appear similar in height to the Sutter Buttes, the most prominent landscape feature in the view. The poles would therefore cause a co-dominant level of scale dominance.

Spatial Dominance

Despite the fact that the spatial composition of the view from Key Observation Point 8 is panoramic, a large number of poles would be visible across the view from this viewpoint, so the poles would be prominent in regard to composition. Because of their

middleground location, spatial dominance would be subordinate in regard to position. Because a substantial number of the transmission poles would be backdropped by sky, spatial dominance in regard to backdrop would be prominent. The overall spatial dominance rating would be co-dominant.

View Blockage

From Key Observation Point 8 the poles would block a minor portion of the scenic view of the Sutter Buttes. Therefore, the severity of view blockage due to the poles would be moderate.

VISUAL RESOURCES APPENDIX E - COMMISSION STAFF'S ASSESSMENT OF VISUAL SUSCEPTIBILITY FACTORS FOR THE AREA FROM WHICH THE COOLING TOWER PLUME WOULD BE VISIBLE

VISUAL QUALITY

Visual quality within the cooling tower plume's viewshed is generally moderate, typical for a rural landscape. The homes closest to the project site have views of the existing Greenleaf 1 facility, so visual quality is low to moderate there. However, the plume will at times be visible from several miles away. Within this range are many residences with moderate to high visual quality, including views of the Sutter Buttes. Under conditions during which a cooling tower plume would be visible for the proposed project, a visible cooling tower of similar height but narrower would be expected for the adjacent Greenleaf 1 power plant. When a visible cooling tower plume from the existing Greenleaf 1 power plant is greater than approximately 95 meters (calculated as approximately 20 per cent of the daylight hours) visual quality in views toward the site will be reduced to low to moderate.

VISUAL SENSITIVITY

As previously discussed, residents are considered to have high visual sensitivity.

VISIBILITY

The visibility of the plume varies within the area due to variability in screening provided by trees, due to the angles of the major view directions in each residence in relation to the location of the project site, and due to variability in weather. Visibility will range from high to low.

VIEWER EXPOSURE

The factors determining viewer exposure are distance, the number of viewers, and the duration of exposure. The nearest residences with views of the plume are approximately 1/4 mile from the project site, within foreground distance of the project. Twelve residences are within one mile of the project site, 84 residences are within two miles, and 204 residences are within three miles (SPP 1997, Figures 8.12-1a and 8.12-1b). The duration of exposure will vary due to the variable presence and size of the plume and due to the differences in activities between viewers. Plumes 180 meters (591 feet) or greater in height will occur approximately 10 percent of the daylight hours each year. Plumes of 90 meters (296 feet) or greater will occur for approximately 32 percent of the daylight hours each year. These heights are in addition to the 50 ft. tall cooling towers. The time of day and time of year that the plumes will occur will also affect exposure. The taller plumes will occur primarily in the months of December and January. They will occur with less frequency in

November and February, and even less frequency in October and March. The taller plumes will almost never occur during the other six months of the year. The tallest plumes will generally occur in the morning. During the months with the greatest plume potential, which have shorter days and colder temperatures, residents do not spend as much time outdoors, where the plume will be more visible. Fog is expected to reduce the portion of the time that the plume would be visible. For the 32 percent of the daylight hours that the plume is predicted to be 90 meters (296 feet) or taller, fog is predicted to be present approximately 37.5 percent of the time. A daytime plume 90 meters or taller would therefore be present without fog for approximately 20 percent of the daylight hours, primarily in the morning. Overall, viewer exposure will be moderate.

VISUAL RESOURCES APPENDIX F - COMMISSION STAFF'S ASSESSMENT OF VISUAL SEVERITY FACTORS FOR THE COOLING TOWER PLUME

CONTRAST

Existing Plume

The visible cooling tower plume from the proposed project would cause strong contrast in regard to form because it would be noticeably wider and slightly shorter than the cooling tower plume from the existing Greenleaf 1 power plant. The lines of the plume would be similar to the lines of the cooling tower plume from the existing Greenleaf 1 power plant. Color and texture contrast would be low because the plume would appear similar to the cooling tower plume of the existing Greenleaf 1 power plant in regard to these factors. Scale contrast for the 20 percent of daylight hours that the plume is higher than 90 meters (296 feet) would be moderate, because the plume will appear noticeably wider than the cooling tower plume from the existing Greenleaf 1 cooling tower. In summary, in regard to the cooling tower plume of the existing Greenleaf 1 power plant, the cooling tower plume from the proposed project would cause high contrast in regard to form and scale, and low contrast in regard to 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 generally rounded form of the numerous orchard trees in the viewshed and high contrast in regard to the low, rectilinear form of the crop fields. The plume would cause high contrast in regard to the line of the fields. 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 the cooling tower plume from 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 Sutter Buttes on the horizon. The plume would cause high contrast in regard to the generally straight line of the horizon and the irregular line of the Sutter Buttes. 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, the cooling tower plume from 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, because of its substantial height and width and foreground to middleground distance, 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 foreground to middleground location, spatial dominance would be prominent to subordinate in regard to position. Because the plume would be backdropped by sky, spatial dominance in regard to backdrop would be prominent. The overall spatial dominance rating would be co-dominant with the plume from the Greenleaf 1 power plant.

VIEW BLOCKAGE

From some residences in the viewshed the plume would block a moderate portion of moderate-to-high quality views of the Sutter Buttes. Therefore, the severity of view blockage would be moderate.

VISUAL RESOURCES APPENDIX G - COMMISSION STAFF'S ASSESSMENT OF VISUAL SUSCEPTIBILITY FACTORS FOR THE ALTERNATIVE TRANSMISSION LINE ROUTE FOLLOWING O'BANION ROAD THAT THE APPLICANT IS CONSIDERING

Key Observation Point 6 is located near the residence on the north side of O'Banion Road, west of South Township Road (see VISUAL RESOURCES Figure 21). It was chosen to represent the view of the transmission line if it is routed along O'Banion Road.

Visual Quality

From Key Observation Point 6 the view toward the transmission line route has agricultural crops in the foreground. In the background are the 500 kV PG&E transmission line and the 230 kV Western line near the Sutter Bypass levee over two miles away. The trees in the bypass partially provide a background for the lattice towers. The existing transmission lines reduce the visual quality from this key observation point to low-to-moderate.

Viewer Sensitivity

Because Key Observation Point 6 represents a residence, viewer sensitivity is considered high.

Visibility

A small portion of the view of the transmission line route is blocked by a large barn. The majority of the transmission line route in this view is unobstructed. Therefore, visibility is moderate-to-high.

Viewer Exposure

Distance

This view area is within foreground distance of the project site.

Number of Viewers

This view area contains one residence. Traffic on O'Banion Road west of South Township Road is extremely light.

Duration of View

Because the view area represents a residence, duration of view is long.

Overall Viewer Exposure

Because the view area contains only one residence and traffic is extremely light, overall viewer exposure is low.

Summary of Visual Impact Susceptibility

Because the view area contains only one residence and traffic is extremely light, visual impact susceptibility is low.

VISUAL RESOURCES APPENDIX H - COMMISSION STAFF'S ASSESSMENT OF VISUAL SEVERITY FACTORS FOR THE ALTERNATIVE TRANSMISSION LINE ROUTE FOLLOWING O'BANION ROAD THAT THE APPLICANT IS CONSIDERING

VISUAL RESOURCES Figure 22 is a photosimulation of the project as seen from Key Observation Point 6.

Contrast

Contrast with Structures

From Key Observation Point 6 the most prominent existing structure is the barn in the foreground. The 500 kV PG&E transmission line and the 230 kV Western transmission line are visible in the background. The simple, linear form of the proposed poles would cause high contrast with the more complex form of the existing lattice towers and the rectangular form of the barn. The new poles would have straight line elements, similar to the lattice towers and the barn, so line contrast would be low. Although the proposed poles would be grey, they would be in shadow for much of the day from this location so they would appear dark, as does much of the barn. The existing transmission towers are also gray but they appear lighter because their components appear more slender and background sky can be seen through them. Color contrast would be moderate with the color of the existing lattice towers and low with the brown color of the barn. The smooth texture of the proposed steel poles would be the same as the texture of the existing lattice towers, and would cause moderate contrast with the rough texture of the barn. The proposed poles would appear somewhat taller than the existing lattice towers, but they would appear substantially shorter than the barn because they are farther from the view location than the barn is. Therefore, scale contrast would be low. In summary, contrast with existing structures would be high in regard to form, moderate in regard to color and texture, and low in regard to line and scale.

Contrast with Vegetation

Vegetation visible in the view from Key Observation Point 6 consists of cropland in the foreground and middleground and the trees in the Sutter Bypass on the horizon. The vertical form of the poles would contrast highly with the areal form of the cropland and the roughly horizontal band of the trees in the Sutter Bypass. The straight lines of the poles would similarly contrast highly with the existing vegetation. The proposed poles would appear very dark because they would be south of the view location, causing them to be in shadow most of the time and causing high color contrast with the variety of seasonally light green or tan tones of the vegetation. The flat texture of the poles would contrast moderately with the moderate level of texture of the cropland. The texture of the trees in the Sutter Bypass is not discernible from this view distance. The poles would appear smaller than the masses of vegetation in the view, so scale

contrast in regard to vegetation would be low. Because the proposed poles would differ from the existing lattice towers in form and would appear noticeably larger than the existing towers, the poles would add a substantial increment to the contrast caused by the existing structures. Therefore, contrast with vegetation would be high in regard to form, line, and color, moderate in regard to texture, and low in regard to scale from Key Observation Point 6.

Contrast with Land/Sky

No water is visible in this view. The landform is flat. The straight, narrow, and vertical appearance of the proposed transmission poles would contrast highly with this landform in regard to form and line. The proposed poles would appear very dark because the poles would be south of the view location, causing them to be in shadow most of the time and causing high contrast with the earthtones of the land. The flat texture of the poles would create a moderate level of contrast with the moderate texture of the land. The poles would appear substantially taller than any existing landforms, so scale contrast in regard to land would be high. Because the proposed poles would appear noticeably larger than the existing poles, the proposed poles would add a substantial increment to the contrast caused by the existing poles. Therefore, contrast with land would be high in regard to form, line, color, and scale, and moderate in regard to texture from Key Observation Point 6.

Scale Dominance

The transmission poles would be subordinate in size compared to the field of view and would occupy a moderate part of the setting. They would appear noticeably taller than the existing transmission towers but smaller than the existing barn. Therefore, scale dominance from Key Observation Point 6 would be subordinate.

Spatial Dominance

Because the spatial composition of the view from Key Observation Point 6 is panoramic, the poles would be somewhat prominent in regard to composition. However, the existing lattice towers and the existing barn would have similar prominence in regard to composition. Because the poles would cross the middle of the field of view, spatial dominance would be prominent in regard to position, but again the existing towers and the barn would have similar prominence in regard to position. Because the transmission poles would be mostly backdropped by sky, spatial dominance in regard to backdrop would be prominent. Again, the lattice towers and the barn also are mostly backdropped by sky, so they too would be prominent in regard to backdrop. In summary, the overall spatial dominance rating would be co-dominant.

View Blockage

From Key Observation Point 6 the poles would block a small portion of the low-to-moderate quality view. Therefore, the severity of view blockage due to the poles would be negligible.

VISUAL RESOURCES APPENDIX I - COMMISSION STAFF'S ASSESSMENT OF VISUAL SEVERITY FACTORS FOR STAFF'S ALTERNATIVE TRANSMISSION LINE ROUTE PROCEEDING WEST TO THE EXISTING PG&E 500 KV TRANSMISSION LINE THEN SOUTH TO THE O'BANION SWITCHING STATION SITE

Contrast with Structures

From Key Observation Point 5 the most prominent existing structures are the poles of the electrical distribution line along the east side of South Township Road. Poles along O'Banion Road are also visible. The Greenleaf 1 power plant and the existing Western 230 kV and PG&E 500 kV transmission lines are visible on the horizon but are subordinate due to the background distance. From this distance the new transmission poles would appear similar in form to the electrical distribution lines in the foreground. The new poles would be different in form from the existing lattice towers of the existing transmission lines, but due to the distance to the transmission lines this difference would not be prominent. The new poles would have straight line elements, similar to both the existing wood poles in the foreground and the existing lattice towers near the new poles, so line contrast would be low. The difference between the grey color of the new poles and the brown color of the existing wood poles would not be prominent due to the distance of the new poles from the view location. The color of the new poles would be similar to the existing transmission towers near them. Therefore, color contrast would be low. The difference between the flat texture of the steel poles and the more rough texture of the existing wood poles would not be noticeable due to the distance, so texture contrast would be low. The existing wood poles would appear much larger than the new poles because the existing wood poles are much closer to the view area. The new poles would appear approximately the same size as the existing transmission line towers that they would be near. Therefore, scale contrast would be low. In summary, in regard to existing structures the proposed poles would cause low contrast in regard to form, line, color, texture, and scale.

Contrast with Vegetation

Vegetation visible in the view from Key Observation Point 5 toward the site consists of young orchard trees, grass, and a few trees. The vertical form of the poles would contrast highly to the low, irregular form of the grass and the rounded form of the trees. The straight lines of the poles would similarly contrast highly with the existing vegetation. The grey color of the towers would contrast moderately with the variety of green tones of the vegetation. The texture of the towers as a whole would appear varied because of the complexity of the lattice design, and 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 line would only add incrementally to the contrast with vegetation caused by the existing poles,

which are closer to the residences, and to the contrast with vegetation caused by the existing lattice towers, so contrast with vegetation would be low.

Contrast with Land/Water

No water is visible in this view. The landform consists of flat cropland with the Sutter Buttes visible to the left on the horizon. The proposed transmission poles would contrast highly with this land surface in regard to form and line. The grey color of the line would cause moderate contrast with the dirt surface of South Township Road and with other land visible from this viewpoint. The flat texture of the poles would cause moderate contrast with the rougher texture of the land. No landforms appear large from this view, so the poles would create a high level of scale contrast. In summary, if no existing structures were visible, contrast with land would be high in regard to form, line, and scale, and moderate in regard to color and texture. However, the proposed line would only add incrementally to the contrast with land caused by the existing poles, which are closer to the residences, and the existing lattice towers, so contrast with vegetation would be low.

Scale Dominance

The new transmission poles would be small compared to the panoramic field of view and would occupy a small part of the setting. Therefore, scale dominance from Key Observation Point 5 would be subordinate.

Spatial Dominance

Because the spatial composition of the view from Key Observation Point 5 is panoramic, the poles would be subordinate in regard to composition. Because of their background location, spatial dominance would be subordinate in regard to position. Because the transmission poles would be partly backdropped by sky, spatial dominance in regard to backdrop would be somewhat prominent. The overall spatial dominance rating would be to subordinate.

View Blockage

The proposed poles would block a very small portion of the scenic view of the Sutter Buttes. Therefore, the severity of view blockage would be moderate.

CULTURAL RESOURCES

Testimony of Kathryn Matthews

INTRODUCTION

This analysis discusses cultural resources which are defined to include the structural and cultural evidence of the history of human development and life on earth. Archaeological evidence indicates that the rich and varied environment of California has provided the resources needed for human occupation for many thousands of years. This evidence of California's early occupation is becoming increasingly vulnerable to the ongoing development and urbanization of the state.

Cultural resource materials may be found nearly anywhere in California, and they may be found on the ground surface or they may be found at varying depths beneath the surface. In some areas of the state, a sequence of settlements on the same site may cover multiple layers of previous cultural resources. In other parts of the state, the distribution of cultural materials may be much more dispersed. Cultural resources are considered non-renewable resources.

Cultural resources are significant to our understanding of our culture, our history and heritage. Critical to the analysis of cultural resources are the spatial relationships between an undisturbed cultural resource site and the surface environmental resources and features, and the analysis of the locational context of the resource materials within the site and beneath the surface. 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. Analysis of cultural resources can also provide insight into the broader patterns of human adaptation to environmental change.

Three aspects of cultural resources are addressed in this analysis: prehistoric and historic archaeological resources and ethnographical resources.

PREHISTORIC RESOURCES

Prehistoric archaeological resources are those materials relating to prehistoric human occupation and use of an area; these resources may include sites and deposits, structures, artifacts, rock art, trails, and other traces of prehistoric human behavior. In California the prehistoric period began over 10,000 years ago and extended through the 18th century when the first Euro-American explorers settled in California.

HISTORIC RESOURCES

Historic archaeological resources are those materials usually associated with Euro-American exploration and settlement of an area and the beginning of a written historical record; they may include archaeological deposits, sites, structures, traveled ways, artifacts, documents, or other evidence of human activity. Under state requirements, historic resources must be greater than 100 years old while under

federal requirements, such resources are considered historic if they are greater than 50 years old.

ETHNOGRAPHIC RESOURCES

Ethnographical resources are those materials important to the heritage of a particular ethnic or cultural group, such as Native Americans, African, European, or Asian 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)

The determination of potential impacts to cultural resources is required by the Warren-Alquist Act and the Siting Regulations of the California Energy Commission (Energy Commission), by the California Environmental Quality Act (CEQA), and by the National Environmental Policy Act (NEPA). 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 for compliance with these laws.

FEDERAL

- National Historic Preservation Act; Title 16 United States Code § 470 *et* seq:; requires Federal agencies to consider the effects of their actions on sites that are eligible for inclusion in the National Register of Historic Places (NRHP). The NHPA defines "historic properties" as those properties eligible for or listed on the National Register. This includes any cultural resources that are (1) properties (things, tangibles), and (2) significant (ie, eligible). Regulations established in Title 36 Code of Federal Regulations, Part 800, require consultation with the State Historic Preservation Officer (SHPO) and notification of the Advisory Council on Historic Preservation (ACHP) if a proposed action could impact such sites.

  In consultation with the SHPO, the Federal agency lead defines the project's Area of Potential Effect (APE). Western Area Power Administration (Western) is the federal lead for this project for the National Historic Preservation Act.

- National Environmental Policy Act (NEPA); Title 42 United States Code, § 4321-4327: requires Federal agencies to consider potential environmental impacts of projects with federal involvement and to consider appropriate mitigation measures.

- American Indian Religious Freedom Act; Title 42 United States Code § 1996: is intended to protect and preserve for Native Americans their inherent right of freedom to believe, express, and protect their traditional religions of Native Americans, including access to religious or traditional sites, use and possession

of sacred objects, and freedom to worship through ceremonies and traditional rites.

- 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.

- Archaeological Resources Protection Act of 1979 (ARPA); Title 16, United States Code section 470aa-470ll: requires permits for the excavation and/or removal of cultural materials from Federal and Indian lands. Excavations must be undertaken for the purposes of furthering scientific knowledge in the public interest. Also of importance, is that the act provides for both civil and criminal penalties for violation of the act, i.e., excavation and/or removal without a permit. Per Nick's e-mail.

- Curation of Federally-owned and Administered Archaeological Collections; Title 36 Code of Federal Regulations, section 79: These regulations establish guidelinesand standards for the storage, treatment, preservation, and administration of archaeological collections belonging to the Federal government. These regulations were promulgated under the authority of the National Historic Preservation Act. Per Nick's e-mail.

- Archaeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines (48 Federal Register 44716 - 44740): These are not regulatory and are intended to provide technical advice about archaeological and historic preservation activities and methods.

STATE

- California Environmental Quality Act (CEQA); Public Resources Code sections 21083.2, 21084.1, *et seq*: require analysis of potential environmental impacts of proposed projects on cultural resources that are eligible for or listed on the California Register of Historic Resources (CRHR). Properties that are listed on or have been determined to eligible for the NRHR are automatically included in the CRHR, as are properties that have been determined significant through certified local studies. For practical purposes, compliance with NHPA will also result in compliance with CEQA for cultural resources.

- CEQA; Public Resources Code, 21083.2, 21084.1, *et seq*: require application of feasible mitigation measures if potential project-related impacts are identified.

- CEQA Guidelines; California Code of Regulations, § 15000, *et seq*, Appendix G (j)]: specifically defines a potentially significant environmental effect as

occurring when the proposed project will "...disrupt or adversely affect...an archeological site, except as part of a scientific study."

- CEQA Guidelines; California Code of Regulations, § 15000, *et seq*, Appendix K: specifically sets forth all the steps necessary to analyse the effects of a proposed project on historic and prehistoric resources.

- Public Resources Code, section 5020.1.

- Public Resources Code, section 5024.1.

- Public Resources Code, § 5097.5: Any unauthorized removal of archaeological or historic resources or sites located on public lands 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.

- California Health and Safety Code, § 7050.5: If human remains are discovered during construction, the project owner is required to contact the county coroner.

- Public Resources Code, § 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 disposal.

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.

Sutter

Sutter County has developed specific requirements for the protection of cultural resources and mitigation of potential impacts to such resources. Section 4.9 of the 1996 County General Plan (and associated EIR) sets forth goals, policies, implementation programs, and mitigation measures relative to protection of historic and cultural resources. The draft EIR for the revisions to the General Plan state that Goal 5B is to identify, protect, and enhance Sutter County's important historical, archaeological, and cultural sites. Mitigation Measure 4.9.1 directs the County, through its Community Services Department, to require a reconnaissance survey be conducted for development projects in areas of known high resource sensitivity. If the report on the survey concludes that resources are present, then the County requires the developer to implement the mitigation measures as set forth in the survey report (Sutter 1996a, 1996b; Farhar 1998a, 1998b).

Colusa County

Colusa County has no specific LORS related to cultural resources. The County does require a project developer to consult with a professional archaeologist if any cultural resources are encountered during project construction. This requirement is usually included in the use permit for a project (Kelley 1998).

ENVIRONMENTAL SETTING

REGIONAL DESCRIPTION

The SPP project area is located in the Great Valley Geomorphic Province of California. This valley is generally characterized by broad lowlands that are bounded on the west by the Coast Range and on the east by the foothills of the Sierra Nevada Mountains. The SPP project has been proposed for construction in the northern portion of California's great valley, near the eastern edge of the valley, and to the east and south of the confluence of the Feather and Sacramento rivers. Refer to the **Project Description** section for a regional map of the project development area (Calpine 1997).

CULTURAL RESOURCE SETTING

As described in the AFC, there were subtle differences in the geology, topography, and vegetation within the Sacramento Valley that had very profound influences on the life and culture of the prehistoric inhabitants. The prehistoric natural environment consisted of three quite distinct zones of vegetation and topography: the natural river levees and meander belt of the Sacramento River; the Sutter over-flow basin; and the low, upland terraces between the Sutter basin and the Feather River (Calpine 1997).

The natural levee zone consists of a narrow band, extending from one-half to a full mile out from either side of the Sacramento River channel. While the river and sloughs provided an abundance of fish, the fertile levee zone supported a dense riparian forest that provided a diversity of other food resources. The overflow basin was quite swampy and filled with wetland vegetation that attracted migrating waterfowl, fish and elk. The low terrace zone consisted of oak and grassland savannah that provided prehistoric residents with acorns, as well as antelope, deer, and elk. While all three of these zones contained resources of use to Native American populations, most of the previously recorded prehistoric occupation sites in the immediate project area have been found in the natural river levee zone. This zone is considered most likely to contain evidence of prehistoric occupation sites (Calpine 1997).

Prehistoric Setting

As discussed in the AFC, relatively little archaeological work has been done in this part of the Sacramento Valley. In general, the prehistoric pattern was for an increase in population density over time, with a corresponding improvement in tools and hunting

implements, increased settlement, and the use of a greater diversity of food resources. In California, archaeologists have identified several major periods of prehistory, each with its own characteristics and cultural patterns. The first period is called the Pre-Archaic, estimated at 13,500 to 11,000 years before the present (BP). The populations were small and they subsisted on wide-ranging hunting and gathering, dependent on large game and localized lake and marsh habitats.

Subsequent periods include the Early to Middle Archaic Period, estimated at 11,000 to 6,000 years BP; the Late Archaic Period (6,000 to 4,000 years BP; the Early and Middle Pacific Period (4,000 to 1,500 years BP); the Late Pacific Period (1,500 to 600 years BP); and the Final Pacific Period (600 to 200 BP). For a more detailed discussion of these periods please refer to the AFC (Calpine 1997) and to the book, The Archaeology of California, by J.L. Chartkoff and K.K. Chartkoff (Chartkoff and Chartkoff 1984).

CULTURAL RESOURCES Figure 1

The Late Pacific Period is considered by archaeologists to be a major cultural turning point, as the bow and arrow replaced the spear thrower and a shift in the use of grinding stone tools from portable manos to bedrock mortars. By the Final Pacific Period, prehistoric populations had become increasingly sedentary and dependent on a wide variety of staple foods; long distance trade networks were stronger, and social systems were more complex (Calpine 1997; Chartkoff and Chartkoff 1984).

Ethnographic Background

As discussed in the AFC, the Valley Nisenan (also known as the Southern Maidu) and the River Patwin (also known as the Southern Wintu) occupied the project area in proto-historic times. The Nisenan inhabited the American, Bear, and Yuba river basins; the Valley Nisenan lived along the banks of the Sacramento and lower American rivers while the Hill Nisenan lived in the lower foothills. The River Patwin, as distinct from the Hill Patwin, also lived along the rivers in the northern part of the Sacramento Valley. Several Patwin villages were recorded on the west side of the Sacramento River but their exact locations are unknown. The approximate boundaries between the two tribal groups are shown in Cultural Resources Figure 1 which is taken from the AFC (Calpine 1997).

As discussed in the AFC, the village was the most important unit of social and political organization for both the Patwin and the Nisenan. Villages could range in size from an extended family of three to seven houses, up to large villages of 40 or 50 houses and as many as 500 people. Trade in food and other resources was extensive and communication generally followed the rivers and streams. After contact with Euro-American trappers, explorers, and missionaries, the number of native peoples drastically declined. Although neither the Patwin nor the Nisenan were missionized, the contact took its toll. Also, much of the River Patwin and Valley Nisenan lands were taken over in the 1830s and 1840s by Mexican and American settlers who secured land titles and claims on the resources because of lenient governmental policies (Calpine 1997).

For additional information on the early peoples of California see Volume 8 of the Handbook of North American Indians, edited by Robert F. Heizer (Heizer 1978).

Contact and Early Settlement As described in the AFC, the SPP project is located in Sutter County, which is named for one of the most prominent settlers and residents in the Sacramento Valley -- Captain John A. Sutter. The first recorded contact with the native peoples was made by the Gabriel Moraga Expedition in 1808 when it likely passed through the project area on its way to the Sutter Buttes and on its return to the mission at San Jose. Sutter arrived in the Sacramento area in 1839 and began establishing outpost settlements. Sutter's primary stock ranch, Hock Farm, was located four miles south of Yuba City and five miles east of the SPP project site, and it is listed as a State Historic Landmark (Calpine 1997).

As settlers moved to the area, they were not discouraged by the vast swamps and wetlands and began to construct small dams, levees, and ditches to protect their lands from flood waters. Often structures on one property directed flood waters onto another's property, building animosity. These problems were exacerbated by the hydraulic mining in the upper canyons of the rivers, with the silt and debris washing down to fill river channels and clogging local flood control systems. As the rivalries escalated to regional and county-wide levels, the state passed legislation to coordinate flood management within the Sacramento area.

Reclamation District No. 1500 was established in 1913 and it encompasses most of the project area and the Sutter basin. This district was responsible for maintaining the levees and drainage systems within its boundaries. By 1918 construction of the Sutter By-pass had reached a point where most of the area was protected from flood waters. The Sutter Mutual Water Company was formed to provide water to lands within Reclamation District 1, and by the early 1920s there were some 46 miles of main irrigation canals and 137 miles of lateral canals; there were an additional 19 miles of main drain and 425 miles of lateral drainage ditches to serve the area. Portions of these original structures are present in the project area (Calpine 1997).

Transportation and Agricultural Development

Early settlers in the project area depended on water transport on the Sacramento and Feather rivers. The seasonal changes in water levels and siltation from mining created difficulties in maintaining transportation. If settlers traveled by land there were major rivers to cross and ferry crossings were established at key points, especially after the discovery of gold in 1849. By the late 1800s most of the ferry services ceased due to construction of bridges and lack of business. Rail transport became available in the 1870s but was vulnerable to flooding and some sections of track and bridges were not replaced after they washed out (Calpine 1997).

The railroad was critical for the transport of agricultural products. Wheat was an important crop in the 1860s. During World War I, the demand and prices for agricultural products shot up. Rice was an experimental crop that rapidly became important once the irrigation system was completed. There were experiments with large-scale corporate farming camps and later, with 40- to 80-acre orchards and vineyards. Many of today's residents are descendants of these early farmers and they are still involved in agriculture (Calpine 1997).

Pre-AFC Literature and Records Search

With such a rich history and prehistory, there is a potential that development of the SPP project would encounter evidence of previous occupation and use of the land in the area. Prior to preparation of the AFC, consultants to the applicant reviewed literature, site records, and maps at the Northeast Center of the California Historical Resources Information System located at the California State University at Chico. The consultants also found that certain soils groups shown on maps published by the US Soil and Conservation Service seemed to generally correlate with some of the land

forms along the earlier channels of the Sacramento River. They found that for cultural resources, the presence of natural river levee zones appeared to correlate with soils in the Shanghai-Nueva-Columbia soils group (Calpine 1997). This is not to say, however, that the presence of these soils automatically indicates the presence of cultural resource materials or sites in that area. It is possible though, that areas that did not experience the same degree of inundation as other locations along the river channel may have provided somewhat safer high ground that could have attracted settlement and/or seasonal use (Calpine 1997).

Information found during the literature and record search was used to assess the potential for a proposed project to encounter sensitive cultural resource materials in the project area. The search focused on the area of potential effect (APE) which is defined as "the geographic area or areas within which an undertaking may cause changes in the character or use of historic properties, if any such properties exist" [36 CFR 800.2(c)]. The search also included areas located up to one mile away from the APE for the project activities.

The literature and records searches indicated that, although most of the area affected by the project had not been previously surveyed for cultural resources, five prehistoric sites have been recorded within one mile of the project. Several of these sites were large mounds 50 to 100 feet in diameter and most likely they were large residential base camps along the river. While no historic sites were recorded within the project area, two sites from the historic period are located nearby. For more detailed information on the results of the literature review, refer to the summary in the Section 8.3 of the AFC. Per Commission requirements, site-specific information was filed with the Energy Commission under separate cover to maintain confidentiality of sensitive resource locations (Calpine 1997).

Pre-AFC Field Survey

On-the-ground surveys of the project area were conducted by the archaeologists in May and July of 1997. Additional surveys were conducted in September and October 1997 and in March and April 1998. The archaeologists were asked to note any cultural resources and record their location for further follow-up. No surface evidence of prehistoric archaeological resources was found during the pre-AFC surveys and one new historic archaeological site was recorded (Calpine 1997).

For the power plant site and switchyard, surveyors walked in parallel transects ten meters apart and, where ground visibility was obscured, they made periodic shovel tests. For the gas and electric transmission routes, each surveyor walked on one side of the access roads, scanning alongside and outward. Where visibility was good, they could see up to twenty meters from the road. Visibility for about 13 percent of the total area potentially affected by the SPP project was fair to poor. Natural and manmade exposures were examined, both for cultural materials, as well as evidence of fossils, on the surface.

Architectural Reconnaissance

Homes and farmsteads older than about forty-five years could potentially be of historic interest in the project area. Besides the on-the-ground surveys, the archaeologists drove local roads in the project area to determine whether architecturally significant structures were present and whether the project would potentially affect them. While many farmsteads and residences observed during the survey appeared to be within the age of potential interest, none seemed to meet the criteria for potential significance. The survey team also noted the extensive irrigation canal and drainage ditch systems in the project area. Many historic structures and systems were seen, but none would apparently be affected by the project (Calpine 1997).

Native American Contacts

In the summer of 1997, the consultant to the applicant contacted the state's Native American Heritage Commission (NAHC) to request information on traditional cultural properties such as Native American cemeteries and sacred places in the project area (Calpine 1997). The NAHC maintains a list and maps of traditional resource sites located throughout the state. The NAHC also can refer staff, applicants, consultants, and members of the public to registered Native American representatives who can assess the potential for a specific project to impact Native American sites or values in various parts of the state.

In response to Calpine's request, the NAHC did not indicate the presence of any sacred properties. It is important to note here that the NAHC often does not have all of the information on sacred sites. Therefore, there may still be sacred properties in the project area.

The NAHC also provided a list of Native American contacts who are of Miwok and Maidu heritage. In a subsequent filing with the Commission, Calpine requested that the records of their contacts with the NAHC be kept confidential. They also requested that the names and addresses of the members of the NAHC contacted by Calpine be treated as confidential since those persons had not given permission for this information to be publicly released (Calpine 1997; 1998bb).

SITE AND VICINITY DESCRIPTION

The SPP project site is located within a 77-acre parcel that contains an existing power generation project and a food drying plant. The site is relatively level, ranging in elevation from 36 to 38 feet above mean sea level. The site is surrounded by lands in agricultural use and there are rural residential units in the vicinity. Generally, the routes for the proposed linear facilities follow local road ways, property lines, or field boundaries to minimize impacts on agricultural use and natural resources (Calpine 1997; 1998a; 1998h). Please refer to the **Project Description** section for a more detailed description of the project and related facilities, and a project site map and facility layout.

Power Plant

While there is some vegetation present, the ground surface at the power plant site has been disturbed by previous agricultural use and by the construction and operation of the existing Greenleaf No. 1 generation project and the food drying plant. The power plant site is located outside of the natural river levee zone so it is unlikely that cultural resource materials would be encountered. The site will be excavated to an unknown depth to reach soils capable of bearing the foundations for the power generation equipment and the bank of cooling towers and basins (Calpine 1997).

Water Supply

The water supply for the SPP project is to be provided by three new wells that are proposed to be drilled within the 12-acre power plant site. A short service pipeline, also within the power plant site would connect the wells with the project (Calpine 1997).

Electric Transmission Line Route(s)

The AFC description of the ground surface along the transmission corridor indicates that some areas have been previously disturbed and some areas are relatively undisturbed and are covered to varying degrees with vegetation. Portions of the proposed alternative corridors are also crossed by existing high voltage transmission facilities and access roads; other portions of the corridor run parallel to existing local roads. Construction placement of the transmission structures will require drilling of the soil to variable depths for foundation footings for the poles (Calpine 1997).

A four-mile transmission route was identified in the AFC and a 5.7-mile alternative route was identified in a later supplement to the AFC. The corridors for these routes generally run along existing roadways, within the rights-of-way that extend about 50 feet on either side of the roadway. During pre-AFC surveys, the center of the roadways were used as the proposed center line for each segment of the alternative transmission line routes. The width of the ultimate right-of-way for the proposed transmission line is expected to vary from 100 to 125 feet (Calpine 1997).

As described in the May 1998 supplement to the AFC, the applicant plans to use single, tubular steel poles for the electrical transmission facilities. The AFC supplement indicates that the average span length would be 750 to 800 feet between the poles. Based on this average span length, about 25 poles would be required for the proposed 4.0-mile transmission route, while over 35 poles would be needed for the 5.7-mile alternative route. Generally, these transmission routes pass through an area of low sensitivity for cultural resources (Calpine 1997).

Natural Gas Pipelines

The AFC and supplements indicate that two gas pipelines will be needed to maintain adequate pressure and supply natural gas to the SPP project. One pipeline will be

sixteen inches in diameter and run for about twelve miles, much of it along existing roadways. The second gas pipeline will be four inches in diameter and it will consist of an upgrade of portions of an existing pipe, plus construction of an additional 8,000 feet of new pipe. The ground surface along both of the gas pipeline routes is described as considerably disturbed and much of the alignment is paved or otherwise covered by development. Portions of the proposed pipeline route are to be bored under the Sutter By-pass levees and channel, and under several of the local sloughs. Other portions of the proposed corridor are crossed by existing high voltage transmission facilities and access roadways. However, over one third of the 16-inch pipeline route and all of the 4-inch pipeline route will pass through the natural river levee zones along the Sacramento River that have been identified where there may be a potential to encounter cultural resources. Given the number of prehistoric sites already recorded in the levee zone in the project area, any undisturbed soils underlying these routes may contain previously unknown cultural resources (Calpine 1997).

IMPACTS

Since project development and construction usually entail surface and sub-surface disturbance of the ground, the proposed SPP project has the potential to adversely affect previously unknown cultural resources. Impacts to cultural resources may result either directly or indirectly during the pre-construction, construction, and operation of the project. 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 are those which may result from increased erosion due to site clearance and preparation, or from inadvertent damage.

Based upon the California Environmental Quality Act (CEQA), the Warren-Alquist Act, and Energy Commission siting regulations, the Commission staff must evaluate the potential for impacts from a proposed project on significant or unique archaeological resources. For the SPP project, Western, as the Federal lead agency, has the responsibility to meet with the SHPO and ACHP to determine whether or not any cultural resources encountered during project-related activities are significant.

SIGNIFICANCE CRITERIA FOR CULTURAL RESOURCES

Significant cultural resources are those that meet established scientific criteria which are generally accepted by professional archaeologists, historians, and cultural resource specialists. Under federal law, the criteria for determining a significant impact to cultural resources differs from that of state law. The significance criteria for each body of law is described below.

Federal Criteria

In Title 36 Code of Federal Regulations, section 60.4, the Federal government sets forth the following criteria to determine eligibility for the National Register of Historic Places:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that also:
>
> (a) are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) are associated with the lives of persons significant in our past; or
>
> (c) 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 distinguishable entity whose components may lack individual distinction; or
>
> (d) have yielded or may be likely to yield information important in history or prehistory.

State Criteria

CEQA indicates that a project will have a significant adverse effect if it impacts "unique" archaeological resources which is a category that is narrowly defined by statute. (Public Resources Code, section 21083.2). In addition, Public Resources Code section 21084.1 provides for the protection of "historical resources" that are greater than fifty years old. The term "historical" has been interpreted by the state Office of Planning and Research to include archaeological resources, and is more encompassing than the resources protected according to their "unique" status [Remy & Thomas, *et al*., 1996; pages 113 and 117].

Section 21084.1 of CEQA would require a finding of significant impact for any project that may have a "substantial adverse change" on the historical significance of a "historical resource", which is defined to include those archaeological resources that are either listed or eligible for listing in the California Register of Historical Resources [Ibid]. Such adverse changes include demolition, destruction, relocation, or alteration of the resource [Remy & Thomas, *et al*., 1996; page 118].

The California State Historic Preservation Officer (SHPO) has developed a set of standards and guidelines for identification, impact mitigation, and protection of cultural resources in the state. The SHPO also has a set of suggested standards and

guidelines for the selection of a qualified professional archaeologist to oversee monitoring and mitigation efforts on projects in the state. These standards and guidelines are based upon the U.S. Secretary of Interior's, Standards and Guidelines. The California Register includes historic resources which have been determined by the State Historical Resources Commission to meet the following criteria, set forth in sub-section (c):

(1) It is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

(2) It is associated with the lives of persons important in our past;

(3) It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values;

(4) It has yielded, or may be likely to yield, information important in prehistory or history (Public Resources Code, section 5024.1).

IMPACTS TO CULTURAL RESOURCES

As described in the AFC, the potential for significant project impacts to cultural resources is directly related to the likelihood that such resources are present and whether they are actually encountered during project development activities. A determination of the potential for discovery of cultural resources is based on the results of the literature review and field surveys. Basically, the more cultural resource sites and materials reported in an area, the greater the potential for future discoveries in the vicinity. Since there were five prehistoric sites recorded within one mile of the SPP project site and linear facility routes, there is a likelihood that cultural resource materials will be encountered during project-related site clearance and excavation (Calpine 1997).

Often the potential for cultural resources to be found during project construction activities, remains uncertain until the ground surface has been broken and excavation of sub-surface soils takes place. Staff's objective is to ensure that there will be no adverse impacts to significant or unique cultural resource materials during project development and construction.

As described in the AFC, the entire project area was surveyed for surface evidence of cultural resources. One new historic site was recorded but it was recommended as not eligible for inclusion in the NRHP. The literature search determined that there were no recorded sites within the project boundaries and that five sites had been recorded within one mile of the project area, in the natural river levee zone. Based on the location of these previously recorded finds, there is a potential for undiscovered archaeological materials to be discovered in association with the natural river levee zone. This zone was found to generally correlate with the presence of soils in the

"Shanghai-Nueva-Columbia" group. Whie the presence of the soil group in the levee zone does not necessarily mean that cultural resources will be found there, Calpine did indicate that it is "somewhat likely that project construction activities, particularly excavation for the natural gass pipeline, would encounter significant buried deposits in this zone". Buried archaeological deposits are much less likely to occur anywhere else in the areas affected by the project (Calpine 1997).

Power Plant Site

The power plant site is located outside of the natural river levee zone and it is unlikely that cultural resource materials would be encountered during grading associated with the power plant site preparation or during the excavations and foundation development associated with power plant construction (Calpine 1997).

Water Supply

The proposed project water supply would be drawn from three wells that are to be drilled within the 12-acre power plant site and any associated water pipeline would also be routed within the project site. The wells and water lines would be located in the same conditions and would be constructed to the same approximate depth as the power plant so the potential for impacts to cultural resources would be virtually the same as for the power plant (Calpine 1997).

Electric Transmission Line Route(s)

Construction of foundations for the transmission structures will require drilling of 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. The width and extent of surface soil disturbance would depend upon the size of equipment needed to set and erect the poles (Calpine 1997).

No surface evidence of cultural resource materials was observed during pre-AFC surveys of the proposed 4.0-mile transmission routeNone of this proposed route is located in the natural river levee zone and no soils of the Shanghai-Nueva-Columbia group were observed along the route. A small portion of the route follows or crosses existing roadways where the underlying soils are hidden by pavement or they were disturbed during preparation for roadway construction; the potential for cultural resources is undetermined. The major portion of this route crosses through open lands that have experienced episodic flooding and inundation (Calpine 1997).

None of the 5.7-mile alternative transmission route is located in the natural river levee zone and no surface evidence of cultural resource materials was observed during surveys of the proposed alternative route.

Natural Gas Pipeline Routes

The new 16-inch gas pipeline will be buried in trenches approximately 32 to 36 inches wide and 72 to 84 inches deep. Estimated surface disturbance of 25 to as much as 50, or possibly 75 feet, in width would occur during pipeline trenching and pipe placement. For boring under levees, sloughs, ditches and roads, additional work space may be cleared at the points of entry and exit for the equipment. Approximately 3 miles of the 12-mile route proposed for the 16-inch gas pipeline is proposed for construction in areas underlain by soils of the Shanghai-Nueva-Columbia group which are indicators of the natural levees of the ancient Sacramento River. Where not previously disturbed, the natural levee zone of the Sacramento River is considered sensitive and could potentially produce buried cultural resource materials. The potential for impacts cannot be fully evaluated until the sub-surface soils are exposed during trenching for the pipelines and the soils are examined for evidence of cultural resources. Portions of the pipeline routes are to be constructed alongside or under existing local streets that have been built over these sensitive soils (Calpine 1997).

The new sections of the 4-inch gas pipeline will be buried in trenches approximately 12 to 18 inches wide and 52 to 56 inches deep. The width of surface disturbance during construction trenching and pipeline placement was estimated to range from 5 to 10 feet within the road shoulder. Where sections of abandoned pipeline are to be reactivated, ten by ten-foot bell holes would be excavated at each end, with no additional excavation needed unless the pipe must be replaced (Calpine 1998*). The majority of the route proposed for the 4-inch pipeline lies alongside or under existing road ways and the amount of expected disturbance is relatively limited in depth and breadth, compared to that needed for the 16-inch line. The majority of this route is underlain by the Shanghai-Nueva-Columbia soils group and, where not previously disturbed by road construction, they still have the potential to contain cultural resource materials (Calpine 1997).

CUMULATIVE IMPACTS

Cumulative impacts to cultural resources may occur when more than one project is proposed in the vicinity of known cultural resources; while each may have a less than significant impact, their combined effects may have a significant impact on the resource. Cumulative impacts also occur when continuing development occurs in an area where known and previously unknown cultural resources are gradually encroached upon and damaged to the point that they no longer can produce useful scientific information or insight into resources and sites of cultural interest and value. Based upon previous cultural resource surveys and research, California has been inhabited by prehistoric and historic-era humans for tens of thousands of years. While the total area affected by the SPP project appears small in comparison to the vastness of the entire central valley in northern California, the sediments and cultural resource materials found in the project area can provide valuable information on environmental conditions and human adaptations to an earlier, wetter climate pattern. Proposed developments reaching wider and deeper into the central valley can accelerate the potential for loss of significant cultural resources. The level of cumulative impact will increase as increasing development opens more undisturbed areas and eventually exposes highly sensitive cultural resource sites.

If the natural gas pipeline were to encounter a large, stratified, buried prehistoric site in the Sacramento River natural levee zone, the possibility of cumulative impacts would arise because such sites are highly significant, and many other such sites have been damaged or destroyed by previous agricultural activity and other developments along the natural levee. Given the relatively low level of impact to such a site that a natural gas pipeline would cause, however, it is also possible that proposed activities would not lead to significant cumulative impacts, depending upon the extent of project excavation or trenching encountered cultural resources (Calpine 1997).

FACILITY CLOSURE

The anticipated lifetime of the SPP project is expected to be in excess of thirty years. At the time of closure, all then-applicable LORS will be identified and the closure plan will address compliance with these LORS. Generally, if no additional ground disturbance occurs during closure activities and all cultural resource conditions of certification have been met, no significant impacts to cultural resources would be expected.

MITIGATION

As discussed in the AFC, no prehistoric archaeological resources were found on the surface during on-the-ground surveys of areas potentially affected by the SPP project construction and operation. 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 can not easily be evaluated prior to construction.

There is a greater potential for the discovery of sub-surface cultural resource materials in some portions of the project area associated with the natural river levee zone, as compared to the over-flow basin and the low, upland terrace zones. Since project development and construction entails disturbance of the ground surface, as well as disturbance below the surface, the proposed SPP project has the potential to adversely affect cultural resources. The objective is to cause no adverse impacts to significant cultural resources during project development and construction. This goal can be achieved by avoiding, wherever possible, any project-related disturbance of cultural resource sites. Western would consult with the SHPO and ACHP regarding potential impacts to significant cultural resources.

Commission Staff has recommended conditions of certification that would help ensure necessary mitigation of impacts if previously unknown cultural resources are encountered during project construction. Western, as the Federal lead agency, has concurred with these conditions.

Critical to the success of any mitigation efforts is the selection of a qualified professional cultural resources specialist. Western and the Commission staff must review the qualifications and approve of the professional archaeologist designated by the project owner to lead and participate in project monitoring and mitigation efforts.

Mitigation measures are developed 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 areas associated with the natural river levee zone. Mitigation measures are derived from good professional practice and they are based on the US Secretary of Interior guidelines, SHPO Guidelines, recommendations by Commission staff, and the policies and guidelines of Sutter and Colusa counties. All of these mitigation measures have previously proven successful in protecting sensitive cultural resources from construction-related impacts, while allowing the timely completion of many projects throughout California.

Commission staff has proposed contingency mitigation measures which are to be implemented if sensitive cultural resources are encountered in any area affected by the project, during pre-construction site preparation or in such activities as coring, boring, augering, excavation, and trenching during project construction.

CALPINE'S PROPOSED MITIGATION

The AFC indicates that five prehistoric sites and several historic sites have previously been found within one mile of the project area, and there is a possibility that excavation for project construction could encounter sub-surface cultural resource materials. Due to the concentration of prehistoric and ethnographic settlement along the natural levees of the Sacramento River, th the levee zone would be the most likely place to find sub-surface cultural resources. These areas also seem to correspond with the presence of soils of the Shanghai-Nueva-Columbia group. Calpine has recommended that a qualified cultural resource specialist conduct full-time monitoring of excavations or trenching for the gas pipelines during construction in the natural levee areas. (Calpine 1997).

As set forth in the AFC, the applicant also recommends that a six-point cultural resource monitoring program should be implemented for areas in the natural river levee zone. The six steps in this program are presented here and have been incorporated into the conditions of certification. The six point program includes:

- Pre-Construction Assessment and Construction Training - The project Archaeologist and Archaeological Monitor will visit the project area before construction begins, to become familiar with site conditions. As construction begins, the Project Archaeologist will conduct a worker education session for construction personnel to explain the importance of and legal basis for, the protection of significant archaeological resources. This worker education session can take place at the same time as the paleontologic resources training session since both disciplines will involve the monitoring of excavation activities (although in different areas). Information about archaeological resources may be combined with information about paleontologic resources in the training brochure that will be distributed to construction supervisory personnel (Calpine 1997; AFC pg 8.3-20).

- Construction Monitoring - The Archaeological Monitor should be present at the construction site at all times when excavation is taking place within the zone of archaeological sensitivity. The boundaries of this zone are defined as the distribution of soils that belong to the Shanghai-Nueva-Columbia group. As mapped in the Sutter County soil surveys (Lytle 1988), these soils are found along Garmire Road, on Girdner Road, on Meridian Road between Girdner Road and the natural gas pipeline connection west of Meridian Road. As mapped for Colusa County on theUSGS map of late Cenozoic deposits in the Sacramento Valley (Helley and Harwood 1985), these soils outcrop on the east side of Poundstone Road and along the length of the Poundstone Road route of the 4-inch natural gas transmission line. The mile posts (MP) in which monitoring is recommended are given and incorporated in to Condition CUL-8. The monitor's role will be to watch for buried archaeological deposits during excavations for the natural gas pipeline (Calpine 1997; AFC pg 8.3-20).

- Site Recording and Evaluation - The Project Archaeologist and Archaeological Monitor should follow accepted professional standards in recording any find and should submit the standard Department of Parks and Recreation, historic site form (Form DPR 523) and locational information to the California Archaeological Inventory (Calpine 1997; AFC pg 8.3-22).

  If the Project Archaeologist determines that the find is not significant, construction will proceed. If the Project Archaeologist determines that further information is needed to determine whether the find is significant, the Commission and State Historic Preservation Officer (SHPO) will be notified, and the consultant will prepare a plan and timetable for evaluating the find, in consultation with the Commission and SHPO. If the find were to occur on the Sutter NWR, the Project Archaeologist and Commission should also consult with the US F&WS to begin National Historic Preservation Act (NHPA) Section 106 compliance. If the find were to occur in the Sacramento River bank, the Project Archaeologist and Commission should also consult with the Army Corps of Engineers, which has regulatory jurisdiction and lead federal agency status for Section 106 compliance along navigable waterways (Calpine 1997; AFC pg 8.3-22).

  The AFC then lists the state and federal criteria for determining whether a find would be considered significant or not. These criteria have previously been presented above, in the discussion of Significance Criteria.

  If human remains are encountered during construction, project officials are required by law (California Health and Safety Code 7050.5) to contact the County Coroner. If the Coroner determines that the find is Native American, the Coroner is required to contact the Native American Heritage Commission (NAHC). The NAHC is required to determine the Most Likely Descendant, notify that person, and request that they inspect the burial and make recommendations for treatment or disposal (Calpine 1997; AFC pg 8.3-23).

If human remains are encountered on federally owned land (within the Sutter NWR), thw USFWS is required to begin negotiations under the Native American Graves Protection and Repatriation Act, to repatriate the remains to a lineal descendant or a culturally affiliated organization (Calpine 1997; AFC pg 8.3-23).

- Mitigation Planning - If the Project Archaeologist and the consulting parties (the Commission, SHPO, and, depending on the location, possibley the USFWS or ACOE) determine that the find is significant, they should prepare and carry out a mitigation plan in accordance with state and federal guidelines. This plan should emphasize the avoidance, if possible, of significnt archaeological resources. If avoidance is not possible, the recovery of a sample of the deposit from which the archaeologist can define scientific data to address archaeological research questions should be considered an effective mitigation measure for damage to, or destruction of, the deposit (Calpine 1997; AFC pg 8.3-23).

  The mitigation program, if necessary, should be carried out as soon as possible to avoid construction delays. Construction should resume at the site as soon as the field data collection phase of any data recovery is completed. The Project Archaeologist will verify the completion of field data collection by letter to Calpine and the Commission so that Calpine and the Commission can authorize for construction to resume (Calpine 1997; AFC pg 8.3-23).

- Curation of Recovered Materials - The archaeologist will arrange for the curation of archaeological materials collected during the monitoring and mitigation program, at a qualified curation facility. A qualified curation facility is a recognized, non-profit archaeological repository with a permanent curator. The archaeologist shall submit field notes, stratigraphic drawings, and other materials developed as part of the archaeological excavation program to the curation facility along with the archaeological collection (Calpine 1997; AFC pg 8.3-23).

- Report of Findings - If buried archaeological deposits are found during construction, the archaeologist will prepare a report summarizing the monitoring and archaeological investigatory program implemented to evaluate the find or to recover data from an archaeological site as a mitigation measure. This report should describe the site soils and stratigraphy, and describe and analyze artifacts and other materials recovered, and explain the site's significance. This report should be submitted to the curation facility with the collection (Calpine 1997; AFC pg 8.3-24).

WESTERN AREA POWER ADMINISTRATION PROPOSED MITIGATION

This mitigation discussion was proposed by the Calpine prior to the identification of Western as the lead federal agency. As the lead, Western has the responsibility to complete the process of identification and consultation defined at Section 106 of the

NHPA. Western will consult with the State Historic Preservation Officer on determinations of eligibility of resources and the effects of the undertaking. In this case, if there is a find during mitigation, Western will make the determination whether the find is significant. Western will then consult with the SHPO, the ACHP, appropriate land-managing agencies and Commission staff as necessary, on the appropriate mitigation.

Following the entry of Western as the Federal lead Agency, Western has proposed revisions to the wording in two of Calpine's proposed six point program presented above. The revisions are based on Western's role as the Federal lead agency.

- Site Recording and Evaluation - The designated cultural resource specialist should follow accepted professional standards in recording any find. The specialist should record the find and locational information on the standard historic site form (California Department of Parks and Recreation, Form DPR 523) and submit the information to the appropriate California Archaeological Inventory.

  The designated cultural resource specialist should notify Western of any find and halt construction in the areas of the find. If the Western Historic Preservation Officer determines that the find is not significant, construction will proceed. If Western determines that further information is needed to determine whether the find is significant, Western will notify the Energy Commission and State Historic Preservation Officer (SHPO), and the designated cultural resources specialist will prepare a plan and timetable for evaluating the find, in consultation with Western, the Commission, and the SHPO. If the find were to occur within the Sutter National Wildlife Reserve (NWR), Western, the CPM, and the designated cultural resource specialist would also consult with the US Fish & Wildlife Service, in accordance with National Historic Preservation Act (NHPA), Section 106 compliance.

  The AFC lists the state and federal criteria for determining whether a find would be considered significant or not. These criteria have previously been presented above, in the discussion of Significance Criteria.

  If human remains are encountered during construction, project officials are required by law (California Health and Safety Code 7050.5) to contact the County Coroner. If the Coroner determines that the find is Native American, the Coroner is required to contact the Native American Heritage Commission (NAHC). The NAHC is required to determine the Most Likely Descendant, notify that person, and request that they inspect the burial and make recommendations for treatment or disposal.

  If Native American remains are encountered on Federally owned land (within the Sutter NWR), the USFWS is required to begin negotiations under the Native American Graves Protection and Repatriation Act, to repatriate the remains to a lineal descendant or a culturally affiliated organization.

- Mitigation Planning - If Western and the consulting parties determine that the find is significant, they would prepare and carry out a mitigation plan in consultation with Western and in accordance with state and federal guidelines. This plan should emphasize the avoidance, if possible, of significant archaeological resources. If avoidance is not possible, the recovery of a sample of the deposit from which the archaeologist can define scientific data to address archaeological research questions should be considered an effective mitigation for damage to, or destruction of, the deposit.

  The mitigation program, if necessary, should be carried out as soon as possible to avoid construction delays. Construction should resume at the site as soon as the field data collection phase of any data recovery is completed. The designated cultural resourcer specialist will verify the completion of field data collection by letter to Western who would contact the Commission so that the Commission can authorize construction to resume.

LOCAL REQUIRED MITIGATION

Sutter County requires that a reconnaissance survey be conducted prior to construction of a proposed development and that, if cultural resources are found during the survey, then any mitigation measures recommended by the resource specialist must be followed. Surveys were completed in preparation for the AFC and the mitigation measures recommended in the AFC and in the Conditions of Certification are likely sufficient to meet the county's requirements.

STAFF'S PROPOSED MITIGATION MEASURES

Commission staff and Western concur with the mitigation measures proposed by the applicant in the AFC and with the measures required by local agencies. Commission staff recommended some modification to the recommendation made by Western, to include the Commission Compliance Manager (CPM) in the notification, co-ordination, and consultation procedures. The wording in the conditions of certification proposed by staff reflects the responsibilities of the various agencies and incorporates the measures presented by Calpine and the agencies. The wording in the conditions would extend the mitigation contingency planning to address the following aspects in greater detail: the selection criteria for the cultural resource specialist; the steps involved in the recovery, analysis, preparation and identification of cultural resource materials that were encountered during project construction; the inventory and curation of any cultural resources recovered; and the preparation and filing of reports on the cultural resource monitoring and mitigation activities.

Project-Specific Mitigation Measures

Rather than setting forth these measures here, the mitigation requirements and guidelines have been incorporated into the proposed Conditions of Certification.

COMPLIANCE WITH APPLICABLE LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

If the cultural resource monitoring and mitigation measures proposed by the applicant and its consultants, by Sutter and Colusa counties, and by the Commission staff are implemented by qualified professionals in a timely and proper manner, the project will be in compliance with the applicable LORS.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The project site is located on the eastern side of the mid-section of the Sacramento central valley which has been inhabited by humans for more than 10,000 years (Chartkoff and Chartkoff 1984). Five prehistoric sites have been recorded within one mile of the project site and associated linear facility routes. There is a potential that where surface disturbance and excavation are required, cultural resources could be encountered during project-related construction activities. Thus, the project has the potential to cause an adverse impact to previously unknown unique or eligible resources. If such resources are encountered during construction, work will be halted until they can be evaluated and any necessary mitigation implemented.

To address the potential for adverse effects to previously unknown resources and to mitigate project-related impacts to an acceptable level, Commission Staff and Western have recommended conditions which address detection of cultural resources during project construction, including what the project owner or its consultants must do if cultural resources are uncovered (ie, assessment for significance, mitigation by avoidance or recordation). Monitoring and mitigation for the presence of significant cultural resources and implementation of full data and artifact recovery is essential to reduce the potential for project impacts to previously unknown cultural resources. Under the National Historic Preservation Act, Western's responsibility in a discovery situation would be to consult withthe SHPO, ACHP, and any land managers on the eligibility, effects, and mitigation measures.

RECOMMENDATIONS

Staff and Western recommend that the Commission adopt the mitigation measures described above, which have been incorporated into the following proposed conditions of certification, to ensure adequate mitigation of potential impacts to significant cultural resources during the construction of the Sutter Power Plant Project.

PROPOSED CONDITIONS OF CERTIFICATION

CUL-1 Prior to the start of project construction (defined as any construction-related vegetation clearance, ground disturbance and preparation, and site excavation activities), the project owner shall provide the California Energy Commission Compliance Project Manager (CPM) and Western

with the name(s) and qualifications of its designated cultural resource specialist and mitigation team members.

The designated cultural resource specialist shall be responsible for implementing all the cultural resource conditions of certification, using qualified personnel to assist him or her in project-related field surveys, monitoring, data collection and artifact recovery, mapping, mitigation, analysis of recovered cultural resources and data, or report preparation.

After CPM and Western approval of the Cultural Resource Monitoring and Mitigation Plan, described below in condition CUL-3, the designated cultural resource specialist and team shall be available to implement the mitigation plan prior to, and throughout construction of the project.

Protocol: The project owner shall provide the CPM and Western with a resume or statement of qualifications for its designated cultural resources specialist and mitigation team members. The resume(s) shall include the following information:

1) The resume for the designated cultural resource specialist shall demonstrate that the specialist meets the following minimum qualifications: a graduate degree in archaeology, anthropology, California history, or cultural resource management; at least three years of cultural resource mitigation and field experience in California, including at least one year's experience leading cultural resource field surveys; leading site mapping and data recording; marshalling equipment necessary and leading archaeological resource recovery operations; preparing recovered materials for analysis and identification; recognizing the need for appropriate sampling and/or testing in the field and in the lab; directing the analyses of mapped and recovered materials and data; completing the identification and inventory of recovered cultural materials; and the preparation of appropriate reports to be filed with the receiving curation repository, the appropriate regional information center(s), the State Historic Preservation Officer, Western and the CPM.

2) The resume for the designated cultural resource specialist 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.

3) If additional personnel will be assisting the designated cultural resource specialist in project-related field surveys; monitoring; data and artifact recovery; mapping; mitigation; material analysis; or report preparation, the project owner shall also provide names, addresses, and resumes for these mitigation team members.

4) If the CPM and Western determine that the qualifications of the proposed cultural resource specialist are not in concert with the above requirements, the project owner shall submit another individual's name and qualifications for consideration.

5) If the previously approved, designated cultural resource specialist is replaced prior to completion of project mitigation, the project owner shall obtain CPM and Western approval of the new designated cultural resource specialist by submitting to the CPM and Western, the name and qualifications of the proposed replacement specialist, at least ten (10) days prior to the termination or release of the preceding designated cultural resource specialist.

Verification: At least ninety (90) days prior to the start of construction on the project, the project owner shall submit the name and resume for its designated cultural resource specialist to the CPM and Western for review and written approval.

Thirty (30) days prior to start of construction, the project owner shall confirm in writing to the CPM, who will notify Western, that the previously approved designated cultural resource specialist and the team of assistants are prepared to implement the monitoring and mitigation measures for cultural resources, as described in the Cultural Resources Monitoring and Mitigation Plan, prepared per condition CUL-3, below.

At least ten (10) days prior to the termination or release of a designated cultural resource specialist, the project owner shall obtain CPM and Western approval of the new designated cultural resource specialist by submitting to the CPM and Western the name and resume of the proposed replacement specialist.

CUL-2 Prior to the start of project construction, the project owner shall provide the designated cultural resource specialist and the CPM with maps and drawings for the Sutter Power Plant project. The final center lines and right-of-way boundaries shall be provided on 7.5 minute quad maps, and the location of all the various areas where surface disturbance may be associated with project-related access roads, storage yards, laydown sites, pull sites, pump or pressure stations, switchyards, electrical tower or pole footings, etc.

Where the potential for impacts to significant cultural resources has been identified, the designated cultural resource specialist may request, and the project owner shall provide, enlargements of portions of the 7.5 minute maps presented as asequence of strip maps for the linear facility routes. The strip maps would show mile-post markers and 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 linear facilities.

Verification: At least ninety (90) days prior to the start of construction on the project, the project owner shall provide the designated cultural resource specialist, the CPM, and Western with final maps at appropriate scale(s) and drawings for all project facilities. Copies of all requests for more detailed maps by the designated cultural resource specialist shall also be submitted in writing to the CPM. There is no need to include Western in this submittal.

CUL-3 Prior to the start of project construction, the designated cultural resource specialist shall prepare a draft Cultural Resources Monitoring and Mitigation Plan to identify general and specific measures to minimize potential impacts to significant cultural resources. The CPM will review and must approve in writing, the draft Cultural Resources Monitoring and Mitigation Plan. The CPM will provide copies of the draft plan to Western so that Western may submit this plan to the SHPO for concurrence prior to the project owner taking any actions under the approved monitoring and mitigation plan.

Protocol: The Cultural Resources Monitoring and Mitigation Plan shall include, but not be limited to, the following elements and measures:

a. A discussion of the sequence of project-related tasks, such as any final pre-project surveys, fieldwork, flagging or staking; construction monitoring; mapping and data recovery; preparation for recovery of cultural resources; preparation of recovered materials for analysis, identification, and inventory; preparation of preliminary and final reports, and preparation of materials for curation.

b. An identification of the person(s) expected to assist with each of the tasks identified in a, above, and a discussion of the mitigation team leadership and organizational structure, and the inter-relationship of tasks and responsibilities.

c. Where sensitive areas are to be monitored during construction or avoided during operation, the designated cultural resource specialist shall identify measures such as flagging or fencing to prohibit or otherwise restrict access to sensitive resource areas. The discussion should address how these measures will be implemented prior to the start of construction and how long they will be needed to protect the resources from project-related effects.

d. Where the need for monitoring of project construction activities has been determined by Western, the designated cultural resource specialist, in consultation with the CPM, will establish a schedule for the monitor(s) to be present; If the designated cultural resource specialist determines that the likelihood of encountering

cultural resource or sites in certain areas is slight, monitoring may be discontinued in that location;

e. If cultural resources are encountered are exposed during project-related grading, excavation, augering, and/or trenching, the designated cultural resource specialist shall have the authority to halt or redirect construction in the immediate vicinity of the find until he or she can determine the significance of the find. The designated cultural resource specialist shall act in accordance with the following procedures:

- The project owner, or designated representative, shall inform the CPM and Western within one working day of the discovery of any potentially significant cultural resources and discuss the specific measure(s) proposed to mitigate potential impacts to these resources.

- The designated cultural resource specialist, representatives of the project owner, Western, and the CPM shall confer within 5 working days of the notification of the CPM, if necessary, to discuss any mitigation measures already implemented or proposed to be implemented, and to discuss the disposition of any finds.

- The SHPO will be consulted on potential eligibility, effect, and proposed mitigative measures. As the federal lead agency, Western will initiate the consultations with the SHPO.

- All required data recovery and cultural resource impact mitigation shall be completed as expeditiously as possible.

f. All isolates encountered will be recorded and mapped; all lithic scatters and/or cultural resource sites will be recorded and mapped and all diagnostic artifacts will be collected for analysis; and all recovered cultural resource materials will be prepared and delivered for curation into a retrievable storage collection in a public repository or museum which meets the Title 36 Code of Federal Regulations 79 standards for the curation of cultural resource materials;

g. Identification of the public institution that has agreed to receive any maps and data, records, reports, and any cultural resource 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. Also

include 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 and Western with a copy of the draft Cultural Resources Monitoring and Mitigation Plan prepared by the designated cultural resource specialist. The CPM and Western will provide written approval or disapproval of the proposed Cultural Resources Monitoring and Mitigation Plan within 15 days of receipt of the submittal. If the draft plan is not approved, the project owner, the designated cultural resource specialist, the CPM, and Western shall meet to discuss comments and work out necessary changes.

CUL-4 Prior to the start of project construction, the project owner shall conduct a pre-construction reconnaissance and staking in all areas expected to be affected by construction and operation of the proposed project and its associated linear facilities. The staking of the linear facilities shall use the final design, centerlines, rights-of-way, and mile posts delineated in the construction drawings and maps prepared under condition of certification CUL-2. The designated cultural resource specialist will use the mile post stakes and boundary markers to identify sensitive areas with the potential to produce cultural resources and for implementation of specific measures, as described in condition CUL-8, below.

Verification: A least thirty (30) days prior to the start of construction, the project owner will complete a pre-construction reconnaissance and staking of the post miles and right-of-way boundaries in all areas expected to be affected by construction and operation of the proposed project and its associated linear facilities.

CUL-5 Prior to the start of construction on the project, the designated cultural resource specialist shall prepare an employee training program. The designated cultural resource specialist shall submit the training program to the CPM and Western for review and written approval.

Protocol: The training program will address the potential to encounter cultural resources during project-related site preparation and construction activities, 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 reporting procedures that workers are to follow if any cultural resources are encountered during project activities. This training program may be combined with other training programs prepared for paleontological and biological resources, hazardous materials, or any other areas of interest or concern.

Verification: At least thirty (30) days prior to the start of construction on the project, the project owner shall submit to the CPM and Western for review, comment, and

written approval, the proposed employee training program and set of reporting procedures the workers are to follow if cultural resources are encountered during project construction. Western may be required to submit this training plan to the SHPO for concurrence as part of the consultation process.

The CPM and Western shall provide written approval or disapprove of the employee training program and set of procedures within 15 days after receipt of the submittal. If the draft training program is not approved, the project owner, the designated cultural resource specialist, the CPM, and Western shall confer as needed to work out any necessary changes.

CUL-6 Prior to the start of construction, and throughout the project construction period as needed for all new employees, the project owner and the designated cultural resource specialist shall provide the 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 approved set of procedures for reporting any cultural resources that may be discovered during project-related ground disturbance.

Verification: Prior to the start of construction, and throughout the project construction period as needed for all new employees, the project owner and the designated cultural resource specialist shall present the CPM- and Western-approved training program on the potential for project impacts to sensitive cultural resources. The training shall include a set of reporting procedures for cultural resources encountered during project activities. The project owner shall provide documentation in the Monthly Compliance Report to the CPM that the employee training and the set of procedures have been provided to all project managers, construction supervisors, and to all workers.

CUL-7 Throughout the project construction period, the project owner shall provide the designated cultural resource specialist with a current schedule of anticipated weekly project activity and a map indicating the area(s) where construction activities will occur. The designated cultural resource 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).

Throughout the monitoring and mitigation phase of the project, the designated cultural resource specialist shall maintain a daily log of monitoring and mitigation activities carried out by the specialist and members of the cultural resource mitigation team. The designated cultural resource specialist shall prepare summary reports on monitoring activities, any cultural resource finds and recovery efforts, and the progress or status of the resource monitoring, mitigation, preparation, identification, and analytical work being conducted for the project. Copies of these summaries shall be included in the Monthly Compliance Reports filed with CPM by the project owner. The CPM will forward

copies of these summary reports to Western. The designated cultural resource specialist may informally discuss the cultural resource monitoring and mitigation activities with their Energy Commission technical counterpart at any time.

Verification: The project owner shall include in the Monthly Compliance Reports to the CPM, a summary of the daily logs prepared by the designated cultural resource specialist and the CPM will forward copies to Western.

CUL-8 The designated cultural resource specialist shall be present at the construction site at all times when construction-related grading, excavation, trenching, and/or augering occurs in areas that lie within the natural river levee zone (found to be generally associated with the Shanghai-Nueva-Columbia soils group). Project areas where the natural levee zones may be found include the switchyard site, and portions of the 16-inch and the 4-inch natural gas pipeline routes. Using the mile posts and boundary stakes placed by the project owner, the designated cultural resource specialist shall monitor the route of the 16-inch natural gas pipeline, between Mile Post (MP) 8.97 to 9.51; MP 10.42 to MP 11.41; MP 12.1 to 13.70. For the route of the 4-inch natural gas pipeline, areas to be monitored full-time are from MP 0.00 to MP 1.60. Other sections of the linear facility routes may be monitored as deemed necessary by the CPM and Western.

Verification: The project owner shall include in the Monthly Compliance Reports to the CPM, a summary of the daily logs prepared by the designated cultural resource specialist and the CPM will forward copies to Western.

CUL-9 If buried human remains are encountered during project-related grading, excavation, augering, and/or trenching, the construction crew shall halt or redirect construction in the immediate vicinity of the find and immediately contact the county coroner and the designated cultural resource specialist. If the coroner determines that the find is of Native American origin, the coroner shall notify the Native American Heritage Commission (NAHC) to request a determination of "most likely descendant". The NAHC is required to notify the descendant(s) and request that they inspect the burial and make recommendations for treatment or disposal.

If Native American remains are encountered on federally managed land (within the Sutter National Wildlife Reserve), the US Fish and Wildlife Service is required to follow the procedures of the Native American Graves Protection and Repatriation Act, to repatriate the remains.

Verification: The designated cultural resource specialist shall notify the County Coroner, the project owner, the CPM, and Western if any buried human remains are encountered during project construction activities.

CUL-10 The project owner, through the designated cultural resource specialist, shall ensure the recovery, preparation for analysis, analysis, identification and inventory, the preparation for curation, and the delivery for curation of all significant cultural 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 cultural resource specialist and other qualified research specialists, who will ensure the necessary recovery, preparation for analysis, analysis, identification and inventory, and preparation for curation of all significant cultural resource materials collected during monitoring, data recovery, mapping, and mitigation activities for the project. The project owner shall keep these files on-site and available for periodic audit by the CPM, for a period of at least two years after completion of the approved Final Cultural Resources Report.

CUL-11 The project owner shall ensure preparation of a Preliminary Cultural Resources Report following completion of data recovery and site mitigation work. The preliminary report is to be prepared by the designated cultural resource specialist and submitted to the CPM and Western for review and written approval. Western will provide copies of the preliminary report to the SHPO.

Protocol: The preliminary report shall include (but not be limited to) preliminary information on the survey report(s), methodology, and recommendations; site records and maps; determinations of significance; data recovery and other mitigation activities; discussion of possible results and findings of any analysis to be conducted on recovered cultural resource materials and data; proposed research questions that may be answered, or that may have been raised by the data from the project; related information such as maps, diagrams, charts, photographs and other appropriate materials; and an estimate of the time needed to complete the analysis of recovered cultural resource materials and prepare a final report. As the Federal lead agency, Western will provide a standard report format to be followed by the designated cultural resource specialist.

If no cultural resource materials were recovered during project-related construction activities, the approved preliminary report shall also serve as the final report and shall be filed with appropriate entities, as described in conditions CUL-13 and CUL-14.

Verification: Within ninety (90) days following completion of the data recovery and site mitigation work, the project owner shall submit a copy of the Preliminary Cultural Resources Report to the CPM and Western for review, comment, and written approval.

CUL-12 The project owner will ensure preparation of a Final Cultural Resources Report by the designated cultural resource specialist, if cultural resource materials are found and recovered during project-related monitoring and mitigation. This final report shall be submitted to the CPM and Western for review and written approval.

Protocol: The final report shall include (but not be limited to) the survey report(s), methodology, and recommendations; site records and maps; description and inventory list of recovered cultural resource materials; determinations of sensitivity and significance; summary of data recovery and other mitigation activities; results and findings of any special analyses conducted on recovered cultural resource materials and data; research questions answered or raised by the data from the project; and the name and location of the public institution receiving the recovered cultural resource materials for curation. As the lead federal agency, Western will provide a standard report format to be followed by the designated cultural resource specialist.

Verification: The project owner shall submit a copy of the draft Final Cultural Resources Report to the CPM and Western for review, comment, and written approval. The report shall be submitted to the CPM and Western within ninety (90) days following completion of the analysis of the recovered cultural materials and preparation of related information. The project owner shall submit a copy of the final cultural resources report to the CPM and Western for review and written approval.

CUL-13 The project owner shall ensure that Western is provided with an original (or an original-quality) copy of the approved Final Cultural Resources Report, and other copies necessary to submit to the public institution receiving the recovered data and materials for curation, to the SHPO, and to the appropriate regional archaeological information center(s). A legible copy of the approved Final Cultural Resource Report shall be filed with the CPM, with a request for confidentiality, if needed to protect any sensitive resources or sites.

The report copy sent to the curating institution and to the appropriate regional information centers shall include the information required by 36 Code of Federal Regulations 79 and the regional archaeological information centers.

Verification: The project owner shall maintain in its compliance files, copies of all documentation related to the filing of the original materials and the approved final cultural resources report with the public institution receiving the recovered data and materials for curation, with the appropriate regional archaeologic information repository(ies), and the SHPO. If no cultural resource materials were recorded or recovered, then the approved Preliminary Cultural Resources Report shall serve as the final report and is to be filed with these same agencies.

CUL-14 Within thirty (30) days following filing of the Final Cultural Resources Report with the CPM, Western, and the appropriate entities, the project owner, through the designated cultural resource specialist, shall deliver for curation all cultural resource materials collected during data recovery and mitigation for the project. The materials shall be delivered for curation into a public repository which meets the U.S. Secretary of Interior requirements for the curation of cultural resource materials.

Verification: The project owner shall maintain in its project history or compliance files, copies of signed contracts or agreements with the museum(s), university(ies), or other appropriate public repository(ies) by which the project owner has provided for delivery for curation of all the cultural resource materials collected during data recovery and site mitigation for the project.

REFERENCES

CEC (California Energy Commission). 1998a. Data Requests Numbers 1 through 59. Submitted to Charlene Wardlow, Calpine Corporation, February 2, 1998.

CEC (California Energy Commission). 1998b. Sutter Power Project Issue Identification Report. Submitted to the Proof of Service List, February 11, 1998.

CEC (California Energy Commission). 1998c. March 25 and March 31 workshop Data Requests 60 through 69. Submitted to Charlene Wardlow and Curt Hildebrand, Calpine Power project, April 7, 1998.

Calpine (Calpine Corporation). 1997a. Application for Certification, Sutter Power Plant Project (97-AFC-2). Submitted to the California Energy Commission, December 15, 1997.

Calpine (Calpine Corporation). 1997b. Calpine Corporation, Sutter Power Plant Project (97-AFC-2); Geotechnical Investigation Report, dated August 1997 [Black & Veatch File 37023.41.0403. Submitted to the California Energy Commission, December 15, 1997.

Calpine (Calpine Corporation). 1997c. Commission Staff Site Visit, to proposed Sutter Power Plant Project (97-AFC-2) site. Conducted on December 16, 1997.

Calpine (Calpine Corporation). 1998a. Additional Data for Sutter Power Plant (97-AFC-2). Submitted to the California Energy Commission, January 8, 1998.

Calpine (Calpine Corporation). 1998b. Application for Confidential Designation, Sutter Power Plant; Cultural Resources (97-AFC-2). Submitted to the California Energy Commission, January 9, 1998.

Calpine (Calpine Corporation). 1998c. Additional Biological Data for Sutter Power Plant (97-AFC-2). Submitted to the California Energy Commission, January 20, 1998.

Calpine (Calpine Corporation). 1998f. Sutter Power Plant, Responses to February 2, 1998 Data Requests. Submitted to the California Energy Commission, March 4, 1998.

Calpine (Calpine Corporation). 1998h. Supplemental Filing Changing Transmission Route. Submitted to the California Energy Commission, May 18, 1998.

Calpine (Calpine Corporation). 1998i. Supplemental Filing Changing Size of Cooling Tower from Six to Ten. Submitted to the California Energy Commission, May 21, 1998.

Calpine (Calpine Corporation). 1998j. Response to data requests 64 and 66 with addition to 63, 67 and 68. Submitted to the California Energy, May 1, 1998.

Calpine (Calpine Corporation). 1998k. Various documents/information requested by Energy Commission staff. Submitted to the California Energy Commission, June 5, 1998.

Calpine (Calpine Corporation). 1998l. Information Requested by Energy Commission Staff-Visual Screening Mitigation Planting Plan and Revised Figures VIS-1 and VIS-2. Submitted to the California Energy Commission, June 8, 1998.

Calpine (Calpine Corporation). 1998m. Sutter Interconnection Study with Western Area Power Administration Transmission System. Submitted to the California Energy Commission August 5, 1998.

Calpinie (Calpine Corporation). 1998n. Underground Transmission Line Feasibility Study. Submitted to the California Energy, August 14, 1998.

Calpine (Calpine Corporation). 1998o. Sutter County Board of Supervisor's Resolution No. 98-58 Criteria for Agricultural Land Conversion. Submitted to the California Energy Commission, August 14, 1998.

Calpine (Calpine Corporation). 1998p. Response to Preliminary Determination Compliance Comments, Cooling Tower Information. Submitted to the California Energy Commission, September 22, 1998.

Calpine (Calpine Corporation). 1998q. Calpine's Mitigation Measures, October 1998.

Calpine (Calpine Corporation). 1998r. Comments on Visual Resources Impact Assessment. Submitted to the California Energy Commission, August 14, 1998.

Carpenter, George. 1998. County Senior Planner, Sutter County, California. Workshop conversation with Kathyrn M. Matthews (California Energy Commission), July 14, 1998.

Chartkoff, J.L. and K.K. Chartkoff. 1984. The Archaeology of California. Stanford University Press, Stanford, California.

Farhar, John. 1998a. County Planner, Sutter County, California. Telephone conversation with Kathyrn M. Matthews (California Energy Commission), June 3, 1998.

Farhar, John. 1998b. County Planner, Sutter County, California. Telephone conversation with Kathyrn M. Matthews (California Energy Commission), August 12, 1998.

Heizer, Robert F. (ed). 1978. Handbook of North American Indians, Volume 8;

published by the Smithsonian Institution, Washington DC.

Johnson, P.J. 1978. "Patwin", in Handbook of North American Indians, Volume 8.

Kelley, David. 1998. County Planning Director, Colusa County, California. Telephone conversation with Kathyrn M. Matthews (California Energy Commission), August 11, 1998.

Moratto, Michael J. 1984. California Archaeology; published by Academic Press, Inc, division of Harcourt Brace Jovanovich, Publishers; New York, San Francisco.

Remy, Michael H. and Tina A. Thomas, et al. 1996. Guide to the California Environmental Quality Act (CEQA), 1995 Supplement; published by Solano Press Books, Point Arena, California; March 1996.

Sutter County. 1996. Sutter County General Plan, Background Report; Chapter 8: Cultural Resources; published November 25, 1996.

Sutter County. 1997. Sutter County General Plan Revision, Draft Environmental Impact Report; Section 4.9 Historic and Cultural Resources; published ** 1997.

Wilson, J.A. and A.H. Towne. 1978. "Nisenan" in Handbook of North American Indians, Volume 8. Robert F. Heizer (ed); published by the Smithsonian Institution, Washington DC.

SOCIOECONOMIC RESOURCES

Testimony of Amanda Stennick

INTRODUCTION

The technical area of socioeconomics encompasses several related areas of interest and concern. A typical socioeconomics impact analysis evaluates the effects of project-related population changes on local schools, medical and protective services, public utilities and other public services, and on the fiscal and physical capability of local governmental agencies to meet the needs of project-related changes in population. The socioeconomics analysis also addresses the issue of environmental justice. This analysis discusses the potential effects of the proposed Sutter Power Project (SPP) on local communities, community resources, and public services, pursuant to CEQA Guidelines, Title 14 California Code of Regulations, Section 15131.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

Sutter County Ordinance 1248 regarding development impact fees, applies to the project. Section 1360-050 of Sutter County Ordinance Code establishes development impact fees on the issuance of all building permits for new construction in Sutter County. These fees will be paid by Calpine to Sutter County prior to issuance of a Certificate of Occupancy and will contribute towards funding public improvements, infrastructure, and services within the county. Development impact fees for industrial projects are set at $0.37 per square foot. Calpine has stated that for purposes of determining the amount to be paid in developer impact fees the SPP will total 73,386 square feet. Therefore, Calpine will pay to Sutter County a total of $27,152.82 in development impact fees.

ENVIRONMENTAL JUSTICE

President Clinton's Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed on February 11, 1994. The order required all federal agencies to develop environmental justice strategies. The Council on Environmental Quality (CEQ) and the U.S. Environmental Protection Agency (EPA) subsequently issued Guidelines to assist all federal agencies and state agencies receiving federal funds, to develop strategies to address this problem. The agencies are required to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.

Environmental Justice Screening Analysis

During siting cases, staff will follow the federal guidelines' two-step screening process. The process will assess:

- whether the potentially affected community includes minority and/or low-income populations; and

- whether the environmental impacts are likely to fall disproportionately on minority and/or low-income members of the community.

Depending on the outcome of the screening process, local community groups will be contacted to provide the Energy Commission staff with a fuller understanding of the community and the potential environmental justice issues. In addition, local community groups will be asked to help identify potential mitigation measures.

Socioeconomics Table 1 contains demographic information for Yuba City. Data for this table were taken from the 1990 US Census Data, as specified in the USEPA Guidelines (guidelines) for use in an environmental justice analysis (USEPA 1996). Energy Commission Staff is aware that 1990 Census Data may not accurately represent the 1998 population of Yuba City. Energy Commission staff made several inquiries to various agencies who use demographic data in analyzing the characteristics of local and regional populations. Energy Commission staff learned that 1990 US Census Data is used by USEPA for their environmental justice analyses (Scheuermann, Henley 1998). Energy Commission staff also learned that Census estimates and projections are done only on a county-wide basis and the most recent data are for the year 1994 (Heim, Doche, Choi, 1998). The guidelines warn against artificially inflating or diluting the presence of an affected minority and/or low-income population by using an inappropriate unit of geographic analysis. Because the SPP is situated near Yuba City, using county-wide data could artificially inflate or dilute the presence of an affected minority and/or low-income population. Therefore, Energy Commission staff believe that 1990 US Census Data is the most reliable source of data for an environmental justice analysis. However, if members of the community believe there may be potential environmental justice issues, Energy Commission staff will work with the community using non-traditional data gathering techniques, including outreach to community-based organizations to identify distinct minority and/or low-income populations living within the SPP area.

According to the guidelines, a minority population exists if the minority population percentage of the affected area is fifty percent of the affected area's general population. Based on the screening process for environmental justice, information in Socioeconomics Table 1 indicates that the minority population of the affected area is not greater than fifty percent of the general population. Therefore, because there is no minority population, there appears to be no potential minority population-based environmental justice issues in the SPP area.

The poverty threshold for a family of four persons was $12,674 (1990 US Census Data). To determine the number of persons below the poverty level, Energy Commission staff used data from the 1990 US Census: Poverty Status By Age; Universe: Persons for whom poverty status is determined (the aggregate number of persons five years and under to seventy-five years and over) to arrive at the following figure:

Yuba City - of the total city population, approximately 18 percent (4,991) of persons are living below the poverty level.

SOCIOECONOMICS Table 1
Demographic Profile for Yuba City

Yuba City	Percentage of Total
White 19,422	71%
Black 689	3%
American Indian 396	1%
Asian/Pacific Islander 1,975	7%
Other Race 50	<1%
Hispanic Origin 4,905	18%
Total Population 27,437	100%
Source: 1990 US Census Data, Statistical Information on Population	

As stated above, a minority population exists if the minority population percentage of the affected area is fifty percent of the affected area's general population. Because the guidelines do not give a percentage of the population as a threshold to determine the existence of a low-income population, Energy Commission staff used the fifty percent rule as required for minority populations. Because there is no low-income population, there appears to be no potential low-income population-based environmental justice issues in the SPP area.

As stated above, if members of the community believe there may be potential environmental justice issues, Energy Commission staff will work with the community by using non-traditional data gathering techniques, including outreach to community-based organizations to identify distinct minority and/or low-income populations living within the SPP area.

SETTING

Please refer to the **Project Description** section of this document for a complete project description.

REGIONAL DESCRIPTION

For purposes of demographic analysis, the regional area is defined as the Yuba Metropolitan Statistical Area (MSA), comprised of Sutter and Yuba Counties.

For purposes of determining the availability of the construction workforce, Energy Commission staff has used the Sacramento MSA, comprised of Sacramento, Placer, and El Dorado Counties, because of the potential of the construction workforce to be drawn from a larger geographical region. The political unit of Sutter County is used to determine all other information, such as the availability of services, schools, and housing, since the project will be located in Sutter County.

Demography

Sutter County is comprised of the incorporated cities of Yuba City and Live Oak, and the communities of Meridian, Rio Oso, Trowbridge, Sutter, Pleasant Grove, Nicolaus, East Nicolaus, Riego, and Robbins. Yuba City is the county seat. Yuba County is comprised of the incorporated cities of Marysville and Wheatland, and the communities of Linda, Olivehurst, Loma Rica, Smartsville, Brownsville, Dobbins, Challenge, Browns Valley, Oregon House, Rackerby, Strawberry, Valley, and Camptonville. Both counties are largely agricultural.

Historical population data and population estimates for Sutter and Yuba Counties, and California are summarized in Socioeconomics Table 2. As shown on Table 2, Sutter County's population in 1970 was 42,100 and increased to 74,200 by 1996. This represents an average annual growth rate of 2.25 percent. In comparison, Yuba County's population in 1970 was slightly greater than Sutter County's with a population of 44,400. In 1996 Yuba County's population had grown to 61,400 for a 1.28 percent average annual growth. For the same time period, California had a 1.88 percent average annual population growth rate, which demonstrates that from 1970 to 1996, Sutter County has grown faster than the state average.

SOCIOECONOMICS Table 2
Population Growth

Area	1970	1980	1990	1996	2000	2010
Sutter County	42,100	52,600	65,100	74,200	85,154	105,588
Yuba County	44,400	49,800	58,800	61,400	70,867	87,100
California	20,039,000	23,782,000	29,976,000	32,223,000	NA	NA
Source: Calpine 1997: California Dept. of Finance 1997; SACOG 1997						

Employment

Within the region, Yuba City is considered the center of commerce for the Yuba MSA as well as southern Butte and Colusa Counties. The regional economy is supported primarily by employment from government (Beale Air Force Base), wholesale; and retail trade, agriculture, service jobs, and light manufacturing. Socioeconomics Table

3 shows 1996 employment data for the Yuba MSA and California. The 1996 labor force in the Yuba MSA was estimated to be 55,400, of which 35,600 resided in Sutter County. The average unemployment rate for the Yuba MSA in 1996 was 15 percent, while California had an unemployment rate of 7.2 percent.

SOCIOECONOMICS Table 3
1996 Yuba MSA Employment

	Labor Force	Employed Labor Force	Unemployed Labor Force	Unemployment Rate
Sutter County	35,600	29,900	5,700	16.0%
Yuba County	21,300	18,700	2,600	12.1%
Yuba MSA	55,400	47,100	8,300	15.0%
California	15,596,100	14,469,900	1,126,200	7.2%

Source: Calpine 1997; California Employment Development Department, Labor Market Information Division

Socioeconomics Table 4 shows the estimated 1997 construction employment for the Sacramento and Yuba MSAs. As stated above, for purposes of determining the availability of the construction workforce, Energy Commission staff has used the Sacramento MSA, comprised of Sacramento, Placer, and El Dorado Counties, because of the potential of the construction workforce to be drawn from a larger geographic region. The project is expected to employ a maximum of 256 construction workers. Operation of the plant is expected to employ about 20 employees, including operating and maintenance technicians, and administrators (Calpine 1997). Based on employment information obtained from Socioeconomics Tables 3 and 4, a surplus of construction workers would be available to staff the construction and operation of the project.

SOCIOECONOMICS Table 4
1997 Estimated Construction Employment

MSA	1997 Total Employment	Estimated Percent Construction	Estimated Construction Employment
Sacramento MSA	739,900	8.9%	65,900
Yuba MSA	56,400	2.8%	1,600

Source: California Employment Development Department, Labor Market Information Division

Housing Availability

Housing characteristics provided in the AFC indicate that in 1996, Sutter County had 28,209 dwelling units, comprised of 20,326 single family units, 5,989 multiple family units, and 1,894 mobile homes. Sutter County's vacancy rate in 1996 was 4.4 percent. This is less than the federal housing standard of 5.0 percent at which rate housing is considered to be in short supply. Housing stock for Yuba County in 1996 was 22,729 dwelling units, comprised of 14,539 single family units, 4,358 multiple family units, and 3,832 mobile homes. Yuba County's vacancy rate in 1996 was 7.0 percent, indicating that there is a supply of available housing in Yuba County.

Sheriff

As stated in the 1996 Sutter County General Plan, the Sutter County Sheriff's Department and the California Highway Patrol (CHP) provide law enforcement in Sutter County. The CHP has a mutual aid agreement with the Sutter County's Sheriff's Department and will respond when requested by the Sheriff. The CHP office in Yuba City has 34 uniformed staff, including 29 officers, 4 sergeants, and one captain. The office has 15 vehicles in operation. Staffing includes five units during the day shift (two in Sutter County and 3 in Yuba County), six units during the afternoon shift (three in Sutter County and three in Yuba County) and two units on the graveyard shift, one in each county.

The Sutter County Sheriff's Department provides law enforcement in the unincorporated areas of the county and the City of Live Oak operates the county jail and acts as bailiff for the county court system. The main office is at the Law Enforcement Center in Yuba City, with resident deputies in Meridian, Robbins, and Pleasant Grove. The county jail is also located at the Law Enforcement Center in Yuba City. As of 1996, the Sheriff's department had 53 sworn (sheriff, officers, deputies) and 72 non-sworn personnel or limited sworn personnel (clerical staff, correctional officers, bailiffs). The Sheriff's department maintains ten patrol areas in the county where deputies are assigned two patrol areas during a single shift. The Sheriff's department also has four canine units and one patrol boat that operates year-round. Anticipated emergency response to the SPP site would be about seven minutes. As of 1996, the Sheriff's department averaged one sworn personnel per 665 unincorporated county residents (Calpine 1997).

Fire

According to the 1996 Sutter County General Plan, fire services are provided by an organization of three County Service Areas (Service C, D, and F) and three independent Fire Protection Districts. The Sutter County Fire and Emergency Services Department coordinates fire protection for the County Service Areas in the unincorporated portion of Sutter County, covering a total of about 360 square miles. The department also provides fire service to the City of Live Oak through a contractual agreement. The three independent fire districts include the Meridian Fire Protection District, covering about 93 square miles; the Sutter Basin Fire Protection District,

covering about 127 square miles; and the Walton Fire Protection District, covering about 24 square miles.

The proposed SPP is situated in County Service Area F, which includes the Live Oak, Sutter, and Oswald Tudor Fire Departments. County Service Area F provides fire suppression, prevention, emergency medical, rescue, and level "A" hazardous material services in the rural and urban areas of the northern portion of the county and the rural areas south of Yuba City. County Service Area F consists of four stations. Staffing is as follows:

Station No. 5 (2745 Fir Avenue, Live Oak) is a full-time station with one paid firefighter 24 hours a day. There is a total of four paid firefighters, two seasonal paid firefighters, and 25 volunteers assigned to the station. The station is equipped with a total of nine vehicles.

Station No. 6 (2340 California Street, Sutter) is a full-time station with one paid firefighter 24 hours a day. There is a total of four paid firefighters, two seasonal paid firefighters, and 25 volunteers assigned to the station. The station is equipped with a total of six vehicles.

Station No. 8 (1280 Barry Road, Yuba City) is a full-time station with one paid firefighter 24 hours a day. There is a total of four paid firefighters, two seasonal paid firefighters, and 25 volunteers assigned to the station. The station is equipped with a total of five vehicles. This station is the closest to the SPP site. Estimated emergency response time would be about five minutes.

Station No. 8-2 (8403 Bailey Road, Yuba City) is staffed with off-duty paid staff and volunteers in conjunction with Station 8. Currently available equipment includes one vehicle.

A January 6, 1998 letter to Energy Commission staff from Gary Kraus, of the Sutter County Department of Community Services, Office of Fire and Emergency Services states that Calpine should avoid the use of anhydrous ammonia or any other chemical that will trigger the Federal Risk Management Plan and the CalOSHA Process Safety Management Program. The reason for this statement is that Sutter County does not have the budget or staff to handle the associated reporting requirements that would be triggered by the use of this or other similar chemicals. In addition, Sutter County does not have the budget, staff, or equipment to adequately respond to risks or hazards associated with the use of anhydrous ammonia during construction and operation of the SPP (Kraus 1998).

Schools

The 1996 Sutter County General Plan states that public education in Sutter County is provided by twelve school districts. Eight districts provide elementary education, four districts provide secondary education. The closest community college is Yuba College, located in Marysville.

The proposed SPP project is located in the Yuba City Unified School District. The Yuba City unified School District has 15 schools and over 10,000 students. Data provided in Socioeconomics Table 5 shows all school districts with their 1996 enrollment figures, capacity, and projection figures.

SOCIOECONOMICS Table 5
School District Data

District Boundaries	1996 Enrollment Figures	Enrollment Capacity	Projections
Brittain Elementary District	643	650	830 by the year 2000
Browns Elementary District	168	168	311 students over 10 years
East Nicolaus Joint Union High School District	238	375	Not available
Franklin Elementary District	370	400	None
Live Oak Unified District	1,709	2,326	100-150 additional students
Marcum-Illinois Union District	136	135	54 additional students
Meridian Elementary District	67	150	No projected growth
Nuestro Elementary District	104	120	No projected growth
Pleasant Grove Joint Union District	168	200	will reach capacity by 1998-1999
Sutter Union High School District	510	550	550 less transfers
Winship Elementary District	54	70	Steady for next two years
Yuba City Unified District	10,476	10,710	10,785
Source: Sutter County General Plan Background Document, 1996			

Community Medical Services

As stated in the AFC, the closest emergency medical facility is Fremont Hospital in Yuba City. Fremont Hospital has 132 beds plus six facilities that provide additional care and services. These facilities include two acute care facilities, a 59-bed skilled

nursing facility (convalescent care), Feather River Surgery Center, Peach Tree Clinic, Sierra Health Care, and Fremont-Rideout Homecare. Estimated emergency response time for ambulance service to the site would be about seven minutes.

Utilities

Electricity and natural gas services in the project area are provided by Pacific Gas and Electric Company.

IMPACTS

PROJECT SPECIFIC IMPACTS

Calpine expects project construction to begin in December 1998 and end in December 2000 for a total of about 24 months. Calpine expects the first six months of the construction schedule to be a time of minimal activity (Calpine 1997). If actual construction begins as expected in July 1999, the peak construction period is expected to last from February 2000 through May 2000. There will be an average and peak workforce of about 150 and 250, respectively. Socioeconomics Table 6 indicates the maximum number of workers by craft for the project. As shown in Socioeconomics Tables 4 and 6, the number of construction workers needed for the project represents a small fraction of the available workforce. As stated in the AFC, Calpine expects most of the construction workforce to be drawn from the Sacramento and Yuba MSAs, and that they would commute daily to the project area during the construction period.

Calpine expects about 20 permanent workers will be needed for operation of the power plant. Staff for the project will include twelve operating technicians, four maintenance technicians, and four administrative personnel. At the March 25, 1998 data response workshop, Calpine stated that they will provide an outreach and training program to hire and train people from the local community to staff the SPP. In response to staff's data request on their hiring policy, Calpine provided the following information: "...Calpine expects to follow its standard corporate policy with the following priorities given to applicants:1) Inter-company transfers of Calpine employees with applicable experience. We would expect that a number of positions would be filled with Greenleaf 1 and 2 employees due to experience and the local opportunity to work at a new combined-cycle facility. This would in turn provide new openings at the existing plants. 2) Hire qualified individuals from within the local community. Calpine policy reflects our corporate intentions of promoting economic development in the communities where we have operations. 3) Hire workers from outside the area should an adequate number of qualified applicants not be found in the local community" (Hildebrand 1998).

SOCIOECONOMICS Table 6
Construction Requirements By Month[1]

TRADE	1999						2000												
Construction	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
Boilermaker									4	9	14	15	15	15	14	5			91
Carpenter	4	12	17	20	20	20	20	18	14	17	14	9	8	7	4	3	3	2	212
Electrician		2	3	4	4	15	40	62	78	84	82	57	53	37	13	8	3	2	547
Insulator						2	2	2	2	2	2	4	3	3	2				24
Ironworker	3	4	7	8	8	8	22	15	7	7	7	5	4	3	2	2			112
Laborer	5	14	20	25	27	25	27	27	25	27	27	23	17	10	7	5	3	3	317
Millwright					9	25	52	82	67	47	39	31							352
Operator	2	3	4	5	5	5	12	14	14	15	14	12	8	4	3	2			122
Pipefitter		2	3	3	4	5	13	25	35	42	45	39	25	15	10	4	2	2	274
Painter										2	2	3	3	3					13
Teamster						2	3	4	5	7	5	3	2	2	3				36
Bricklayer Cement Finisher								2	3	2									7
Supervisory		2	2	3	3	4	7	7	7	7	5	5	4	3	2				61
Total	14	39	56	68	83	119	195	230	241	256	232	179	146	105	63	31	13	9	1989

1. Mobilization and site preparation will occur December through June of construction period; requirements will be minimal

Source:Calpine 1997

Housing

Calpine expects to hire most of its construction workforce from the Yuba MSA. Any specialized craft workers required for construction are expected to commute from Sacramento, El Dorado, Placer, and Yolo Counties, or the San Francisco Bay Area. Calpine expects that fifty to eighty percent of the construction workforce would commute daily to the job site; the remainder is expected to temporarily relocate and reside in the Sacramento/Yuba City area. Any demand for additional housing as a result of project construction can be accommodated by the availability of rental units, motels, and hotels within Sutter, Yuba, and Sacramento Counties. In-migrating or weekly-commuting construction workers could affect temporary housing stock such as motels or rentals. The vacancy rate in Yuba County could accommodate any potential demand for housing due to project construction. In addition, information provided in the AFC from the Yuba-Sutter Chamber of Commerce states that there are a number of motels and hotels within the Yuba MSA that could provide temporary housing for workers who commute to the project site on a weekly basis.

Public Services

Potential impacts to public services during construction could result from on-site construction activities. These impacts could result from construction-related demands for police, fire, medical, and other emergency services. As stated above, Sutter County Service Area F does not have the budget, staff, or equipment to adequately respond to risks or hazards associated with anhydrous ammonia during construction and operation of the SPP. If the SPP is approved, the fire department will have to upgrade their current level of service (staff and equipment) to provide adequate fire protection and hazardous materials handling capabilities for construction and operation of the project. Please refer to the **Hazardous Materials** and **Worker Safety and Fire Protection** sections regarding the need for additional personnel and equipment.

Staff has received a letter from the Fire Department that states the costs of project-specific impacts to the Fire Department will be covered by revenues from property taxes, additional funding from Calpine, an annual special tax of $1,896.56, and a one-time impact fee of $7, 512.44 (Kraus 1998). The impact fee is paid by Calpine to Sutter County at the time of the final building inspection. Calpine and Sutter County are in the process of concluding an agreement on the amount of fees and timing of payment that Calpine will provide to the Fire Department to cover additional costs of project-specific impacts associated with hazardous materials handling and additional fire protection (Kraus 1998).

Schools

The Yuba City Unified School District assesses developer impact fees of $.28 per square foot for commercial/industrial projects and $.22 per square foot for office space (Walters 1998). Calpine states in the AFC that for purposes of determining school impact fees the project will total about 7,500 square feet and 500 square feet

of office space. Therefore, the SPP will be assessed by the Yuba City Unified School District a one-time fee of $2,210.

Construction and operation of energy projects can cause impacts to local school districts which are at or over capacity by adding to the enrollment of those districts. To adequately address increases in enrollment, those districts must incur additional costs for additional teachers and classrooms. As shown in Socioeconomics Table 5, three school districts in Sutter County were at capacity in 1996; other districts will have reached capacity by the time SPP peak construction occurs.

SPP is located within the Yuba City Unified School District which, in 1996 was under capacity by 234 students. The district's expected enrollment over the next two years will exceed capacity by 75 students. Therefore, by the time SPP construction begins, the Yuba City Unified School District will have exceeded its capacity. The Yuba City Unified School District has resorted to the use of portable classroom facilities, school impact fees, and year-round academic schedules as a solution to the chronic lack of classroom space and increased enrollment. In addition to the significant increase in enrollment in the past few years, a 39.3 percent increase in K-12 enrollment is expected for Sutter County between 1992 and 2002 (Sutter County General Plan).

Energy Commission staff analysis shows that some school districts in Sutter County are at or over capacity. However, based on the availability of a local and regional workforce and Calpine's statements that they expect to hire construction and operation personnel from the local workforce, Energy Commission staff does not expect a considerable number of workers and their families from outside the region to relocate to the project site for construction and operation of the SPP. Therefore, Energy Commission staff does not believe that the project has the potential to cause an increase in local school enrollment and cause districts at or over capacity to incur additional costs.

Utilities, Waste Management, Hazardous Waste, Water Demand, Wastewater Disposal

Potential impacts to utilities during construction could result from on-site construction activities. These impacts could result from construction demands for water, waste water, solid waste, and electrical utilities. Calpine has stated the utility hook-ups would be available at the site for water and electrical service. Sanitary wastes generated during construction would be collected in portable, self-contained toilets. Other waste generated during construction such as site dewatering and non-point source precipitation runoff, would be disposed in accordance with Sutter County requirements. Equipment wash water generated during project construction would be contained and transported off site to be discharged to the municipal sewer system. Solid wastes generated during construction would be collected on site and disposed at a Class III landfill. Please refer to the sections on **Waste Management** and **Water Resources** for detailed discussions relating to any impacts in these areas.

Impact on Fiscal Resources and the Local Economy

In 1996-97, the Sutter County Board of Supervisors approved an annual final budget in the amount of $92,049,060 (tax revenues include property and sales tax) (Calpine 1997). Socioeconomics Table 7 shows how funds were allocated.

SOCIOECONOMICS Table 7
Sutter County Budget Appropriation, 1996-97

Funding Category	Funding Allocated	Percent of Budget
Education	$1,091,745.00	1.2%
Public Protection	$25,724,400.00	28.0%
General Government	$10,446,165.00	11.3%
Recreation/Culture	$325,014.00	0.4%
Health and Sanitation	$20,916,472.00	22.7%
Public Ways and Facilities	$9,690,694.00	10.5%
Contingencies/Reserves	$682,810.00	0.7%
Public Assistance	$23,171,760.00	25.2%
Total	$92,049,060.00	100%
Source: Calpine 1997; Sutter County 1997		

Calpine estimates the cost of the project to be between $250 and $285 million. The Sutter County Assessor's Office estimates that, based on a county-wide tax rate of 1.0 percent, the SPP is expected to generate about $2.5 to $2.85 million in local property taxes. In fiscal year 1996-97, an estimated $0.17 of every dollar paid in property taxes remained in Sutter County, with the rest going to the state (Strong 1997). Based on the expected property taxes generated by the SPP ($2.5 to $2.85 million) about $425,000 to $485,000 will be disbursed in Sutter County. Property tax revenue reflects the value of the completed facility, and will not be realized by Sutter County until after completion of construction. The effect on fiscal resources during construction will only be from sales tax on equipment and materials purchased in the county.

Calpine estimates that the total cost for materials and supplies for project construction would be about $135 million. Sales tax generated on this amount for purchases in California and elsewhere would be between $6 and $10 million (Calpine 1997). Of the $135 million spent during construction, about $5 million would be spent on materials and supplies in Sutter County (Calpine 1997). Based on the 7.25 percent sales tax rate in Sutter County, only $362,500 in sales tax will be generated during project construction. Of this amount, only $12,500 will go to the county. Socioeconomics Table 8 shows the Sutter County sales tax rate and distribution for sales tax

generated during construction of the SPP, based on the projected $5 million spent in Sutter County on materials and supplies.

SPP construction will provide short-term construction jobs for about 250 workers. Calpine expects an average hourly wage (including benefits) of about $60.00 per hour for each construction employee. This would result in an estimated construction payroll of $20 million. Operation of the SPP will employ about 20 workers, with an average annual salary of about $50,000. This would result in an average operation payroll of $1 million (Calpine 1997).

SOCIOECONOMICS Table 8
Sutter County Sales Tax Rate and Distribution

Sales Tax Rate	Distribution Percent	Distribution Dollars
7.25% county-wide	0.25% county	$12,500
	6.0% State of California	$300,000
	1.0% Local (City)	$50,000
Totals	7.25%	$362,500
Source: Calpine 1997; Sutter County		

Impact on Local Property Values

Because the site is currently zoned AG (General Agriculture), to conform to the Sutter County General Plan and Zoning Code, the proposed project will require a rezone of the property and a general plan amendment from AG to M-2 PD (General Industrial Combining Planned Development District) and from Agriculture 80-acre minimum to Industrial, respectively. Zoning changes alone do not trigger a re-appraisal of property. The SPP parcel will be re-appraised on grading of the land, new construction, and any other improvements made on the site. It is not known at this time whether the assessment on the parcel will include possessory interest (Stottlemeyer 1998).

Property taxes on land zoned for agricultural use are generally lower than land zoned for industrial use. The property value of the subject parcel will increase, once the parcel is re-appraised and taxes are assessed based on the new appraisal (Stottlemeyer 1998). In addition, property values in the area could change over time as owners of adjacent parcels may seek approval from the Sutter County Board of Supervisors for a general plan amendment and rezone of their properties.

During many public workshops residents who live and farm near the SPP site have expressed concerns about decreasing property values due to transmission lines that will be directly visible from their homes. The proposed route will consist of about 5.7 miles of 230 kV transmission line that will run south along South Township Road to

Tudor Road then either west along Murray Road south to the Sutter Bypass levee or directly south from Tudor Road, across farmland to the new switching station location.

Because of these concerns, Energy Commission staff has researched current literature on proximity impacts analysis and cites the Kinnard-Dickey paper, A Primer on Proximity Impact Research: Residential Property Values Near High-Voltage Transmission Lines as a comprehensive study on this topic. Previous studies cited in the Kinnard-Dickey paper show that three procedures are used to measure any difference between sales prices, marketing periods and/or sales volume of proximate properties and those of competitive properties in control areas: 1) Paired Sales Analysis - finding sales of properties within the impact area and comparing them with sales of similar, competitive properties in the control area. Any price differentials are noted, and any pattern of such differences is identified. More recent studies apply statistical testing procedures to the results when sufficient numbers of paired sales are available; 2) Survey Research/Opinion - this method is used as either a supplement or substitute for analysis of market sales transaction data. Potential purchasers either will or will not buy; they either will or will not pay the same or similar prices for proximate properties. It is important to note that Survey Research/Opinion merely reflects responses to hypothetical situations by interviewees who are not necessarily prospective buyers - especially in the impact area under study; and 3) Market Impact Studies Using Multiple Regression Analysis (MRA) in the Hedonic Pricing Model Format - gathering data files on as many market sales transactions as possible within the impact area and within one or more similar control areas over a specified time period, usually a few years prior to an awareness of the proposed project. The extended time period is used to identify and measure any price/value impact that might occur within the impact area after an awareness of the project occurs. This type of "before and after" analysis supplements the comparison of levels and trends and prices, marketing time, and sales volume within the impact area and those in the control area. The post-announcement sales information also provides a basis for testing the likely duration of any value impact that might be identified. The MRA approach to market proximity impact analysis is preferred in the current professional and academic literature because the model reflects what buyers and sellers actually do as opposed to what potential buyers say they might do under specified hypothetical circumstances. Further, the use of large sets of sales data indicate that the results are more representative of the market than those of the paired sales studies.

Studies cited in the Kinnard-Dickey paper show that three possible effects to the market value of residential properties have been claimed: 1) Diminished Price - which is identified by comparing unit prices that are proximate to power lines to unit prices of similar and competitive properties more distant from power lines; 2) Increased Marketing Time - even when proximate properties sell at or near the same prices as more distant control properties, claimants argue that proximate properties take longer to sell. Such increased marketing time can represent a loss to the seller by deferring receipt, availability, and use of sale proceeds; and 3) Decreased Sales Volume - is a more subtle indicator of diminished property value if potential buyers decide not to buy in the impact area. A measurable decrease in sales volume in the impact area compared with sales volume in the control area where otherwise similar properties

purportedly still are selling can represent evidence of decreased market value from proximity to the high voltage transmission lines (or claimed hazard).

The findings of the Kinnard-Dickey paper indicate the following:

1) The need to distinguish between fear of health hazards by current and potential residents and the market behavior of buyers and sellers in the same area; misleading to confuse opinion responses of hypothetical buyers based on fear with actual past and likely behavior of buyers in market areas identified as proximate to high voltage transmission lines or claimed hazard.

2) Studies of both attitudes and market behavior of purchasers who are near sources of claimed hazards show that the more informed a potential buyer is, the less likely that buyer is to be deterred from purchasing near the claimed hazard. Knowledge of occurrence probabilities, awareness of findings of reproducible scientific studies, and understanding of the causal nexus (if any) lead to a greater willingness of the potential buyer to live near the claimed hazard, and has been found to minimize price effects on proximate residential properties.

3) Some MRA studies indicate that any observed negative price, marketing time, and sales volume effects tend to be statistically nonsignificant; results could easily have occurred randomly or by chance. Therefore, they do not necessarily represent a consistent, systematic market response to locations proximate to high voltage transmission lines (or claimed hazard).

4) In some MRA studies, negative price effects in the range of five to nine percent were identified up to 200 feet distant from the edge of the high voltage transmission line right-of-way. These studies found that effective screening of views can diminish or eliminate the negative price effect. In addition, any observed negative value impacts decrease, and most likely disappear over time (four to ten years).

5) While fear (whether reasonable or not) of health hazards is admissible in courts as an explanation of why diminution in property values has occurred, it is not a measure of the diminution in market value (amount) due to the lack of corroborating market sales data. Even if buyer attitudes have been influenced with the emerging support of fear concerns in both court cases and market-wide survey research studies, such studies focus directly on the attitudes and opinions of potential buyers, while market proximity impact studies reflect, identify, and measure the influence of those attitudes and opinions through actual market behavior.

Some unresolved issues requiring further research include:

1) Conflicts with findings of paired sales studies and opinion/attitude survey research;

2) Consistency and comparability of results regarding property characteristics, characteristics of the claimed hazard, and variation of data availability among market areas at different times;

3) Buyer and seller behavior; and

4) The preferability for proximity impact analysis of recorded market sales versus survey research/opinion based on interviews and whether both are required to achieve appropriate market impact indicators.

In addition to a literature search on proximity analysis impacts, staff reviewed the Analysis of Property Value Impacts of the Crockett Cogeneration Project, submitted by the Applicant for the Crockett Cogeneration Project. The Crockett analysis cites several studies that examine the impacts on property values of very large industrial facilities. Such facilities include nuclear power plants, industrial waste incinerators, and landfills. As stated in the Crockett analysis, one or more of three methods were used to study impacts of property values: hedonic pricing, contingent valuation, or regression analysis of market sales data. Hedonic pricing techniques analyze how the attributes of a good affect its price, and have been used in several of the studies to estimate the losses in sale price of homes due to possible exposure to technological or natural risks. The findings of previous studies in the Crockett analysis "yield an equivocal conclusion. Under some conditions facilities result in negative economic impacts and under other conditions they do not. Thus, even for very large facilities that are extreme in terms of their potential health, safety, and aesthetic impacts, there is no clear association with diminished economic impacts. Indeed, economic impacts are not clearly and reliably observed even for nuclear power generation facilities near residential properties" (Analysis of Property Value Impacts of the Crockett Cogeneration Project, Appendix X, Crockett Cogeneration Project, 1992).

Further, the Crockett analysis states that "there are many factors involved in purchasing a new home: affordability; age; size; schools; location; and so on, and it has simply not been demonstrated that a view obstruction would be a major factor in a property value decline" (Crockett 1992).

The Kinnard-Dickey paper and the Crockett analysis cite several examples of proximity impact analyses, methodologies used to measure impacts, and types of possible proximity impacts on residential property values. Further, both studies conclude that differing, sometimes conflicting findings have emerged from market studies. Despite the fact that many technical and conceptual issues remain untested and unresolved, the Kinnard-Dickey paper supports the use of the MRA in the Hedonic Pricing Model format, when a large data set of appropriately screened property sales are used.

While it is possible that property owners near the proposed transmission line route may have the perception that their homes will diminish in value, the actual loss of property value and potential effects can only be tested through data from home sales. Further, Energy Commission staff believes that it is infeasible to conduct a proximity impact analysis at this time because the MRA method, as supported by the Kinnard-Dickey paper, requires that data be collected on as many market sales transactions as possible within the impact area and within one or more similar control areas over a few years prior to an awareness of the proposed project to accurately reflect what buyers and sellers actually do as opposed to what potential buyers say they might do under specified hypothetical circumstances.

Based on the findings of the Kinnard-Dickey paper and the Crockett analysis, Energy Commission staff believes that the potential for the proposed transmission line route to significantly diminish property values would be difficult, if not impossible to prove. Energy Commission staff has reviewed Calpine's mitigation plan to re-route the line south down South Township Road and then west on O'Banion to a switchyard site on the south side of O'Banion Road near the Sutter Bypass. This route was identified by Energy Commission staff in the PSA as an alternative site for the switch station and point of interconnection with Western's electrical transmission system. If Calpine proceeds with the proposed mitigation, the revised transmission line route would reduce the line from 5.7 to 4.0 miles but would not affect Energy Commission staff's findings on the above-analysis on residential property values and the presence of transmission lines.

CUMULATIVE IMPACTS

As stated above, the proposed project consists of a power plant, general plan amendment, and rezone for a 77-acre parcel. If the general plan amendment and rezone are approved by the Sutter County Board of Supervisors, the parcel would be zoned for industrial uses and would have the potential for further industrial development. Owners of adjacent parcels also may seek approval from the Sutter County Board of Supervisors for a rezone and general plan amendment for their properties. For these reasons, Energy Commission staff believes the project has the potential to induce population and economic growth in Sutter County. Because cumulative impacts can result from individually minor but collectively significant projects taking place over time, Energy Commission staff believes the SPP has the potential for cumulative socioeconomic impacts. At the same time, no specific or reasonably foreseeable projects have been proposed for the SPP parcel or adjacent parcels. Any potential cumulative impacts resulting from the reasonable, foreseeable buildout of the parcel would be in accordance with the uses in the underlying M-2 zone and the Combining Planned Development District. Please refer to the **Land Use** section of the PSA for a discussion of cumulative impacts.

In addition, residents who live and farm near the SPP site have expressed concerns about the project including increased noise, traffic, and land use compatibility with existing farming operations and the project including the proposed transmission line

route, zone change, and general plan amendment (please refer to the **Land Use** section for a discussion on transmission line route and agricultural practices). Based on the agricultural goals and policies of the Sutter County General Plan and because the SPP is located in an area zoned for large agricultural parcels with a history of farming as the predominant land use, Energy Commission staff believes that industrialization of the SPP parcel has the potential to impact the farming community and reduce the quality of life for surrounding residents.

FACILITY CLOSURE

Facility closure has no LORS that pertain to socioeconomic resources.

MITIGATION

Staff has received a letter from the Fire Department that states that the costs of project-specific impacts to the Fire Department will be covered by revenues from property taxes, additional funding from Calpine, an annual special tax of $1,896.56, and a one-time impact fee of $7, 512.44 (Kraus 1998). The impact fee is paid by Calpine to Sutter County at the time of the final building inspection. Calpine and Sutter County are in the process of concluding an agreement on the amount of fees and timing of payment that Calpine will provide to the Fire Department to cover additional costs of project-specific impacts associated with hazardous materials handling and additional fire protection (Kraus 1998).

Calpine expects to hire most of its construction workforce from Sutter, Yuba, and Sacramento Counties. Any specialized craft workers required for construction are expected to commute from Sacramento, El Dorado, Placer, and Yolo Counties, or the San Francisco Bay Area. Calpine expects that fifty to eighty percent of the construction workforce would commute daily to the job site. The remainder is expected to temporarily relocate and reside in the Sacramento/Yuba City area.

Based on Calpine's corporate intentions of promoting economic development in communities where they have power plants, some construction and most operation workers are expected to be hired from Sutter County, therefore, Energy Commission staff does not expect the project to contribute to impacts on housing, schools, police protection, and medical services. No mitigation in these areas is proposed. Because Calpine has stated that there will be economic benefits to Sutter County from construction of the SPP, Energy Commission staff proposes a contingency measure to this effect. This measure is incorporated into Energy Commission staff's proposed conditions of certification.

CONCLUSION AND RECOMMENDATION

CONCLUSION

Energy Commission staff analysis indicates that the proposed project by itself and cumulatively, has the potential to induce population and economic growth. Please refer to the **Land Use** section of the PSA for a discussion of cumulative impacts.

Calpine has proposed an outreach program to train and hire local people for operation of the plant. Calpine has estimated that during construction, about $5 million will be spent in Sutter County for materials and supplies. Staff recommends the following condition of certification be adopted to minimize any adverse socioeconomic effects of the project and to provide some economic benefit to Sutter County.

RECOMMENDATION

If the Commission certifies the proposed project, staff recommends that it adopt the following conditions of certification.

PROPOSED CONDITIONS OF CERTIFICATION

SOCIO-1 The project owner and its contractors and subcontractors shall recruit employees and procure materials and supplies within Sutter County first unless:

- to do so will violate federal and/or state statutes;
- the materials and/or supplies are not available; or
- qualified employees for specific jobs or positions are not available; or
- there is a reasonable basis to hire someone for a specific position from outside the local area.

Verification: At least 60 days prior to the start of construction, the project owner shall submit to the California Energy Commission (CEC) Compliance Project Manager (CPM) copies of contractor, subcontractor, and vendor solicitations and guidelines stating hiring and procurement requirements and procedures. In addition, the project owner shall notify the CEC CPM in each Monthly Compliance Report of the reasons for any planned procurement of materials or hiring outside the local regional area that will occur during the next two months. The CEC CPM shall review and comment on the submittal as needed.

SOCIO-2 The project owner shall provide a letter to the CEC CPM outlining the agreement between Calpine and Sutter County on the amount of fees and timing of payment Calpine will provide to cover project-specific impacts associated with hazardous materials handling and fire protection. These funds are in addition to property taxes, annual special taxes, and one-time developer

impact fees that will also be used to offset the costs of project-specific impacts to the county.

Verification: At least 60 days prior to the start of construction, the project owner shall submit to the CPM a copy of the agreement with the Sutter County Fire Department which states the amount of fees and timing of payment Calpine will provide to cover project-specific impacts associated with hazardous materials handling and fire protection.

REFERENCES

Augustine, David. 1998. Consultant with Foster Wheeler. Conversation with staff on April 9 and 10, 1998.

California Department of Finance. 1993. Population Estimates for California Cities and Counties.

Calpine. 1997. Application for Certification Sutter Power Project (97 AFC-2) . Prepared by Foster Wheeler for the Sutter Power Plant Project and submitted to the California Energy Commission. December 15, 1997.

Crockett 1992. Analysis of Property Value Impacts of the Crockett Cogeneration Project, Appendix X, Crockett Cogeneration Project.

Choi, Simon. 1998. Southern California Association of Governments (SCAG). Conversation with staff on March 9, 1998.

Doche, Vivian. 1998. Southern California Association of Governments (SCAG). Conversation with staff on March 9, 1998.

Heim, Marilyn. 1998. Department of Finance, Demographic Research Unit. Conversation with staff on March 6, 1998.

Henley, Cheryl. 1998. GIS Center USEPA. Conversation with staff on March 26, 1998.

Hildebrand, Curt 1998. Response to data request in 4/6/98 CEC Data Request.

Kinnard, William N. and Dickey, Sue Ann. A Primer on Proximity Impact Research:Residential Property Values Near High-Voltage Transmission Lines. Real Estate Issues, v20n1, pages 23-29, April 1995.

Kraus, Gary. 1998. Sutter County Department of Community Services, Office of Fire and Emergency Services. Conversation with CEC staff on March 25, April 7, and August 11, 1998.

Scheuermann, Karen, 1998. United States Environmental Protection Agency (USEPA). Conversation with staff on March 26, 1998.

Strong, Michael V.1997. Sutter County Assessor. October 8 letter from Michael V. Strong to Karen Peterson of Foster Wheeler.

Stottlemeyer, Bruce 1998. Sutter County Assessor's Office. Conversation with staff on May 15, 1998.

Sutter County General Plan, November 1996.

Sutter County General Plan Background Document, November 1996.

Calpine. 1997. Application for Certification Sutter Power Project (97 AFC-2) . Prepared by Foster Wheeler for the Sutter Power Plant Project and submitted to the California Energy Commission. December 15, 1997.

United States Environmental Protection Agency (USEPA) 1996. Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses, July 12, 1996.

BIOLOGICAL RESOURCES

Testimony of Linda Spiegel

INTRODUCTION

This section provides the California Energy Commission staff's analysis of potential impacts to biological resources from Calpine's proposal to construct and operate the Sutter Power Plant (SPP). This analysis is directed toward impacts to state- and federally-listed species, species of special concern, wetlands, and other areas of critical biological concern. This analysis describes the biological resources of the project site and ancillary facilities; determines the need for mitigation; determines the adequacy of mitigation proposed by the applicant and, where necessary, specifies additional mitigation measures to reduce identified impacts to less than significant levels; determines compliance with applicable laws, ordinances, regulations, and standards; and recommends conditions of certification.

This analysis is based, in part, on information provided as of September 15, 1998 from Calpine's Application For Certification (Calpine 1997, AFC section 8.2; Calpine 1998a, Addendum 1), supplements, responses to data requests, wetland delineation report (Foster Wheeler Environmental Corporation 1997), biological assessment (Foster Wheeler Environmental Corporation 1998a), workshops, site visits, and discussions with various agency representatives and species experts. Reports on water temperature and chemical modeling were submitted on July 10, 1998 (Foster Wheeler Environmental Corporation 1998b,c). However, at a workshop held on August 4, 1998 staff, other agency representatives and interveners raised concerns over data used to perform the models. On September 14, 1988, Calpine submitted a letter stating their intention to mitigate biological impacts from effluent discharge by utilizing 100 percent dry through cooling (Calpine 1998g). This letter also states a revision to the transmission line route and switchyard location from that provided in an earlier supplement (Calpine 1998b).

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

FEDERAL

Endangered Species Act of 1973

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

Clean Water Act

33 USC, section 404 et seq, prohibits the discharge of dredged or fill material into the waters of the United States without a permit. An Individual 404 permit is required to fill more than 3 acres. Nationwide permit (NWP) 26 is required to fill 3 acres or less of wetlands and NWP 12 is required for utility line placement near waters of the U.S.

causing temporary discharge of material. Section 401 et seq, requires water quality assessment when using 404 permits and for discharges into waters of the United States.

Migratory Bird Treaty Act

16 USC, section 703 through 711, prohibits the take of migratory birds.

STATE

California Endangered Species Act of 1984

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

California Code of Regulations (CCR)

Title 14 CCR, sections 670.2 and 670.5, lists animals of California designated as threatened or endangered.

Fully Protected Species

Fish and Game Code, sections 3511, 4700, 5050, and 5515, prohibits take of plants and animals that are fully protected in California.

Significant Natural Areas

Fish and Game Code, section 1930, designates certain areas such as refuges, natural sloughs, riparian areas, and vernal pools as significant wildlife habitats.

Streambed Alteration Agreement

Fish and Game Code, section 1600, reviews projects for 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 Environmental Quality Act (CEQA)

Public Resources Code, section 21000 et seq., requires all government agencies to develop standards and procedures necessary to protect California's environmental quality. It establishes public procedures for identification of significant adverse environmental impacts. CEQA exempts certified state regulatory programs, including

the Energy Commission power plant site certification program, from specific procedural requirements; these programs remain subject to other provisions of CEQA, such as the policy of avoiding significant adverse effects on the environment where feasible.

LOCAL

Sutter County General Plan 1996

Section 4, Conservation/Open Space - Natural Resources.

- Wetland and Riparian Areas: Goal 4.B, to protect wetland and riparian areas throughout Sutter County. Policy 4.B-1, requires new developments to fully mitigate the loss of federally regulated wetlands to achieve a no net loss through any combination of avoidance, minimization, or compensation. Policy 4.B-2, discourages direct discharge of surface runoff into wetland area and requires new development to be designed in a manner that pollutants and siltation will not significantly affect wetlands. Policy 4.B-3, encourages the preservation and restoration of natural wetland environments when feasible and practical as part of the development review process. Policy 4.B-4, encourages the creation and use of wetland mitigation banks as long as their creation and existence will not adversely impact existing and/or planned agriculture or urban development.

- Fish and Wildlife Habitat: Goal 4.C, to protect and enhance habitats that support fish and wildlife species. Policy 4.C-1 strives to preserve those areas of wildlife habitat designated "high habitat value". Policy 4.C-2, encourages preservation and proper management of those areas designated "moderate habitat value". Policy 4.C-3, supports the preservation and re-establishment of fisheries in the rivers and streams within the County. Policy 4.C-4, requires participation in the process of developing mitigation programs for threatened and endangered species. Policy 4.C-5, requires support of the preservation and protection of waterfowl resources and their habitat. Policy 4.C-6, encourages the preservation and re-establishment of wildlife corridors between natural habitat areas to maintain biodiversity and prevent the creation of biological islands. Policy 4.C-7, encourages the preservation of rare, threatened or endangered animal species.

- Vegetation: Goal 4.D, to preserve and protect the vegetation resources. Policy 4.D-1, encourages the preservation of important areas of natural vegetation including, but not limited to, oak woodlands, riparian areas, and vernal pools. Policy 4.D-2, encourages the preservation of rare, threatened, and endangered plant species. Policy 4.D-3, requires all new development projects avoid, to the maximum extent possible, ecologically-fragile areas (e.g. areas of rare, threatened or endangered species of plants, riparian areas, vernal pools). Policy 4.D-4, strives to protect major groves of native trees located in the unincorporated areas of the County. Policy 4.D-5, encourages the use of native

and drought tolerant plant materials in all public and private revegetation/landscaping projects.

SETTING

REGIONAL DESCRIPTION

The SPP project site is located in central Sutter County within the Sacramento Valley (Biological Resources, Figure 1). The area is characterized by alluvial plain soils deposited by the Sacramento and Feather Rivers and historically supported abundant grasslands, wetlands, waterfowl, furbearers, ungulates, and other biological resources (County of Sutter 1996). Currently, most of the county is used for agriculture and very few areas support wetlands or grasslands. The historic marshes, small lakes, sloughs and wetlands were drained and diverted into the Sutter Bypass after its construction in the early 1900's. There is an extensive network of irrigation canals that convey water to agricultural fields. Many of these irrigation canals support vegetation similar to that found along natural waterways, providing some of the most important remaining habitat for the federally- and state-listed giant garter snake (*Thamnophis gigas*). The area is still the major wintering ground for migratory waterfowl of the Pacific Flyway. Although there has been a steady decline in waterfowl numbers throughout the Sacramento Valley since 1979, the Sutter National Wildlife Area and the Butte Sink support 22 to 25 percent of the Valley's wintering population (County of Sutter 1996). Some riparian corridors are still present along the Sacramento and Feather Rivers and along the Sutter Bypass, which includes the two channels paralleling either side of the bypass proper. The Sacramento River and Sutter Bypass are used as a spawning ground or migratory route by several fish species that are either listed or proposed for listing, including winter-, spring-, and fall-run chinook salmon (*Oncorhynchus tshawytscha*), Central Valley steelhead (*Oncorhynchus mykiss*), and Sacramento splittail (*Pogonichthys macrolepidotus*). Remaining grasslands provide foraging habitat for the state-listed Swainson's hawk (*Buteo swainsoni*) and several other raptors. Due to the loss of most natural areas within Sutter County, preserving the remaining habitat is important for maintaining existing levels of wildlife (County of Sutter 1996).

Sutter County has developed a three-tiered biological sensitivity classification of all county lands based on the presence, extent, expected function, relative sensitivity, and overall importance of vegetative communities. Areas with higher sensitivity values are most difficult to mitigate due to lack of available replacement habitat. Highly Sensitive Habitat Areas are sensitive natural communities (e.g. communities defined by California Department of Fish and Game's [CDFG] Natural Heritage Division as rare or sensitive), areas known to provide habitat for one or more special status plant or animal species, or conservation areas subject to state or federal permitting process. Examples of Highly Sensitive Areas are the Sutter Buttes and the Sutter National Wildlife Area. Moderately Sensitive Areas are potential habitat for

BIOLOGICAL RESOURCES Figure 1
Sutter Power Plant Project Features, Including Linear Facilities

sensitive species, degraded wetlands, and agricultural lands of value to sensitive species. Examples of Moderately Sensitive Areas are vernal pools in grazed pastures and man-made wetlands. Low Sensitivity Areas have relatively low biological sensitivity. Examples of Low Sensitivity Areas are non-native grasslands and residential parks. Maps showing the approximate locations of these areas are provided in the Sutter County General Plan Background Report and by Calpine (Calpine 1997, AFC, page 8.2-3 & 8.2-4). These maps depict the SPP plant site in a Low Sensitivity Area and the linear facilities within Moderately and Highly Sensitive Areas. Ground truthing these maps was not a comprehensive effort, however, and site-specific evaluations are required to precisely determine the value of a particular parcel (County of Sutter 1996).

SITE VICINITY AND DESCRIPTION

Biological Resources Table 1 lists the wildlife and plant species of concern that were observed at or presumed to be present in the project area. Complete lists of species that were observed (Calpine 1997, AFC, Table 8.2-4 and 8.2-5) or could occur (Calpine 1997, AFC, Table 8.2-1; Foster Wheeler Environmental 1998a, pages 10 -13) in the project vicinity are provided elsewhere. Thorough descriptions of the site vicinity and special status species are also provided (Calpine 1997, AFC, Section 8.2; Foster Wheeler Environmental 1998a, pages 14, 18 -26).

Power Plant Site

The 77-acre site consists of the 12.3-acre Greenleaf 1 power plant and associated roads, 8.67 acres of seasonal wetlands, 52.8 acres of annual grasslands, 2.0 acres of drainage canals, and 1.2 acres of blackberry bramble. The grasslands, formerly rice fields that have been fallow for 10 years following construction of Greenleaf 1, are mowed annually for fire control. This practice may have the same effect as grazing and likely keeps the non-native annuals from growing too dense and eliminating all native forbs. The grasslands provide foraging habitat for game birds, several raptors, including the Swainson's hawk, and upland habitat for the giant garter snake. The drainage canals, considered "waters of the U.S." (C. Escarda, pers.comm. 1998), contain vegetation similar to natural water ways and support several prey species such as bullfrogs, crayfish, insects and mosquito fish. These canals provide suitable habitat for several bird species, including the American bittern (*Botaurus lentiginosus*), and for the giant garter snake. The blackberry bramble as well as a few willow and cottonwood trees provide habitat for several bird species, including a resident great-horned owl (*Bubo virginianus*). The plant site is surrounded by agricultural land, predominately rice fields.

The wetlands found on site represent a small island of remaining natural wetlands or a remnant of the historic landscape. The applicant's wetland delineation identified five classifications of wetlands (Calpine 1997, AFC, Table 8.2-6, Foster Wheeler Environmental Corporation 1997): transitional vernal pools, borrow pits, mosquito abatement trenches, perennial mosquito abatement pond, and seasonal depressions (Biological Resources Figure 2). The borrow pits and mosquito abatement trenches

BIOLOGICAL RESOURCES Table 1
Species of Concern Observed or Presumed to be in the SPP Project Area

Common Name	Scientific Name	Status[1]
American bittern	*Botaurus lentiginosus*	FC
White-face ibis	*Plegadis chihi*	FC, SC
Aleutian canada goose	*Branta canadensis leucopareia*	FT
White-tailed kite	*Elanus leucurus*	FP
Northern harrier	*Circus cyaneus*	SC
Bald eagle	*Haliaeetus leucocepalus*	FT, SE
Swainson's hawk	*Buteo swainsoni*	ST
American peregrine falcon	*Falco peregrinus anatum*	FE, SE
Greater sandhill crane	*Grus canadensis tabida*	ST, FP
Lark sparrow	*Chondestes grammacus*	FC
Giant garter snake	*Thamnophis gigas*	FT, ST
Northwestern pond turtle	*Clemmys marmorata*	FC, SC
Winter-run chinook salmon	*Oncorhynchus tshawytscha*	FE, SE
Spring-run chinook salmon	*Oncorhynchus tshawytscha*	FPE
Fall-run chinook salmon	*Oncorhynchus tshawytscha*	FPT
Late fall-run chinook salmon	*Oncorhynchus tshawytscha*	FPT
Central Valley steelhead	*Oncorhynchus mykiss*	FPE
Sacramento Splittail	*Pogonichthys macrolepidotus*	FPT
California hibiscus	*Hibiscus lasiocarpus*	CNPS list 2

[1] Status:
FE: Federally Endangered
FT: Federally Threatened
FP: Federally Protected
FPE: Federally Proposed Endangered
FPT: Federally Proposed Threatened
FC: Federal Species of Concern
SE: State Endangered
ST: State Threatened
SC: California Species of Special Concern
CNPS list 2: California Native Plant Society list 2 - rare or endangered in California

BIOLOGICAL RESOURCES Figure 2
Sutter Power Plant Site Showing Wetlands and Giant Garter Snake Upland Habitat

are man-made. The borrow pits, located west and north of the existing Greenleaf 1 plant, were excavated in 1987 and left fallow. The mosquito abatement trenches and collection pond, located south of Greenleaf 1, were excavated in 1987 and used to raise mosquito fish until 1991. Currently, the borrow pits and abatement trenches contain all three indicators (wetland hydrology, hydrophytic vegetation, and hydric soils) necessary to classify as wetlands. One abatement trench receives water year-round from a ground water source and is considered a "waters of the U.S." by Title 33 of the Code of Federal Regulations. The collection pond is currently used by Greenleaf 1 to receive water from cooling towers. The vernal pools are located along the southeast corner of the 77-acre parcel. The seasonal wetlands are located at the west and east sides of the parcel. Each of these wetlands are considered Moderately Sensitive Habitat by Sutter County (County of Sutter 1996).

Non-listed vernal pool crustaceans, California linderiella (*Linderiella occidentalis*) and versatile fairyshrimp (*Branchineota lindahli*) were found on site. California linderiella were found in all wetland types, while the versatile fairyshrimp was found in a seasonal ponded wetland.

The plant site is located within the Pacific Flyway. Large flocks of migratory birds, including the state-listed sandhill crane (*Grus canadensis tabida*) and Aleutian Canada goose (*Branta canadensis leucopareia*), were observed flying overhead and/or foraging nearby during winter surveys (Calpine 1997, AFC, pages 8.2-15, 16 & 42).

Natural Gas Pipeline Corridor

The 14.9-mile natural gas pipeline parallels paved and dirt roads. Approximately, 5,500 feet of line runs through the Sutter National Wildlife Refuge (SNWR) along Hughes Road. Approximately 6.5 miles parallel irrigation canals. The SNWR, located in the Sutter Bypass, contains seasonal wetlands, permanent wetlands, and riparian corridors. This is classified as a Highly Sensitive Habitat Area by Sutter County. Two water channels located on either side of the Bypass are used by anadromous fisheries, including winter-, fall-, and spring-run chinook salmon and Central Valley steelhead. The Sacramento splittail use the Bypass for spawning during years with high flows. California hibiscus (*Hibiscus lasiocarpus*, CNPS list 2) were observed along the levee of the eastern channel and the north side of Hughes Road. The irrigation canals contain wetland vegetation and several prey species. These canals are habitat for the listed giant garter snake and used for foraging by several bird species, such as egrets, herons, and American bitterns. The route crosses Sutter County Moderately Sensitive Habitat Areas at two locations along Oswald Road. Roughly 40 valley oak trees (*Quercus lobata*) are present along Poundstone Road (Colusa County) and a 27-acre valley oak grove is located east of Poundstone Road, just south of Cecil Road (Calpine 1997, AFC, Figure 8.9-2k). Construction will require a 25 to 50-foot corridor.

Transmission Line

The AFC identified the preferred route of the transmission line to extend south along the west side of South Township Road to O'Banion Road. This route would then extend west along the south side of O'Banion Road for about 1000 feet, crossing to the north side of O'Banion Road for another 1000 feet to a new 1.9 acre switching yard located east of the Sutter Bypass levee and north of Pumping Plant 2 (Calpine 1997, page 8.2-49, Figures 8.9-2a and b). The length of this line is four miles. In a Supplemental Filing on May 13, 1998, Calpine proposed two other routes (3B and 3B1), each 5.7 miles in length (Calpine 1998b, Supplement). Route 3B (Tudor Road Route) parallels South Township Road to Tudor Road and continues south through 1.2 miles of agricultural fields consisting of row crops to the new 1.9-acre switching station located adjacent to the Bypass. Route 3B1 (Murray Road Route) follows the same path as Route 3B to Tudor Road, travels west to Murray Road, then south along Murray Road through 0.5 mile of row crops to the Sutter Bypass levee and southeast along the Bypass to the new switching station. In a letter dated September 11, 1998, Calpine proposed to use a modified O'Banion route. This route follows South Township to O'Banion, travels along the south side of O'Banion to a switching station located near the levee on the south side of O'Banion.

The modified O'Banion Route requires 32 poles, while route 3B and Route 3B1 require 38 poles. The span between poles is expected to be 750 to 800 feet. The line will consist of a single steel pole, each with a 40 inch diameter base, and a dual circuit line. The line will include a 3/8-inch steel shield wire (ground wire; see Project Description Figure 4). The right of way will be 100 to 125 feet, but the construction corridor will not exceed 50 feet.

The modified O'Banion Route parallels 3.7 miles of field irrigation ditches, which support giant garter snakes and other aquatic biota. This route passes four 10 to 20-ft wide irrigation canals that may serve as waterfowl flyways. The switching station site, south of O'Banion Road, consists of rice fields that are managed to attract waterfowl during the hunting season. Routes 3B and 3B1 will cross Gilsizer Slough, which support seasonal emergent wetlands and giant garter snakes. CDFG owns a conservation easement along the Slough and has some concerns about the line deterring waterfowl and negatively affecting hunting (D. Crowe, pers. comm. 1998a). About two miles of the line parallels irrigation ditches, which support several wildlife species including giant garter snakes. Several waterfowl and wading birds were observed along a 25-foot wide ditch located along the Bypass levee near the switching station. Two valley oak trees are directly within the route on South Township Road about 0.5 mile south of O'Banion Road.

The entire area lies within both the Pacific Flyway and the major wintering grounds for migratory birds. For several species, including snow goose (*Chen caerulescens*), Ross' goose (*Chen rossii*), Aleutian Canada goose, greater white-fronted goose (*Anser albifrons*), sandhill crane, northern pintail (*Anas acuta*), blue-winged teal (*Anas discors*), American wigeon (*Anas americana*), and ring-necked duck (*Aythya collaris*), the vast majority of the population winter in the northern Sacramento Valley, particularly at the SNWR and Butte Sink (Small 1994). Waterfowl and long-bodied wading birds such as herons, bitterns, egrets, and particularly, cranes are most

susceptible to collisions with powerlines (APLIC 1994, Brown et al. 1985, M. Garrett, pers. comm. 1998). Flocks of waterfowl exhibiting a flushing response are also vulnerable because the birds flying in a cluster may not see the lines in time to make appropriate adjustments to avoid the lines (M. Garrett, pers. comm. 1998). Some portions of the transmission line route parallel existing distribution lines. This cluster of powerlines could exacerbate collision risk. Collision risk increases during periods of inclement weather, fog, low light conditions, peak flight events, and in high use areas.

IMPACTS

PROJECT SPECIFIC IMPACTS

Power Plant Site

Construction of the SPP, switchyard, and access road will permanently eliminate 12.73 acres of grasslands or foraging habitat for the following special status birds (Calpine 1997, AFC, Figure 8.2-3 and Table 8.2.1):

- Swainson's hawk (state threatened)
- Aleutian Canada goose (federally threatened)
- greater sandhill crane (state threatened)
- white-tailed kite (California fully protected)
- northern harrier (species of special concern)

Calpine's AFC reports the amount of grassland loss as 9.9 acres (Calpine 1997, AFC, Table 8.2-9). This figure did not include the 2.1 acres of seasonal wetlands that are foraging habitat during the dry season or the 0.73-acre access road (Biological Resources Table 2).

There may also be temporary loss of foraging habitat in areas immediately adjacent to the new plant site and access roads, and to the 0.91-acre laydown area (Calpine 1997, AFC, Figure 8.2-4) .

Construction of the SPP will also eliminate 2.1 acres of wetlands and may indirectly impact an additional 3.19 acres (Biological Resources Table 2). The footprint will be built on a 5 foot-high berm from fill material obtained off-site (Calpine 1997, AFC, Appendix 9A, page A-6) and will cover 1.09 acres of borrow pits and 1.01 acres of a 4.19-acre pond (Biological Resources Figure 2). Calpine maintains that the remaining 3.19 acres of the 4.19-acre pond will not be affected because the natural flow of water is northwest, away from the plant site (Calpine 1997, AFC, pages 8.2-52 - 53). However, Calpine has also reported that the site is essentially flat with no contours (Calpine 1998c, Data Response 35). It is possible that eliminating 25 percent of the pond may adversely affect the hydrology of the remaining wetland.

There may also be temporary disturbances to wetlands surrounding the SPP and access roads from construction vehicle traffic and equipment. Wetlands that may be

particularly susceptible due to their proximity to construction activities are SPP-27. SPP-29, and SPP-34 (Biological Resources Figure 2).

Construction of the SPP will also eliminate 2.7 acres of giant garter snake upland habitat (Biological Resources Table 2). The USFWS defines buffer areas 200 feet from giant garter snake habitat as supporting upland habitat (K. Hornaday, pers. comm. 1997). Giant garter snake habitat is located in the drainage ditches at the south and southeast border of the SPP footprint (Biological Resources Figure 2). Eliminating the borrow pits may also constitute a loss of 1.09 acres of giant garter snake wetland habitat (J. Deweese, pers.comm). These borrow pits hold water in April (Calpine 1997, AFC, page 8.2-40; April 4 and 27 in 1997, D.Crowe, pers. comm. 1998b), during the early period of snake activity. If these are considered snake habitat, then a 200-foot zone of upland habitat surrounding these wetlands will also be impacted. The larger 4.19-acre pool dries by late February, before the snake activity period (Calpine 1997, AFC, page 8.2-41) and is, therefore, not considered snake wetland habitat. Other drainage ditches surrounding the entire 77-acre site that are giant garter snake habitat will not be impacted by project construction.

The chemical and physical characteristics of the wastewater could impact both anadromous and inland fisheries in the Sutter Bypass, giant garter snakes and other aquatic dependent species in the irrigation canals, and waterfowl in the Sutter National Wildlife Refuge. During normal operating conditions, the SPP will discharge 1.9 million gallons per day (approximately 3 cubic feet per second [cfs]). At maximum operation (conditions of 115 ^{0}F ambient air temperature) approximately 2.8 million gallons per day (4.3 cfs) will be discharged. The effluent will be discharged into the irrigation canals and flow by gravity for 3.5 miles from the SPP to the North Drain, emptying into the Sutter Bypass through Pumping Plant #2 (Biological Resources Figure 1). The dimensions of the irrigation canals range from 5 x 0.92 feet to 8 x 1.50 feet before reaching the North Drain, which is 6.5 x 36 feet. It is uncertain if the smaller canals can handle the capacity of water discharge from Greenleaf 1, SPP, surface water runoff, irrigation water and high groundwater from adjacent agricultural fields. Enlarging the canals will constitute a take of giant garter snake habitat. Additionally, maintenance of canals will require periodic clearing of the vegetation which will alter giant garter snake habitat.

The wastewater discharge may contain chemical constituents such as arsenic, boron, copper, manganese, and zinc in concentrations considered toxic to aquatic organisms. The SPP effluent will be mixed with discharge from Greenleaf 1 and irrigation water from the agricultural fields, which could cause cumulative impacts in excess of the SPP discharge. The discharge will also elevate temperatures in the canal and possibly the Bypass. Impacts to aquatic biota from the quality and temperature of the discharge would be most significant in the irrigation canals during the non-irrigation season, from October through March, when flows, and thus the dilution factor, in the canals are low. Impacts to aquatic biota in the east channel of the Sutter Bypass would be most significant during the irrigation season (April through September) when spring and summer flows are lowest.

Fall- and spring-run chinook salmon adults migrate up the Sutter Bypass channels to spawn in Butte Creek. Adult migration occurs in mid-July through November and mid-March through mid-November for fall- and spring-run, respectively. Young salmon emigrate down the Bypass from January through April (spring-run) and January through May (fall-run). Water temperature has a direct effect on survival of adults, eggs, and fingerlings. Although chinook salmon do not spawn in the Bypass, exposure of ripe adults to water temperatures greater than 60 ^{0}F results in less viable eggs, and temperatures greater than 65 ^{0}F can inhibit upstream migration (Boles 1988). For emigrating young salmon and steelhead trout, temperatures greater than 55 ^{0}F may effect processes associated with the development of seawater tolerance (Boles 1988). Recommended temperature limits are 65 ^{0}F or less for adult migration and 54 ^{0}F or less for juvenile migration (Boles 1988).

Preliminary tests conducted on the Sacramento splittail indicated mean upper temperature tolerance limits to be between 68.5 - 77.9 ^{0}F (Cech and Young 1994). Peak spawning of the splittail normally occurs between March and May. In 1998, records show highest numbers of splittail in the Sutter Bypass were in June (Wolder 1998).

Sutter National Wildlife Refuge receives water from the North Drain. Elevated temperatures could contribute to initiation of avian botulism particularly from July through January (Friend 1987, Wolder 1998). High levels of metals in the effluent could introduce toxics into the refuge. Wells located in the refuge proper are not used due to unacceptable levels of arsenic and mercury (Wolder 1998).

Estimates of SPP effluent temperatures in the Bypass are provided in the AFC (Calpine 1997, AFC, Table 8.2-11) using the heat balance formula: Temperature in Sutter Bypass immediately downstream of Pumping Plant #2 = (Sutter Bypass upstream cfs x water temp) + (North Drain cfs x water temp) + (SPP effluent cfs x water temp)/(Sutter Bypass upstream cfs) + (North Drain cfs) + (SPP effluent cfs) (AFC, page 8.2-61). These estimates indicate the temperature in the Bypass could be increased by 0.1 to 0.8 ^{0}F, the highest temperatures occurring in September.

Calpine provided results of an instream water temperature model (SNTemp -- Stream Network Temperature Model, Theurer et al. 1984) on July 10, 1998 (Foster Wheeler 1998b) to determine thermal increases from the SPP effluent. The model analyzed temperature changes in April, July, and October as a result of SPP effluent in the canals using meteorological data from 1977 to simulate drought conditions, but flow data from 1998, an unusually wet (El Nino) year (Foster Wheeler Environmental Corporation 1998b, pg 25 and 27). Under this scenario maximum daily temperature differences between natural conditions and power plant operational conditions are predicted to be greatest at the point of discharge (the power plant) in October and April. These increases are approximately 7.2^0 F in October and 9^0 F in April (Foster Wheeler Environmental Corporation 1998b, Figure 4). Temperatures at the SPP discharge point in July would increase by approximately 1.3^0 F. Temperature increases at the North Drain were predicted to be approximately 0.9^0 F in April and October and 0.2^0 F in July (Foster Wheeler Environmental Corporation 1998b, Figure

4). Temperature increases were predicted to be 0.2^0 F at Pumping Plant 2 before entering the Bypass.

Fall flows in the canals are minimal and may consist only of power plant discharge (P. Russell, pers. comm. 1998). Therefore, dilution factors used in the model may have been greatly overestimated and not representative of worst case conditions. Under effluent dominant conditions, temperature increases at the North Drain and at Pumping Plant 2 may be closer to those at the point of discharge. Such increases in temperature could have a significant effect on fisheries and promote optimal conditions for avian botulism.

Optimum growth of botulism bacteria occurs at 77^0 F (Friend 1987). Outbreaks of avian botulism has occurred on the refuge in all but 6 of 27 years between 1975 and 1997 (Wolder 1998). Predicted daily maximum temperatures during SPP operation would approach or exceed 77^0 F in the North Drain and exceed 77^0 F at the point of discharge in all three months modeled (Foster Wheeler Environmental Corporation 1998b, Figure 4). Under conditions without the SPP discharge, the temperature would remain below 77^0 F in October and April. Therefore, under modeled scenarios, it is reasonable to assume that the SPP discharge would increase the risk for avian botulism outbreaks to occur at the refuge.

SPP will use ground water (approximately 3,000 gallons per minute) to circulate through the cooling towers before being discharged as effluent. Twice through cooling will concentrate metals found in the ground water by a factor of 2.2 (Foster Wheeler Environmental Corporation 1998c). Substances of concern to biotic resources are arsenic, boron, chromium, molybdenum, selenium, cadmium, copper, manganese, nickel, zinc, and total dissolved solids (SJVDP 1990).

On July 10, 1998, Calpine provided results of a water quality model to predict levels of total dissolved solids, total organic carbon, arsenic, copper, and manganese in the SPP effluent (Foster Wheeler Environmental Corporation 1998c). Due to the lack of available data on low fall flows, flow data from May 1998 were used to model metals. This scenario simulated unusually high (El Nino year) flows in the irrigation canals and is not representative of worst case conditions. Additionally, detection limits used to sample the ground water for some metals (e.g. cadmium, chromium, copper, and mercury) were higher than standards listed by the Environmental Protection Agency's National Water Quality Criterion for the Protection of Freshwater Organisms. Therefore, the detection limits are not sensitive enough to determine potential impacts to aquatic biota. Further, data provided thus far on the quality of the ground water have been inconsistent. For example, zinc and copper concentrations have been reported as 0.06 and 0.02 ppm, respectively (Calpine 1997, AFC, Table 8.14-2), not detected (Calpine 1998c, Data Response 26), and 0.060 ppm (Calpine 1998e, Data Response 68). Concentrations of arsenic have been reported as 0.022-0.055 ppm (Calpine 1997, AFC, Table 8.14-2), 0.051 ppm for SPP Well 1 (Calpine 1998e, Data Response 68), 0.060 ppm for South Well (Calpine 1998d, Data Response 66). Calpine has stated that the high metal concentrations reported are from 1994 data and the model used current 1998 data C. Wardlow, pers. comm. 1998). Staff is

concerned that the variability in the data reflects variability in the quality of the ground water and worst case conditions for metal concentrations were not used. Results of the model predicted concentrations of arsenic and copper to exceed or approach chronic toxic levels for freshwater aquatic life in the canals as far as the North Drain. During fall months when the drainage canal may contain only effluent discharge, metal concentrations at the North Drain and Pumping Plant 2 could be closer to those predicted at the point of discharge, which exceed the EPA's aquatic standards.

Cooling tower drift contains airborne particulates that could affect soils and vegetation. The AFC (Calpine 1997, AFC, page 8.2-57) states that the maximum radius of deposit is 545 feet, with 70 percent of the drift dropping within 500 feet of the tower. Calpine submitted a supplement to its AFC addressing changes to the cooling tower which included a drift rate of 0.005 percent of the circulation rate (Calpine 1998f, Supplement). Constituents in cooling tower blowdown include those found in the ground water. Due to inconsistencies in the data on chemical concentrations in the south well, the potential impacts of the cooling tower blowdown can not be addressed.

In a letter to the Energy Commission dated September 11, 1998, Calpine proposed using a 100 percent dry cooling design (Calpine 1998g). A dry cooling design will reduce groundwater use to an annual average of 140 gallons per minute and will result in zero discharge. The cooling tower will be replaced by air cooled condensers that will not emit a steam plume. If adopted, the unit will require additional acreage, but will eliminate biological impacts associated with wastewater discharge and cooling tower drift.

Emissions from the heat recovery steam generators (HRSG) stack should not have a significant effect on surrounding vegetation and soils. Pollutants emitted from the stack include carbon monoxide (CO), oxides of nitrogen and sulfur (NO_x and SO_2), and inhalable particulates (PM_{10} and $PM_{2.5}$) (Calpine 1997, AFC, Table 8.2-10). The maximum 1-hour CO emissions of 466 ug/m^3 predicted from the stack combined with the 1-hour CO ambient air concentration of 11.4 ug/m^3 results in a total predicted 1-hour concentration of 477.3 ug/m^3. This is below ambient air quality standards of 23,000 ug/m^3 and concentrations known to result in growth retardation in plants (115,000 ug/m^3; AFC, page 8.2-54). The maximum predicted 1-hour SO_2 emission of 1.3 ug/m^3 SO_2 is lower than the estimated annual thresholds for chronic injury to plants of 130 ug/m^3 (AFC, page 8.2-56). The maximum predicted 1-hour NO_x emission of 90.4 ug/m^3 is lower than the 1-hour threshold of 7,500 ug/m^3 for injury to plants (AFC, page 8.2 -5-56). The maximum annual predicted deposition rate of 0.087 g/m^3/year for PM_{10} and $PM_{2.5}$ combined with the maximum ambient background concentration of 36.7 ug/m^3 for total estimated particulate rate of 23.23 g/m^3/year is below the level (365 g/m^3/year) known to cause damage to plants (Calpine 1997, AFC, pages 8.2-56- 57).

The height of the two HRSG stacks, 185 feet, could result in avian collisions, particularly during night flights, low light, and fog (APLIC 1994). Illuminating the stacks with white or red warning lights could attract and disorient night migrants (Gauthreaux 1988). Intermittent lights have less potential for attracting birds than

steady lights (Byrne, S. pers. comm. 1998). With 100 percent dry cooling, the height the HRSG stacks will be reduced to 145 feet.

Natural Gas Pipeline Corridor

Construction of the natural gas pipeline will permanently remove 0.2 acres of Swainson's hawk habitat: 0.1 acres of wheat at the Poundstone drip station and 0.1 acres as two mature walnut trees at the Sacramento River dehydrator station (Calpine 1997, AFC, Table 8.2-7 and Table 8.2-12; Biological Resources Table 2). Temporary disturbances will occur during construction along the entire 15-mile route, which requires a 25-foot wide construction corridor within the Sutter Bypass and a 50-foot wide construction corridor along the remaining route. Any Swainson's hawk nest located within 0.5 mile of the route during construction activities could be disturbed during the nesting season from April through August. Swainson's hawks were observed nesting one mile south of the Sacramento River dehydrator station in 1997 (Calpine 1997, AFC, Figure 8.2-1a) and 0.3 mile from the Poundstone drip station in 1998 (D. Crowe, pers. comm. 1998c). The route parallels 6.5 miles of irrigation canals that support giant garter snakes. Construction during the winter hibernation period, October through March, could result in direct take of individuals. The pipeline will be constructed by PG&E, and a detailed engineering plan has not been developed (Wilson, pers. comm. 1998). However, it is anticipated that most of the irrigation canals will be avoided. Approximately 20 irrigation canals may be fitted with temporary culverts to allow continuous water flow and trenched underneath to lay the pipe. Five larger canals (20-ft wide or larger) will require boring (Calpine 1997, AFC Figures 8.3-2b & c), which will result in 5 acres (0.5 acres on either side of each) of temporary disturbance to giant garter snake habitat. The pipeline will be bored 30 feet underneath the water channels on either side of the Bypass, eliminating potential impacts to fisheries, riparian vegetation, and California hibiscus. The pipeline will be placed under Hughes Road through the Bypass to eliminate impacts to wetland habitats. Potential pipe laydown areas are sites devoid of vegetation, including airstrips, farm equipment sites, old house sites, abandoned well pads, areas between roads and canals, and an existing substation (Calpine 1998c, Data Response 23).

Transmission Line

Construction of the transmission line near irrigation canals and along Gilsizer Slough could result in the direct take of individual giant garter snakes if conducted during October through March or could temporarily displace giant garter snakes if conducted April through September. The 40-inch diameter single steel poles will require a cement base of 12.25 square feet (Calpine 1998b, Supplement, page S-20 & 28). Thirty-two poles required for O'Banion Road would result in the permanent loss of 0.009 acres and temporary loss of 0.01 acres of Swainson's hawk foraging and giant garter snake upland habitat (Biological Resources Table 2). Thirty-eight poles required for either Route 3B (Tudor Road) or Route 3B1 (Murray Road) would result in the permanent loss of 0.01 acres and the temporary loss 0.009 acres of Swainson's hawk foraging and giant garter snake upland habitat (Biological Resources Table 2).

Routes 3B and 3B1 would remove two valley oak trees (0.09 acres), which are potential hawk nest and perch sites.

For Routes 3B and 3B1, construction of the 220- x 380-foot switchyard would result in the permanent loss of 2.19 acres of Swainson's hawk foraging and giant garter snake upland habitat: 1.9 acres for the yard and 0.29 acres for the 10-foot wide strip of habitat surrounding the yard that will be permanently cleared of vegetation (Calpine 1998c, Data Response 15)(Biological Resources Table 2). This figure differs from the estimate given on Table 8.2-13 (Calpine 1998b, Supplement, page S-20), which did not include the 10-foot wide strip which will be permanently kept clear of vegetation for fire control. Construction will also result in 2.1 acres of temporary disturbance (Calpine 1998b, Supplement, page S-28). The nearest Swainson's hawk nest observed in 1997 was 1.25 miles east the switchyard, within the riparian corridor of the Sutter Bypass.

Information concerning placement and dimensions of the switchyard for the O'Banion Route has not been provided. The site consists of buildings and rice fields that are managed for waterfowl during the hunting season and that constitute Swainson's hawk foraging habitat. Placement within 200 feet of a drainage canal would be considered giant garter snake habitat. Placing the switchyard in the location of the buildings would reduce loss of habitat.

The transmission line will increase the risk of avian collisions. The potential for collisions may be highest over Gilsizer Slough and near the 10-20-ft irrigation canals because waterfowl use waterways as flyways or where the line bisects waterfowl foraging areas. Hunting may elicit a flushing response that could increase the risk for collision along the line that spans the slough. Most collisions occur with the small diameter shield wire located at the top of the span (APLIC 1994, Brown et al. 1985). Areas along the routes that parallel distribution lines would also present higher collision risks due to the clustering of lines. Birds approaching the lines from the direction where the distribution lines are the leading lines may not gain enough height to clear the transmission lines.

CUMULATIVE IMPACTS

The SPP project would convert a total of about 15.2 acres of grassland, agricultural land, and wetland to industrial development. The wetlands on site are considered Moderately Sensitive Habitat by the County of Sutter, and may be difficult to mitigate locally due to the lack of available replacement habitat.

Wastewater discharge into the Sutter Bypass may incrementally contribute to degraded water quality conditions that have significantly impacted anadromous and inland fisheries. These fisheries have experienced serious population declines as a result of past water diversions and discharges that reduce flows, increase

BIOLOGICAL RESOURCES Table 2

Acreage of Permanent Habitat Loss From the SPP Project

	Wetlands	SWHA[1] Habitat	GGS[2] Upland Habitat[3]
Plant Site & Access Road [4]	2.1 to 5.29	12.73	2.7
Gas Pipeline & Dehydrator Stations		0.2	
Transmission Line			
Route 3B		0.10[5]	0.009
Route 3B1		0.10[5]	0.01
O'Banion		0.01	0.01
Switchyard[6]		2.19	2.19
Totals 3B & 3B1:	2.1 to 5.29	15.22	4.90
Totals O'Banion:	2.1 to 5.29	15.13	4.90

[1] SWHA: Swainson's hawk
[2] GGS: giant garter snake
[3] Does not include the 1.09 acres of potential wetland habitat (SPP-31, -32, -36) and surrounding uplands
[4] Does not include acreage required for the dry cooling unit
[5] Includes 0.09 acres of valley oak
[6] The exact location of the O'Banion Route switchyard has not been provided.

temperatures, chemicals, and total dissolved solids, or cause impingement or entrapment. Discharge levels of arsenic from Greenleaf 1 can be high (0.49 mg/l; Calpine 1998h) and further contributions could result in arsenic and other metal concentrations that greatly exceed water quality standards for aquatic biota.

FACILITY CLOSURE

The region surrounding the SPP site is presently dominated by agricultural land, mainly rice fields. This land use type continues to offer foraging habitat for several wildlife species, including waterfowl, cranes, raptors, and giant garter snakes. Facility closure should consider the removal of all structures and re-creation of wetlands on site.

MITIGATION

Calpine has proposed the following mitigation measures to avoid or reduce impacts to biological resources (Calpine 1997, AFC, pages 8.2-66 - 8.2-71; Calpine 1998a, Addendum, Section 8.2; Foster Wheeler Environmental Corporation 1998a). In a letter dated September 11, 1998, Calpine submitted additional mitigation which included incorporating dry cooling, routing the transmission line along O'Banion Road, and placing the switching yard at the south side of O'Banion Road near the Sutter Bypass levee. The specifics of these mitigation measures have not been provided.

Section 7 of the federal Endangered Species Act and Section 404 of the Clean Water Act require consultation with U.S. Fish and Wildlife Service (USFWS), and U.S. Army Corps of Engineers (USACE) to obtain a Biological Opinion and permits that will verify, and possibly require additional, mitigation measures. Calpine has also submitted a Draft Outline of a Biological Resources Mitigation Implementation Plan (Calpine 1998c, Data Response 19) that will provide details for implementing the mitigation measures. This plan will be finalized in consultation with USFWS, CDFG, USACE, and Western Area Power Administration (WAPA).

FISHERIES

Potential impacts to anadromous and inland fisheries from the project could occur as a result of temperature and water quality of the wastewater discharge. The mitigation proposal by Calpine to use 100 percent dry cooling would eliminate any potential for these impacts from the SPP as well as the potential to cause cumulative impacts from SPP and existing Greenleaf 1 discharge.

GIANT GARTER SNAKE

Measures proposed to avoid or minimize impacts to the giant garter snake from project construction and operation are:

- avoid all trenching and auguring near giant garter snake habitat during the hibernation period of October 2 through April 30;

- provide 3 acres of replacement habitat (2 acres of upland habitat and 1 acre of wetland habitat) for every acre of upland habitat lost due to construction. Upland habitat is defined as areas within 200 feet of any wetland, canal or slough within 5 miles of known sightings;

- conduct preconstruction surveys for giant garter snakes 24 hours before earth moving activities during active months of May 1 through October 1. Snakes observed in areas designated for construction will be cleared (swept) to other areas of the canal that will not be affected by construction within the following 24 hours;

- provide a construction worker awareness training program to instruct personnel on giant garter snake recognition and construction limitations.

- provide a qualified biologist on site during construction activities that could affect hibernating snakes (e.g. ground breaking activities or vegetation clearing) that occurs between October 1 and May 1; and,

- provide snake hibernacula and basking habitat by partially burying broken cement, rocks, and logs in the banks of canals above the high water line.

- incorporate dry cooling to eliminate impacts from wastewater quality and temperature.

The measures proposed by Calpine are sufficient to avoid incidental take of individuals, compensate for habitat lost, minimize temporary disturbances from construction activities, and avoid impacts from wastewater discharge. Final compensation ratios and appropriate management and endowment funds will be established in consultation with USFWS and CDFG once the project design and staff's analysis has been finalized.

SWAINSON'S HAWK

Measures proposed to avoid or minimize impacts to the Swainson's hawk from project construction and operation are:

- provide 1 acre of replacement habitat for every 1 acre of grasslands lost from construction;

- conduct preconstruction surveys to determine if an active nest site is within 0.5 mile of construction activities in early spring during construction years;

- design the project to avoid removal of nest trees and placement of linear facilities near nest trees;

- avoid intensive new disturbances within 0.5 mile of an active nest site between March 1 through August 15 or until fledglings are no longer dependent on the nest tree;

- implement a monitoring program to be carried out by a qualified biologist if construction activities occur within 0.5 mile of nest sites; and,

- provide a sensitivity awareness program for construction workers to instruct workers of Swainson's hawk identification and avoidance measures.

The measures proposed by Calpine are sufficient to avoid incidental take of hawks and nest sites, and to minimize temporary disturbances from construction activities. Additional mitigation requiring the protection of on-site foraging habitat not directly taken by the construction activities will also be required. Final compensation ratios for foraging habitat (grassland and agricultural land) lost and appropriate management

and endowment funds will be established in consultation with CDFG once the project design has been finalized.

MIGRATORY BIRDS

Measures proposed to avoid or minimize impacts to the migratory birds from project construction and operation are:

- design the transmission line route to minimize placement in major foraging areas;
- modify lines that bisect potential forage areas with colored 15 inches long by 7 inches wide bird flight diverters, spaced 5 meters apart to increase the visibility of wires;
- space conducting wires far enough apart to reduce or eliminate avian electrocutions;
- restrict timing of construction of the transmission line and gas pipeline to occur when the migratory birds are not in the SPP areas; and,
- develop a monitoring plan to analyze whether the transmission line and HRSG stacks are causing significant impacts from avian collisions and/or electrocutions.
- incorporate dry cooling to eliminate impacts from wastewater quality and temperature

The measures proposed by Calpine are sufficient to avoid incidental take of migratory birds from construction and operation of the project. Restrictions upon the timing of construction of gas pipeline are probably not necessary because this activity should not affect migratory birds. Restrictions upon the timing of construction of the transmission line may be too prohibitive if Swainson's hawks are found nesting in the area. Migratory birds can be present in the area from October through March, while Swainson's hawk nesting occurs from March through August. Therefore, should both incidents need to be avoided, construction could be significantly delayed. Rather than restrict the timing of transmission line construction, measures to flush birds from high use areas (such as the Gilsizer Slough) prior to stringing the transmission lines should be implemented. Whenever feasible, underbuilding existing distribution lines could reduce collision risk.

WETLANDS

Measures proposed to avoid or minimize impacts to the wetlands from project construction and operation are:

- design the project to minimize take of wetlands;
- obtain an individual 404 permit from USACE to fill wetlands;
- obtain a 401 permit from the California Regional Water Quality Control Board (CRWQCB) to fill wetlands on site;
- provide in-kind replacement habitat for loss of wetlands due to project construction;
- protect replacement habitat and existing wetlands on-site in perpetuity;
- mark the boundaries of wetlands to remain on-site and in the Sutter National Wildlife Refuge (SNWR) with flagging prior to construction;
- place the gas pipeline under Hughes road to avoid wetlands in the SNWR;
- avoid vehicle access to wetlands in the SNWR;
- place a construction cloth on wetlands at the plant site to minimize vehicle impacts to surface soils and wetlands outside of the 12-acre project area; and,
- possibly replace disking with mowing to control the grasslands surrounding the site.

The measures proposed by Calpine are sufficient to reduce impacts to wetlands from construction and operation of the project. Final compensation ratios and appropriate management and endowment funds necessary to mitigate the loss of wetlands will be developed in consultation with USFWS. Additional mitigation requiring a monitoring program should be implemented to assure no additional loss or disturbance to remaining on-site wetlands from project construction and operation. Additional compensation may be necessary to off-set impacts to the 4.19 acre wetland located on site.

VEGETATION

No impacts to plants were identified by Calpine, therefore, no mitigation measures for plants were proposed by Calpine. Incorporation 100 percent dry cooling would eliminate potential impacts to surrounding vegetation from cooling tower drift.

The project will result in the loss of two mature walnut trees. Transmission line Routes 3B and 3B1 will result in the loss of two native valley oaks. Staff proposes that Calpine ensure construction activities will not result in the removal or damage to any trees in addition to these four. The loss of the four trees identified for removal

shall be compensated by incorporating native oaks in the Landscape Plan under Visual Resources (Calpine 1997, AFC, Section 8.11.4.1).

ADDITIONAL MITIGATION PROPOSED BY THE APPLICANT

On October 2, 1998, Calpine submitted an AFC Mitigation Program Supplement to use an air cooled condenser rather than the wet cooling tower and wet condenser design (Calpine 1998i). The air cooled condenser will eliminate wastewater discharge from the power plant to the field drains and cooling tower drift, and reduce the size of the HRSG stacks to 145 feet. Concentrated brine from the evaporator (1,000 gallons per day to 4,000 gallons per day at peak load) will be handled by either a 200 x 200 feet on-site evaporation pond, trucked off-site as liquid, or treated in a crystallizer to generate dry salt for off-site disposal. This mitigation program would 1) eliminate impacts to aquatic biota from wastewater discharge in the field drains and Sutter Bypass, 2) eliminate impacts to the wetlands and surrounding vegetation from cooling tower drift, and 3) reduce potential for avian collisions with the HRGS stacks.

ADDITIONAL MITIGATION PROPOSED BY CEC STAFF

The total number of acres directly impacted by the project has increased from the values given in Biological Resource Table 2. Incorporating an air cooled condenser has increased the plant site footprint to 16 acres (Calpine 1998ij). Additionally, Calpine's letter to the USACE for a individual 404 permit requests authorization to fill 5.83 acres of wetlands rather than the 2.1 acres identified in the AFC (Calpine 1998j). The 5.83 acres includes 3.0 acres of wetlands directly impacted by the SPP footprint and 2.83 acres which may be indirectly impacted during construction activities or directly impacted by either the evaporation pond or a detention pond for storm water run off (Calpine 1998j, pg 6). Biological Resources Table 3 shows the acreages of habitat lost, compensation ratios and replacement habitat required as a result of the Mitigation Supplement (Calpine 1998i).

Compensatory habitat is available through Wildlands Inc. for giant garter snake and Swainson's hawk habitat at the Dolan Ranch mitigation bank in Colusa County and for wetlands at the Sheridan Ranch mitigation bank in Sacramento County (K. Berry 1998 pers. comm.). Costs to purchase compensatory habitat credits by habitat type, including the costs for purchase, administration, management, and monitoring are:

Wetlands	$52,000.00/acre
Swainson's hawk	$ 1,500.00/acre
giant garter snake	$19,500.00/acre

Biological Resources Table 3:

Acres of Habitat Permanently Lost, Compensation Ratios and Acres of Compensatory Habitat Required

	Wetlands	Swainson's Hawk Habitat		Giant Garter Snake Habitat
		grassland	ag land	
Plant Site & Access Road	5.83	16.73	0	2.7
Gas Pipeline & Dehydrator Station	0	0	0.2	0
Transmission Line O"Basion Road	0	0.01	0	0.01
Switchyard	0	0	2.19[1]	2.19
Totals:	5.83	16.74	2.39	4.9
Mitigation ratios	1:1	1:1	0.5:1	3:1
Replacement Habitat required	5.83	16.74	1.2	14.7

[1] This assumes that the switchyard will be placed in cultivated fields and not grasslands or developed lands

Assuming the ratios provided above in Biological Resources Table 3, the total cost for compensatory mitigation for off-site habitat is $ 616,720:

5.83 acres of wetlands at $52,000/acre =	$303,160
17.94 acres of Swainson's hawk habitat at $1,500/acre =	$ 26,910
14.7 acres of giant garter snake habitat at $19,500/acre =	$286,650
Total	$616,720

Other compensatory habitat may be available through the USFWS Sutter National Wildlife Refuge. However, this would require legislative approval to expand their existing boundaries which would take two years to approve (D. Crowe 1998d, pers. comm.). The uncertainty of both the legislative approval and the future availability of habitat in the immediate area makes this proposal less accountable, and therefore, less desirable. If this option is selected, Capline must establish an interest bearing account in the amount of $ 616,720 to ensure the purchase of the required amount of

compensatory habitat at the current rate plus provide any additional funds as needed to account for any inflationary rate at the time of purchase.

If used, the evaporation pond would contain high concentrations of arsenic, copper, lead, zinc and other elements found in the well water (Calpine 1998i, Table 4-1). The accumulated salts would be removed from the pond every 3 to 10 years. These salts will consist of the elements listed above (e.g. arsenic) in an extremely concentrated form (97 -98%; Calpine 1998i, pg 4). Waterfowl and wading birds may be attracted to the evaporation pond. Therefore, it will be necessary for the project owner to screen or otherwise eliminate the potential for birds to enter the pond. This impact would be eliminated if the brine wastewater was trucked off-site as either liquid or crystalize dry salt taken from a storage unit.

Energy Commission Visual Resources staff analysis has determined that the O'Banion Road transmission line route will cause unmitigable significant impacts and has proposed an alternative route as mitigation. The alternative route travels west from the SPP through agricultural lands for 1.5 miles, then south, paralleling an existing 500 kV PG&E transmission line for about 1.5 miles, crossing O'Banion Road to a new switchyard south of O'Banion Road and west of the Sutter Bypass levee. Appromimately a quarter mile of this route will also parallel an existing WAPA 230 kV line. This route will result in greater risk for avian collisions than the O'Banion route because it crosses open agricultural land that may serve as foraging habitat and through five parcels operated as seasonal duck hunting clubs. The O'Banion route follows roadways and runs alongside an orchard for at least a mile, which serves as a natural barrier causing birds in flight to gain altitude before approaching the transmission line. The portion of the alternative route that parallels the existing 500 kV line could increase collision risk by creating a wall of condutors if the new conductors are not at the same height as the 500 kV condutors. During a recent two-day fog event in the area, nine birds were found along a one-mile transect under the existing lines by USFWS personnel (Williams 1998, pers. comm.). Therefore, if the alternative route is used, the entire line must be fitted with Bird Flight Diverters at 5-meter intervals and must be surveyed quarterly to monitor for bird mortalities from collisions. Also, the span of the new condutors must be at a height equal or nearly equal to the span of the existing condutors.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS AND STANDARDS

Calpine must obtain several permits and two biological opinions to be in compliance with applicable LORS. These are Section 7 consultation and resulting biological opinion from USFWS, individual 404 permit from USACE, and a Section 401 permit from CRWQCB. A CDFG Streambed Alteration Permit may also be required to route the gas pipeline through the Sutter Bypass. Staff has requested a Biological Opinion from CDFG. Recent changes in project design and lack of complete information regarding final project design have delayed the consultation process with USFWS and CDFG.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Construction and operation of the SPP will not have significant impacts on biological resources if adequately mitigated. For impacts identified thus far, mitigation measures proposed by the applicant and by staff will reduce these impacts to insignificant levels. Additional mitigation measures may be necessary once the consultations with appropriate agencies are completed. A final project design has not been provided by Calpine. Calculations for compensatory habitat required is based on best estimates from the information provided to date and may need to be adjusted. From the information provided to date, a total of 19.2 acres will be permanently lost. Some of these acres support more than one sensitive resource; for example, the wetlands are Swainson's hawk foraging habitat during the dry months and the uplands located within 200 feet of a drainage canal are also Swainson's hawk habitat. It may be possible to compensate for these habitat types simultaneously. If not, the total acres for each habitat type lost must be individually compensated (see Biological Resources Table 3).

The Draft Biological Resources Mitigation Implementation and Monitoring Plan must be submitted and approved by staff before the Commission Final Decision.

RECOMMENDATIONS

Calpine must obtain a Biological Opinion from USFWS and Memorandum of Understanding from CDFG prior to the Final Commission Decision. Calpine must also obtain a Streambed Alteration Agreement or written verification that this permit is not necessary for the Sutter project from CDFG prior to the Final Commission Decision.

Staff recommends that the committee adopt the following Conditions of Certification. Additional Conditions of Certification may be necessary, pending any further information on, or changes to the project design.

CONDITIONS OF CERTIFICATION

BIO-1 Construction-site and/or ancillary facilities preparation (described as any ground disturbing activity other than allowed 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,

2) three years of experience in field biology or current certification of a nationally recognized biological society, such as the Ecological Society of America or The Wildlife Society,

3) one year of field experience with resources found in or near the project area, and

4) ability to demonstrate to the satisfaction of the CPM the appropriate education and experience for the biological resource 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 area(s) until the CPM approves a new designated biologist and that designated biologist is on-site.

Verification: At least 30 days prior to the start of rough grading, 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 duties:

1) advise the project owner's supervising construction or operations engineer on the implementation of the biological resource conditions of certification,

2) supervise or conduct mitigation, monitoring, and other biological resource 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 condition.

Verification: 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.

BIO-3 The project owner's supervising construction and operating engineer shall act on the advice of the designated biologist to ensure conformance with the biological resource conditions of certification.

Protocol: The project owner's supervising construction and operating engineer shall halt, if needed, 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) tell the project owner and the supervising construction and operating engineer when to resume construction, and

2) advise the CPM if any corrective actions are needed or have been instituted.

Verification: Within two working days of a designated biologist notification of non-compliance with a Biological Resources condition 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 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.

BIO-4 The project owner shall develop and implement a Worker Environmental Awareness Program in which each of its own employees, as well as employees of contractors and subcontractors who work on the project site or related facilities (including any access roads, storage areas, transmission lines, water and gas lines) during construction and operation, are informed about biological resource sensitivities associated with the project (see General Conditions of Compliance).

Protocol: The Worker Environmental Awareness Program:

1) shall be developed by the designated biologist and consist of an on-site or classroom presentation in which supporting written material is made available to all participants.

2) must discuss the locations and types of sensitive biological resources on the project site and adjacent areas,

3) must present the reasons for protecting these resources,

4) must present the meaning of various temporary and permanent habitat protection measures, and

5) must identify who 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 material. Each statement shall also be signed by the person administering the Worker Environmental Awareness Program.

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 (6) months after the start of commercial operation. Signed statements for active operational personnel shall be kept on file by the project owner for the duration of their employment and for six months after their termination.

Verification: At least 30 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 running total of all persons who have completed the training to date.

BIO-5 Prior to the start of any ground disturbance activities, the project owner shall enter into an Endangered Species Memorandum of Understanding (MOU) with the California Department of Fish and Game (CDFG) (per Section 2081 of the California Endangered Species Act) and implement the terms of the agreement.

Verification: At least 60 days prior to the start of rough grading, the project owner shall submit to the CPM a copy of the final CDFG Endangered Species MOU.

BIO-6 Prior to construction, the project owner shall provide final copies of the Biological Opinions per Section 7 of the federal endangered species act obtained from the U.S. Fish and Wildlife Service (USFWS) and

incorporate the terms of the agreement into the Biological Resources Mitigation Implementation and Monitoring Plan.

Verification: At least 60 days prior to the start of rough grading, the project owner shall submit to the project CPM copies of the final USFWS Biological Opinion.

BIO-7 The project owner shall acquire either a Streambed Alteration Agreement or written verification that this permit is not necessary from the California Department of Fish and Game for project impacts to drainages, and implement the terms of the agreement.

Verification: At least 45 days prior to the start of rough grading, the project owner shall provide the CPM with a copy of the California Department of Fish and Game Streambed Alternation Agreement or written verification that this permit is not necessary for this project.

BIO-8 The project owner shall ensure the following measures are implemented to avoid or mitigate project impacts to giant garter snakes:

1) Avoid trenching or auguring activities within 200 feet of giant garter snake habitat from October 2 through April 30.

2) Have the designated biologist on site during construction activities that occur between October 1 and May 1. The designated biologist shall possess a permit as required under Section 10(a)1(A) of the federal Endangered Species Act to capture or relocate snakes.

3) Within 24 hours prior to commencement of construction activities, the site shall be inspected for snakes by the designated biologist. Observed snakes should be reported and cleared to an area that will not be affected by construction within the next 24 hours. If a snake is encountered during construction activities, the designated biologist should be contacted and take appropriate measures to ensure the snake will not be harmed.

4) Avoid obstructing the flow of water through the canals. Any dewatered habitat must remain dry for at least 15 consecutive days after April 15 and 15 consecutive days prior to excavating or filling dewatered habitat.

5) Prevent runoff from construction activities from entering giant garter snake habitat.

6) Restrict vegetation clearing to the minimal area necessary to facilitate construction activities. Mark and avoid giant garter snake habitat in or adjacent to the project that will not be directly affected by construction activities.

7) Provide replacement habitat at a location acceptable to USFWS and CDFG to compensate for habitat lost (BIO-13).

8) Mow, rather than disk, to control vegetation on-site. Mower blades should be raised to at least 6 inches during the snake's active period of May 1 to October 1.

9) Conduct activities to clear vegetation in the irrigation canals as necessary to minimize disturbance to snake habitat and in accordance with methods approved by CDFG and USFWS.

10) Eliminate wastewater discharge as described in Condition SOILS&WATER 2.

Verification: At least 45 days prior to rough grading, the project owner shall provide to the project CPM for review and approval written documentation (BRMIMP, BIO-12) that the above measures will be or have been accomplished by the applicant and the procedures used or that will be used to implement these measures.

BIO-9 The project owner shall ensure the following measures are implemented to mitigate or avoid project impacts to Swainson's hawks:

1) The designated biologist shall conduct preconstruction surveys during March through June during construction years to determine if an active nest site is within 0.5 mile of construction activities.

2) Design the project to avoid removal of nest trees and to avoid placement of the transmission line within 0.1 mile of a nest tress.

3) The designated biologist shall monitor construction activities that occur within 0.5 mile of an active nest site between March 1 and August 15 or until fledglings are no longer dependent on the nest tree. The monitoring plan shall be acceptable to CDFG.

4) Provide replacement habitat at a location acceptable to CDFG to compensate for the loss of habitat (BIO-13).

5) Protect on-site Swainson's hawk foraging habitat not taken by the power plant foot print in perpetuity or provide replacement habitat at a location and ratio acceptable to CDFG and establish an endowment account adequate to provide funds for the perpetual maintenance and management of the replacement habitat.

Verification: At least 45 days prior to rough grading, the project owner shall provide to the project CPM for review and approval written documentation (BRMIMP, BIO-12) that the above measures will be accomplished by the applicant and the procedures used or that will be used to implement these measures.

BIO-10 The project owner shall ensure the following measures are implemented to mitigate or avoid project impacts to migratory birds:

1) Powerlines should be constructed following recommendations in Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996 (Avian Powerline Interaction Committee 1996).

2) Powerlines located in sensitive areas (e.g. over Gilsizer Slough and through potential foraging or flyway areas) shall be fitted with bird flight diverters placed on the ground wire at 16.4-foot (5-meter) intervals. Sensitive areas shall be identified in the Biological Resources Mitigation Implementation and Monitoring Plan (Condition BIO-12).

3) Between October through March, measures shall be taken in areas of high migratory bird use (such as Gilsizer Slough) to flush birds from the construction area prior to stringing wires.

4) Develop a monitoring plan to analyze whether the transmission line and HRSG stacks are causing significant impacts from avian collision and/or electrocutions. If it is determined that significant impacts are occurring, propose remedial mitigation measures to be implemented. A report presenting the monitoring data and a discussion of the mitigation effectiveness shall be provided annually for 10 years following the completion of construction. If it can be shown that impacts to birds from the project are not occurring, Calpine has the option to request staff to decrease the frequency or cease monitoring.

5) Underbuild distribution lines whenever possible. Underbuild lines should be spaced below conductors to provide a vertical clearance of at least 43 inches.

6) If the new transmission line parallel's the existing PG&E's 500 kV line and WAPA's 230 kV line, the height of the conductors should be equal or nearly equal (within five feet) to the height of the existing line.

7) If an evaporation pond is used to store the evaporater brine, the evaporation must be screened or otherwise modified to eliminate the potential for birds and wildlife to enter the pond.

8) Eliminate wastewater discharge as described in Condition SOILS&WATER 2.

Verification: At least 45 days prior to rough grading, the project owner shall provide to the project CPM for review and approval written documentation (BRMIMP, BIO-12) that the above measures will be accomplished by the applicant and the procedures used or that will be used to implement these measures. The avian

collision/electrocution monitoring plan annual report shall be provided to the project CPM no later than December 31 for each year monitoring is required.

BIO-11 The project owner shall ensure the following measures are implemented to mitigate or avoid project impacts to wetlands:

1) Provide in-kind replacement habitat at a location acceptable to USFWS for wetlands impacted by the project (BIO-13).

2) Establish an endowment account adequate to provide funds for the perpetual maintenance and management of the replacement habitat.

3) Mark and avoid all wetlands on site that will not be directly taken by the power plant footprint and all wetlands along Hughes Road in the Sutter National Wildlife Refuge.

4) Protect on-site wetlands not taken by the power plant foot print in perpetuity or provide replacement habitat at a location and ratio acceptable to USFWS and establish an endowment account adequate to provide funds for the perpetual maintenance and management of the replacement habitat.

5) Use an air cooled condenser to eliminate wet cooling tower evaporation and incorporate drains designed to route contaminated runoff away from the remaining wetlands or develop and implement a monitoring program to ensure the wetlands remaining on-site are not degraded by project operations. The program should include parameters acceptable to USFWS that monitor hydrologic quality and productivity, and identify and defend reference or control wetlands for comparative analysis. If it is determined that the on-site wetlands are being negatively impacted, propose remedial mitigation measures to be implemented. A report presenting the monitoring data and a discussion of the mitigation effectiveness shall be provided annually for the life of the project. If it can be shown that the wetlands are not being negatively impacted, Calpine has the option to request staff to decrease the frequency or cease monitoring.

6) Place a construction cloth over all remaining wetlands located within 500 feet of construction and related roads during construction activities.

7) Place the pipeline under Hughes Road.

Verification: At least 45 days prior to rough grading, the project owner shall provide to the project CPM for review and approval written documentation (BRMIMP, BIO-12) that the above measures will be accomplished by the applicant and the procedural terms for implementing these measures. The wetland monitoring plan annual report

shall be provided to the project CPM no later than July 1 for each year monitoring is completed.

BIO-12 The project owner shall submit to the CPM for review and approval a copy of the final Biological Resources Mitigation Implementation and Monitoring Plan.

Protocol: The Biological Resources Mitigation Implementation and Monitoring Plan shall identify:

- of all sensitive biological resources to be impacted, avoided, or mitigated by project construction and operation;
- all conditions agreed to in the USFWS Biological Opinion and CDFG Endangered Species Memorandum of Understanding;
- all mitigation, monitoring and compliance conditions included in the Commission's Final Decision;
- all conditions agreed to in the USACE Clean Water Act Permits;
- all conditions specified in the CDFG Streambed Alteration Permit, if required.
- required mitigation measures for each sensitive biological resource;
- required habitat compensation, including provisions for acquisition, enhancement and management, for any loss of sensitive biological resources;
- a detailed plan for protecting the existence and monitoring the integrity of the wetlands remaining on-site;
- a detailed description of measures that will be taken to avoid or mitigate temporary disturbances from construction activities;
- all locations, on a map of suitable scale, of laydown areas and areas requiring temporary protection and avoidance during construction;
- aerial photographs of all areas to be disturbed during project construction activities - one set prior to site disturbance and one set subsequent to completion of mitigation measures. Include planned timing of aerial photography and a description of why times were chosen;

- monitoring duration for each type of monitoring and a description of monitoring methodologies and frequency;

- performance standards to be used to help decide if/when proposed mitigation is or is not successful;

- all remedial measures to be implemented if performance standards are not met; and

- a process for proposing plan modifications to the CPM and appropriate agencies for review and approval

Verification: At least 45 days prior to rough grading, the project owner shall provide the CPM with the final version of the Biological Resources Mitigation Implementation and Monitoring Plan for this project, and the CPM will determine the plans acceptability within 15 days of receipt of the final plan. The project owner shall notify the CPM five working days before implementing any modifications to the Biological Resource Mitigation Implementation and Monitoring Plan.

Within 30 days after completion of construction, the project owner shall provide to the CPM for review and approval, a written report identifying which items of the Biological Resource Mitigation Implementation and Monitoring Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which condition items are still outstanding.

BIO-13 The project owner shall provide a non-refundable $ 616,720 in the form of a check or money order to Wildlands Incorporated to acquire and manage lands as compensation for the loss of habitat from SPP construction and operation.

Protocol: Final determination of compensatory acres required will be determined by CEC after the project owner has submitted a final design of the project or by assuming a worse case estimate. The total number of compensatory acres shall account for the total number of acres lost for each habitat type impacted (Swainson's hawk habitat, wetland habitat, and giant garter snake habitat).

If any habitat disturbance occurs beyond that covered by the $ 616,720 non-refundable amount, the project owner shall provide additional funds at current 1998 values of $52,000 per wetland acre, $ 1,500 per Swainson's hawk habitat acre, and $19,500 per giant garter snake habitat acre at ratios established by the CPM in consultation with USFWS and CDFG. The additional funds will be provided to Wildlands, Incorporated. Additional disturbance shall be determined by black and white aerial photographs taken before and after construction at a scale of 1" = 200' as specified in BIO-12.

Verification: Within sixty (60) days after the Commission Decision is issued, the project owner shall provide the CPM a copy of the check or money order delivered to Wildlands Incorporated. Within ninety (90) days prior to the start of construction, the project owner shall provide the CPM with aerial photos taken before construction. Within one hundred eighty (180) days after construction, the project owner shall provide the CPM aerial photos taken after construction and an analysis of the amount of any additional habitat disturbance than that determined in the FSA. The CPM will notify the project owner of any additional amount of funds required to compensate for additional habitat disturbances at the adjusted market value at the time of construction to purchase and protect habitat.

REFERENCES

Avian Power Line Interaction Committee (APLIC). 1994. Mitigating bird collisions with power lines: the state of the art in 1994. Edison Electric Institute. Washington, D.C.

Avian Powerline Interaction Committee. 1996. Suggested practices for raptor protection on power lines: the state of the art in 1996.

Boles, G. L. 1988. Water temperature effects on chinook salmon (Oncorhynchus tshawytscha) with emphasis on the Sacramento River. A literature review. Department of Water Resources. Sacramento, CA.

Brown, W. M., C. D. Roderick, and E. G. Bizeau. 1985. Mortality of cranes and waterfowl from powerline collisions in the San Luis Valley, Colorado. Pages 128-136 *in* J. C. Lewis, ed. Proceedings 1985 Crane Workshop. Platte River Whooping Crane Maintenance Trust, Grand Island, NE.

Byrne, S. 1998. Pacific Gas and Electric Company, Technical and Ecological Services . Personal communication with Linda Spiegel, May 21.

Calpine. 1997. Application for certification, Sutter Power Project (97-AFC-2). Submitted to the California Energy Commission, December 1997.

Calpine. 1998a. Application for certification, revised addendum I, Sutter Power Project (97-AFC-2). Submitted to the California Energy Commission, January 20.

Calpine. 1998b. Application for certification (97-AFC-2), supplemental filing to change electric transmission line route. Submitted to the California Energy Commission, May 11.

Calpine. 1998c. Response to California Energy Commission (CEC) staff data request, Sutter Power Project (97-AFC-2). Submitted to the CEC, March 4.

Calpine. 1998d. Response to California Energy Commission (CEC) staff data request, Sutter Power Project (97-AFC-2). Submitted to the CEC, May 1.

Calpine. 1998e. Response to California Energy Commission (CEC) staff data request, Sutter Power Project (97-AFC-2). Submitted to the CEC, April 15 and May 1.

Calpine. 1998f. Application for certification (97-AFC-2), supplemental filing to change size of cooling tower. Submitted to the California Energy Commission, May 21.

Calpine. 1998g. Letter to Paul Richins dated September 11, 1998 re: Additional environmental mitigation for Calpine's sutter power plant. Submitted to the California Energy Commission, September 14.

Calpine. 1998h. Response to CURE data request #18. Submitted to the California Energy Commission, July 8.

Calpine. 1998i. Calpine sutter power plant AFC mitigation program supplement, October 1998. Submitted to the California Energy Commission, October 2.

Calpine. 1998j. Letter to U. S. Army Corps of Engineers dated September 30 re: Request for Department of the Army Clean Water Act Section 404 individual permit for filling wetlands on the proposed Sutter Power Plant project site, Sutter County, California, project identification number 199700183. Submitted to the California Energy Commission, October 2.

Cech, J. J. and P. S. Young. 1994. Environmental requirements and tolerances of the Sacramento splittail, *Pognichthys macroplepidotus* (Ayres) (November 1993 - February 1994) progress report. Unpublished report. Wildlife & Fisheries Biology, Univ. of Calif, Davis.

Count of Sutter. 1996. County of Sutter general plan 2015. Background Report. November 25, 1996.

Crowe, D. 1998a. Foster Wheeler Environmental Corporation. Personal communication with Linda Spiegel, July 22.

Crowe, D. 1998b. Foster Wheeler Environmental Corporation. Personal communication with Linda Spiegel, August 4.

Crowe, D. 1998c. Foster Wheeler Environmental Corporation. Personal communication with Linda Spiegel, April 22.

Crowe, D. 1998d. Foster Wheeler Environmental Corportaion. Personal communication with Linda Spiegel, October 7.

Escarda, C. 1998. Central Valley Regional Water Quality Control Board. Personal communication with Joe O'Hagan, CEC, September 2, 1998.

Friend, M. (ed). 1987. Field guide to wildlife diseases. U.S. Fish and Wildlife Service, Resource Publication 167. 225pp.

Deweese, J. 1997. U.S Fish and Wildlife Service. Personal communication with Linda Spiegel, June 4.

Foster Wheeler Environmental Corporation. 1997. Wetland delineation report, Sutter power plant project, Sutter County, California. Foster Wheeler Environmental Corporation, Sacramento, CA.

Foster Wheeler Environmental Corporation. 1998a. Biological assessment, sutter power plant project, Sutter County, California. Foster Wheeler Environmental Corporation, Sacramento, CA.

Foster Wheeler Environmental Corporation. 1998b. Sutter power plant effluent water temperature modeling report. Foster Wheeler Environmental Corportation, Sacramento, CA.

Foster Wheeler Environmental Corporation. 1998c. Sutter power plant effluent water quality modeling report. Foster Wheeler Environmental Corportaion, Sacramento, CA.

Garrett, M. 1998. Pacificorps. Personal communication with Linda Spiegel, May 21.

Gauthreaux, S. A., JR. 1988. The behavioral response of migrating birds to aircraft strobe lights: attraction or repulsion? Final Technical Report, Headquarters, United States Air Force/Air Force Systems Command, Air Force Engineering and Services Center, Tyndall Air Force Base, FL.

Hornaday, K. 1997. U.S. Fish and Wildlife Service. Personal communication with Linda Spiegel, August 14.

Russell, P. 1998. Sutter Extension Irrigation District. Yuba City, CA. Personal communication, August 4 workshop.

San Joaquin Valley Drainage Program (SJVDP). 1990. Fish and wildlife resources and agricultural drainage in the San Joaquin Valley, California. Vol. 1. San Joaquin Valley Drainage Program, Sacramento, CA.

Small, A. 1994. California birds their status and distribution. Ibis Publishing Company. Vista, CA.

Theyrer, F. D., K. A. Voos, and W. J. Miller. 1984. Instream water temperature model. Department of the Interior Instream Flow Information Paper No. 16. FWS/OBS-84/15. Washington, D.C.

Wilson, S. 1998. Pacific Gas and Electric Company, Building and Land Services. Personal communication with Linda Spiegel, May 21.

Wardlow, C. 1998. Calpine Corporation. Personal communication at the August 4 workshop.

Williams, L. 1998. US Fish and Wildlife Service, Sutter National Wildlife Refuge. Personal communication with Linda Spiegel, October 5.

Wolder, M. 1998. Letter dated August 10, 1998 from U.S. Fish and Wildlife Service, Sacramento National Wildlfie Refuge Complex, Willows, CA.

SOIL & WATER RESOURCES

Testimony of Joseph O'Hagan

INTRODUCTION

This analysis examines the water and soil resource aspects of the Sutter Power Project (SPP), specifically focusing on the following areas of concern:

- how the project's demand for water affects groundwater supplies;
- whether project construction or operation will lead to accelerated wind or water erosion and sedimentation;
- whether project construction or operation will lead to degradation of surface or groundwater quality;
- whether or not the completed facilities will be vulnerable to flooding or contribute to off-site flooding and drainage problems; and
- whether the project will comply with all applicable laws, ordinances, regulations and standards.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

Clean Water Act

The Clean Water Act (33 USC section 1257 et seq.) requires states to set standards to protect water quality. Point source discharges to surface water are regulated by this act through requirements set forth in specific or general National Pollutant Discharge Elimination System (NPDES) Permits. Stormwater discharges during construction and operation of a facility and incidental non-stormwater discharges associated with pipeline construction also fall under this act and are addressed through a general NPDES permit. In California, the requirements of the Clean Water Act are administered by the nine Regional Water Quality Control Boards (RWQCB). Section 404 of the act regulates the discharge of dredged or fill material into waters of the United States, including rivers, streams and wetlands. Site specific or general (nationwide) permits for such discharges are issued by the Army Corp of Engineers (ACOE).

STATE

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act of 1967, Water Code section 13000 et seq., requires the State Water Resources Control Board and the nine RWQCBs to adopt water quality criteria to protect state waters. These criteria include the identification of beneficial uses, narrative and numerical water quality standards and implementation procedures. The criteria for the project area are contained in the Central Valley Region Water Quality Control Plan (Basin Plan 1994). In addition to the

requirements of the Basin Plan, the SWRCB (1971) adopted the Plan for the Control of Temperature in Coastal and Interstate Waters and Enclosed Bays and Estuaries. This plan sets numerical and narrative water quality standards controlling the discharge of wastes with elevated temperature to the state's waters. These standards are applied to the proposed project through the NPDES permit.

The Porter-Cologne Water Quality Control Act also requires the SWRCB and the nine RWQCBs to ensure the protection of water quality through the regulation of waste discharges to land. Such discharges of waste to land, including evaporation ponds, are regulated under Chapter 15, Division 3, Title 23 of the Code of California Regulations. These regulations require that the RWQCB issue a Waste Discharge Requirement which specifies conditions regarding the construction, operation, monitoring and closure of the waste disposal site.

Section 13552.6 of the Water Code specifically identifies that the use of potable domestic water for cooling towers, if suitable recycled water is available, is an unreasonable use of water. The availability of recycled water is based upon a number of criteria, which must be taken into account by the SWRCB. These criteria are that: the quality and quantity of the reclaimed water are suitable for the use; the cost is reasonable; the use is not detrimental to public health, will not impact downstream users or biological resources and will not degrade water quality.

Section 13552.8 of the Water Code states that any public agency may require the use of recycled water in cooling towers if certain criteria are met. These criteria include that recycled water is available and meets the requirements set forth in section 13550; the use does not adversely affect any existing water right; and if there is public exposure to cooling tower mist using recycled water, appropriate mitigation or control is necessary.

The SWRCB has also adopted a number of policies that provide guidelines for water quality protection. The principle policy of the State Board which addresses the specific siting of energy facilities is the Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling (adopted by the Board on June 19, 1976 by Resolution 75-58). This policy states that use of fresh inland waters should only be used for powerplant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound. This SWRCB policy requires that power plant cooling water should, in order of priority come from wastewater being discharged to the ocean, ocean water, brackish water from natural sources or irrigation return flow, inland waste waters of low total dissolved solids, and other inland waters. This policy goes on to address cooling water discharge prohibitions.

Under the NPDES program, the SWRCB has adopted the Construction Activities Storm Water General Permit for earth moving activities disturbing five acres or more and the Industrial Activities Storm Water General Permit for operation of industrial facilities. The Central Valley Regional Water Quality Control Board (1997) has also adopted General Order (No. 93-230) for Dewatering and Other Low Threat Discharges to Surface Water. This general permit sets forth waste discharge requirements to

address the discharge of low volume, clean wastewater resulting from dewatering, well testing, pipeline flushing and other miscellaneous construction and operation activities.

Section 401 of the Clean Water Act provides for state certification of federal permits allowing discharge of dredged or fill material into waters of the United States. These certifications are issued by the RWQCBs.

The Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65)

The Safe Drinking Water and Toxic Enforcement Act of 1986, Health and Safety Code sections 25249.5 et seq., prohibits the discharge or release of chemicals known to cause cancer or reproductive toxicity into drinking water sources.

LOCAL

Sutter County General Plan

Policy 3.D-1 The County shall continue to require that all new development outside the Special Flood Hazard Area as defined by the Federal Emergency Management Agency (FEMA) be protected from a 50 year storm event (Sutter County 1996). FEMA (1996) defines Special Flood Hazard Areas as those areas subject to inundation by a 100-year flood. The project is located in Zone X, which is not in the Special Flood Hazard Area and therefore, this general plan policy applies to the project.

SETTING

REGIONAL DESCRIPTION

The proposed Sutter Power Project (SPP) is located in central Sutter County, approximately seven miles southwest of the community of Yuba City. The proposed project will occupy a 12 acre portion of a 77 acre parcel also occupied by the existing 49.5 MW Greenleaf 1 power plant. The climate of Sutter County is characteristic of the southern Sacramento Valley, with dry, hot summers and wet, cool winters. Rainfall occurs mainly between April and October. The average annual precipitation is approximately 17.3 inches.

Agricultural land uses represent over 80 percent of the development within Sutter County (Calpine 1998a, page 8.4.1). With the exception of Greenleaf 1, land uses within one mile of the SPP site are entirely in agricultural land uses, predominately rice, orchards and field crops.

The major surface water features in Sutter County consist of the Sacramento River on the west and the Yuba, Bear and Feather Rivers on the east. In addition, the Sutter Bypass crosses the central and southern portion of the county from just south of the Sutter Buttes to the Feather and Sacramento Rivers in the southeast portion of the

county. A floodway with levees, the bypass conducts flood waters from the Sacramento River and Butte Slough back to the Sacramento River near the Sacramento River-Feather River confluence. The county also has numerous natural and man-made drainages, sloughs and canals. Natural surface drainage patterns have been extensively altered by flood control structures and irrigation drains.

The Sutter Bypass and the Sacramento River are approximately one and five miles west of the SPP site, respectively. Design flows for the bypass in this area is 155,000 cfs. Design flows for this portion of the Sacramento River is 66,000 cfs (DWR 1994). Actual flows in the river and the bypass vary widely on both a seasonal and annual basis. The highest mean monthly flow was 59,442 cfs for March, 1983. The lowest mean monthly flow was 79 cfs in April 1977. Flows below 1,000 cfs in the bypass are generally confined to the two toe drains found at the base of the east and west levees. Gilsizer Slough, a natural drainage used to carry runoff from Yuba City is approximately two miles south of the SPP site. Project elements will cross all three of these drainages.

Both surface and groundwater are used to meet agricultural and domestic water needs within the county. Groundwater of varying quantity and quality is found throughout the area depending on the sedimentary deposit being tapped. The Sutter Extension Water District supplies irrigation water for approximately 25,000 acres in central and southern Sutter County east of the Sutter Bypass (Russell 1998).

Geologically, Sutter County, with the exception of the Sutter Buttes, is a sedimentary basin consisting of a series of marine and non-marine sediments, four of which represent the major freshwater aquifers within the region. DWR (1978) provides a detailed description of these aquifers. The AFC (Calpine 1997, pages 8.14-6 and 8.14-7) provides a good summary of this information. Groundwater pumping within the county is estimated to be approximately 275,000 acre feet per year (Sutter County 1996). Groundwater levels within the area vary both on a seasonal and annual basis. Seasonal variations result from increased recharge during wet periods and from increased withdrawals during the irrigation periods.

DWR monitors 104 groundwater wells within Sutter County, only four of which, however, are monitored on a monthly basis. Groundwater levels, as monitored by DWR at a well, located approximately two miles east of the SPP site, dropped over 18 feet between April 1 and September 12, 1996. By December 17, 1996, groundwater levels had rebounded over 12 feet. Annual variation results from climatic factors which drive not only groundwater recharge but the availability of surface water supplies. During drought conditions, a greater reliance is placed on groundwater and results in declining groundwater levels. The same well, discussed above, has been monitored by DWR since 1963. Over this period, groundwater levels have varied from approximately 50 feet to less than 15 feet below ground surface. Drought conditions have generally led to groundwater declines of from eight to ten feet (DWR 1982; Calpine 1998j). Comparison of groundwater contours for the project vicinity since 1970 shows that the long-term pattern has been fairly stable, with groundwater levels between 30 and 40 feet.

SITE AND VICINITY DESCRIPTION

Elevations at the site range from 33 feet above mean sea level (msl) in the southwest corner to 38 feet msl in the northeast corner, with an average elevation of 36 feet (Calpine 1997, page 8.14-18). Although the site topography generally slopes to the southwest, a series of depressions and ridges forming seasonal pools are present. In addition, there are three large borrow pits on the 16 acre site where material used in the construction of Greenleaf 1 was extracted. These pits also fill with water during the rainy season. See the Biological Resources Section for further discussion of these vernal pools and ponds. The 77 acre parcel is bounded on all sides with berms associated with irrigation and drainage canals.

Soils present at the site and along the associated linear facilities are generally deep, gently sloping and are poorly to moderately well drained. Clays and clay loams are the predominate surface texture (Soil Conservation Service 1988). Figures 8.9-1a, 8.9-1b, 8.9-1a(R) and 8.9-1b(R) (Calpine 1997, pages 8.9-3 and 8.9-4; 1998, page 8.9-2) show the soil types found at the project site and along the linear facility corridors. Table 8.9-4 (Calpine 1998h) summarizes key characteristics for each of these soils. In general, runoff from these unmodified soils is slow and therefore, they have only a slight to moderate water erosion hazard. Due to fine surface textures, the wind erosion hazard is also slight. Most of these soils, however, have been modified through cultivation practices. Compaction or disturbance of the soil surface makes the potential for runoff and the resulting erosion a concern.

As noted above, natural drainage at the site is to the southwest. Calpine estimates that runoff from the undeveloped site during a 5 minute, 125 year storm is seven cubic feet per second ([cfs] Calpine 1997). Once developed, Calpine (1998q) estimates runoff from the 16 acre site will be 50 cfs. The irrigation canals adjacent to site carry Feather River water diverted by the Sutter Extension Water District to irrigate adjacent agricultural lands. Flows in the E laterals vary with the April through October irrigation season and stormwater runoff. Irrigation flows average 50 cfs but may reach as much as 100 cfs when rice fields are being flooded (Bechtel 1984). Stormwater runoff ranges from one to ten cfs. Calpine proposes to discharge stormwater runoff into a series of field drains which route flows to the south and the west until the North Drain is reached. See Project Description Figures 1 and 2. These field drains, which are used for discharge of Greenleaf 1 wastewater and stormwater runoff, parallel and cross several irrigation canals. The field drains run through culverts beneath the irrigation canals. Flows in these field drains vary seasonally with stormwater runoff and irrigation water. The North Drain, which is maintained by DWR, terminates at O'Banion Road just east of the Sutter Bypass.

Here the water is pumped by the DWR Pump Plant No. 2 over the levee and into the Sutter Bypass. The North Drain is connected to the Gilsizer Drain or South Drain which is a northern extension of Gilsizer Slough. Water from Gilsizer Drain is also pumped by DWR Pump Plant No. 2 into the bypass. The capacity of the pump station is 360,000 gpm (Dickerson 1998). Water from the North Drain is generally pumped from November to April. When water levels in the bypass drop in the spring, water

from the drain can flow by gravity into the bypass. Gilsizer Slough carries stormwater runoff from most of Yuba City and often floods during the rainy season. High flows from the Gilsizer Slough and Drain can backup into the North Drain, but water from the North Drain that doesn't go into the bypass can flow into Gilsizer Slough (Russell 1998).

Due to the presence of levees along the bypass and the Sacramento and Feather Rivers, the project area is designated as being in Flood Zone X on the Federal Energy Management Agency (FEMA 1990) 100 year flood plain designation maps. Areas designated Zone X are defined, in part, as "...areas protected by levees from 100-year floods." Catastrophic flooding has occurred a number of times in Sutter County over the last 50 years. The worst flooding on record in the project vicinity occurred in 1955 when flood water in this areas reached 12 feet (Foster 1998). Localized flooding does occur in the project area due to inadequate drainage.

Although groundwater is encountered at the SPP site within ten feet of the surface, the upper most aquifer present at the SPP site is the Victor Formation which is encountered at a depth of 100 to 200 feet (Calpine 1997). This aquifer consists of sands, silts and clays deposited in channel-like patterns that make correlation from one site to another difficult (DWR 1978). Most of the shallow wells present in the project area draw water from this aquifer (Calpine 1997, page 8.14-7). Beneath the Victor Formation at the SPP site is likely either or both the Laguna and Tehama Formations. The Tehama Formation, found mainly on the western portion of the Sacramento Valley, consists poorly sorted gravels, sands, silts and clays derived from erosion of the Coast Range. The Laguna Formation, found mainly on the eastern portion of the valley, consists mainly of sands, silt and clays derived from erosion of the Sierra Nevada. Both formations probably interfinger in the central portion of the valley. Gravel deposits found in both formations are the most productive for groundwater pumping (DWR 1978). Deeper wells, exceeding 200 feet in depth, tap either of these two formations.

Greenleaf 1 pumps approximately 600 gpm from one of two wells located on-site. The North well, drilled to a depth of 290 feet, is the primary water source for the facility (Calpine 1997). The screen interval is from 264 to 278 feet. Water quality from this well is good with total dissolved solids (TDS) less than 200 mg/l. The South well, with casing to a depth of 117 feet and perforations from 97 to 107 feet in depth, serves as a backup. Water quality of the South well is poor due to elevated TDS and other constituents. Several other on-site production wells have been abandoned due to screen clogging or water quality concerns. In addition there is a potable water well and four monitoring wells on-site (Calpine 1997). The monitoring wells are 20 feet in depth.

IMPACTS

PROJECT SPECIFIC IMPACTS

Erosion and Sedimentation

Activities associated with facility construction will require significant site alteration through grubbing, excavation, grading, and other earth moving activities. Removal of protective vegetation and disturbance of the soil surface structure leaves the soil particles vulnerable to detachment by rainfall. Grading activities may result in soil compaction which increases stormwater runoff velocities, allowing more soil particles to be entrained in the runoff and carried off-site. Alteration of natural drainages may cause runoff to cross exposed surfaces leading to increased erosion. Sediment carried off-site is deposited in adjacent water bodies. This may reduce drainage capacity leading to flooding or degrade sensitive biological habitats, such as vernal pools. Erosion is also a significant concern where construction of linear facilities crosses natural and man-made drainages. As discussed above, all of the soils affected by project elements have a slight to moderate water erosion hazard. Once all vegetation is removed, however, all soils affected by the project should be considered highly vulnerable to erosion. Dewatering activities associated with power plant and gas line construction may also lead to erosion.

Calpine (1997, page A-6) intends to import sufficient fill to raise most of the site five feet to reach a nominal finished grade of 43 feet. Exposed berms and spoil piles are especially vulnerable to water erosion.

During project operation, wind and water action can continue to erode unprotected surfaces. An increase in the amount of impervious surfaces will increase runoff, leading to the erosion of unprotected surfaces. The applicant (Calpine 1998f, data response no.33) has provided a draft Erosion Control and Revegetation Plan that identifies temporary and permanent erosion control measures. This plan is discussed further below. Furthermore, the applicant will have to prepare and implement a stormwater pollution prevention plan as required under the General Construction Activity Stormwater Permit (General Permit No. CAS000002) issued by the State Water Resources Control Board. This general permit requires the development and implementation of best management practices during construction to ensure that no contaminated stormwater leaves the project site.

Once the project is operating, the site will be mainly covered with impervious surfaces. Side slopes will either be paved or vegetated to protect them from erosion. Site drainage will be channeled to the southwest. Stormwater runoff will be routed from the site through the series of field drains to the North Drain and the Sutter Bypass as discussed above. Calpine will have to prepare and implement a stormwater pollution prevention plan as required under the General Industrial Activities Stormwater Permit. This general permit requires the development and implementation of best management practices during operation to ensure that no contaminated stormwater leaves the project site.

Calpine has applied for a Army Corp of Engineers (ACOE) 404 Permit to allow the filling of 5.83 acres jurisdictional wetlands (Calpine 1998s). This permit allows the discharge of fill material into wetlands with ACOE (1997) approval. Calpine will provide

off-site mitigation to compensate for the loss of these wetlands. To protect the remaining on-site wetlands, Calpine is proposing a protection plan that includes mitigation and monitoring measures (Calpine 1998s). For further discussion of wetland issues, see the Biological Resources section.

Construction of the natural gas pipeline will required NWP No.12 to be obtained from the ACOE. NWP No.12 addresses all discharges into waters of the U.S. of fill or dredged material associated with excavation, backfill or bedding activities for utility lines, as long as there is no change in preconstruction contours and less than three acres are disturbed (ACOE 1997). Although the utility will bore under any channel wider than 20 feet, some activity within channels constituting waters of the U.S. will be necessary, triggering the need for this general permit. Such channels may be man-made but are connected to a natural drainage. No dredging or fill activities are anticipated for the transmission line (Calpine 1997). In addition, since the total area disturbed during gas pipeline construction will exceed five acres, a stormwater pollution prevention plan as required under the General Construction Activity Stormwater Permit issued by the State Water Resources Control Board will have to be prepared and implemented.

Water Supply

The project's water supply will be provided from three on-site wells (Calpine 1997, page 2-15) . One well would serve as a backup while the other two would provide water at a rate of approximately 3,000 gallons per minute (gpm). Total average daily water requirements is estimated by Calpine (1997, page 2-15) to be 4.336 million gallons per day (mgd). The majority of this water, approximately 96 percent, is for the circulating water system makeup. See Table 2.2-1 in the AFC (Calpine 1997). Although the turbines may not be operating all the time, water will probably be circulating continuously through the cooling towers to dissipate the heat. Therefore, groundwater pumping will be required throughout the year. Calpine (1997, page 2-16) identified maximum project water demand as 6.353 (mgd). Maximum water demand will occur if the facility operates at full load with duct firing and steam augmentation. Therefore, based upon these assumptions, average and peak annual SPP water demand is 4,856 and 7,115 acre feet (af), respectively.

The water will be treated with sulfuric acid and an organic phosphate solution to prevent scaling and with sodium hypochlorite to prevent biofouling. A proprietary scale inhibitor will also be added. Makeup water for the heat recovery steam generators (HRSGs) will receive additional filtration, demineralization and chemical treatment. Recoverable water cycled through the HRSGs, combustion turbines, oil/water separator and neutralization facility will be routed to the cooling tower makeup flow. Cooling tower makeup water will be cycled through the facility twice.

To determine the potential for groundwater impacts, Calpine (1997; 1998f,g) used a mathematical model to predict potential groundwater drawdown resulting from the project. As noted above, the project intends to use three wells, one serving as a backup. In the model, however, it was assumed that all the water would be pumped

from one well to provide a worse case analysis. The effects of one well will be greater than those resulting from the pumping of two wells. This one well is assumed to be in the northeast corner, closest to neighboring private wells. Other assumptions are based upon information from the Department of Water Resources (1978) and information from the existing wells on-site. The analysis identifies that, due to the high aquifer transmissivity present beneath the site, the groundwater drawdown will only be slightly more than one foot at the project boundary and less than 0.25 foot at the nearest neighboring well. A steady state condition would develop at the northeast corner of the 77 acre parcel within 25 days. A steady state condition refers to the fact that water moving in equals the amount being extracted.

An associated issue is the potential that groundwater pumping may pull in brackish water, contaminating domestic and agricultural wells in the area. As noted above, the hydrogeology of the project vicinity is a complex series of groundwater bearing strata, mainly sands, interspersed with intervening aquitards, mainly clay lenses. In addition, poor quality water is apparently also found at varying depths in the area. Given the lack of detailed information on groundwater quality in the project vicinity, there is a potential that the project may cause a significant impact to groundwater resources. Of particular concern is the potential for significant impacts to shallow, domestic wells found in the area.

Alternatives sources of water or cooling technologies have been evaluated by Calpine to address potential impacts from groundwater pumping. Use of tertiary effluent from the Yuba City wastewater treatment plant was considered by Calpine (1998f, data response No.42) as a cooling water supply, but was considered not feasible at this time because of cost, permitting delays associated with the need for a new eight mile pipeline and the lack of impacts associated with the use of groundwater. Expansion of the facility to provide tertiary treated effluent is being considered by the city (Lewis 1998). Tertiary treatment of effluent is necessary before it can be used in cooling towers. Calpine has indicated a willingness to consider this source of cooling water in the future. Also considered by Calpine (1998f, data response Nos. 41) to reduce water consumption is the use of different cooling technologies. One alternative technology considered by Calpine is dry cooling, which relies on fans to provide cooling and uses essentially no water. Also considered by Calpine (1998f, data response No.41) is the technology know as wet/dry cooling which involves a combination of normal (wet) and dry cooling technology. Water reduction from this alternative ranges from 25 to 50 percent in the configurations considered by Calpine. Both alternative cooling technologies involve considerable expense.

Calpine (1998h), to address concerns about potential effects of the project on groundwater supply and quality, is proposing to use a 100 percent dry cooling technology. This will reduce the project's average water demand by over 95 percent, from slightly more than 3,000 gpm to 140 gpm (Calpine 1998q). As shown in the revised preliminary plant water balance, average daily flows will be 60,000 gallons per day (gpd) and peak flows to be 318,000 gpd (Calpine 1998q). The annual water demand of the project based upon average operating conditions, therefore will be reduced from 4,856 acre feet to 67 acre feet, while annual demand based upon peak

operating conditions, will be reduced from 7,115 acre feet to 356 acre feet. Since the project will not be operating at peak levels a significant portion of the time, Calpine (1998q) estimates that annual groundwater pumping will be approximately 225 acre feet.

Reduction of the project's annual water demand to 225 acre feet minimizes the potential for impacts to groundwater resources. Staff agrees with Calpine's contention that project water demand would not significantly lower groundwater levels. Given the mitigated project's drastically reduced water demand and the high storage capacity and transmissivity of the aquifer at the project site, the resulting drawdown will be minimal and limited to the immediate vicinity of the well. Staff does not anticipate any significant impacts to neighboring wells.

Wastewater Discharge

Calpine (1998k) has identified the anticipated chemical composition of the various liquid waste streams prior to their combination in the project's wastewater discharge. These chemical compositions are based upon water quality from two existing wells at the site. The South Well is used as a backup for the Greenleaf 1 facility. The water quality of this facility is poor, with total dissolved solids (TDS) as high as 900 mg/l (Calpine 1997, page 8.14-10). The other water source is a new well referred to as SPP 1. The water quality of this well is good, with TDS levels of approximately 300 mg/l (Calpine 1998k, data response no. 68). Average anticipated wastewater flows from the proposed facility are 1.952 mgd, approximately 3 cubic feet per second (cfs); peak discharge is 2.832 mgd, approximately 4.3 cfs (Calpine 1997, Figure 2.2-6).

The effluent will be discharged from the facility at the southwest corner of the power plant and flow by gravity through 3.5 miles of field drains from the SPP site to the North Drain, emptying into the Sutter Bypass through Pumping Plant #2 (See PROJECT DESCRIPTION, Figure 1). At this point water in the North Drain flows by gravity into the Sutter Bypass if flows there are low. If flows are high enough, water from the North Drain is pumped into the bypass. The bypass flows south to the Feather River in the vicinity of the community of Nichols. As noted above, during high flows, the bypass is used by anadramous fish species to reach Butte Creek via Butte Slough. See the Biological Resources section for further discussion of this issue.

Natural constituents occurring in the groundwater are concentrated through the cycling of water through the cooling tower and other processes. Groundwater quality from existing wells, as noted above, varies. Groundwater quality from wells on-site are identified in the AFC and in several data responses (Calpine 1997, 1998f, j). Data provided thus far on the quality of the ground water have been inconsistent. For example, zinc and copper concentrations have been reported as 0.06 and 0.02 ppm, respectively (Calpine 1997, Table 8.14-2), not detected (Calpine 1998c, Data Response 26), and 0.060 ppm (Calpine 1998e, Data Response 68). Concentrations of arsenic have been reported as 0.022-0.055 ppm (Calpine 1997, Table 8.14-2), 0.051 ppm for SPP Well 1 (Calpine 1998e, Data Response 68), 0.060 ppm for South Well (Calpine 1998d, Data Response 66). Data response 68 (Calpine 1998c,,j) provides

estimated water quality parameters for the individual waste streams within the power plant and the wastewater to be discharged. The quality of the waste streams was provided based upon water from the SPP1 and South Wells. The water quality from South Well is significantly poorer than water from SPP1, thus providing a range to describe the likely quality of the wastewater. This response, however, omitted some information on several of the contaminants of concern likely to be present in the wastewater. For example, arsenic and boron were not identified for the wastewater streams from the South Well, which may represent a worst case situation for these two constituents.

The chemical and physical characteristics of the wastewater could exceed water quality standards and impact aquatic resources, drinking water and water treatment facilities (California Urban Water Agencies 1998). The proposed project will be required to receive a National Pollutant Discharge Elimination System (NPDES) Permit. Calpine has applied for this permit (1997; 1998f). As part of this permit, Calpine has proposed a package wastewater treatment facility to treat sanitary wastes. Due to the high groundwater levels present at the site, a septic system is not feasible.

Of special concern are the metals, total organic carbon (TOC), and the TDS present in the wastewater. Based upon levels detected in the groundwater, the following metals are of concern: arsenic, boron, copper, manganese and zinc. To address the potential for surface water contamination from these metals, TOC and TDS, Calpine (1998g) conducted a mass balance analysis to determine water quality changes in the field drains, the North Drain, the Sutter Bypass, and the Sacramento River. The SPP effluent will be mixed with discharge from Greenleaf 1 and, from the spring to the fall, irrigation water. In the winter, the effluent and stormwater runoff from the two power plants in the field drains will be mixed with stormwater runoff from adjacent fields. Maximum wastewater discharge from the Greenleaf 1 facility is 0.22 mgd. The North Drain drains a significant area to the north of the project sites. See the discussion under drainage below.

Of the metals of concern, only arsenic, manganese and copper were modeled. The other metals were not analyzed because they were not detected in samples from the SPP 1 Well. The detection limits used to sample the groundwater for some of these metals (cadmium, chromium, copper, and mercury), however, were higher than standards listed by the Environmental Protection Agency's National Water Quality Criterion for the Protection of Freshwater Organisms. Thus, the detection limits are not sensitive enough to determine potential impacts to aquatic biota. It is also clear that the most conservative values for several of these constituents (e.g. zinc and manganese) were not used. Data from samples taken from the South Well, were consistently higher than those taken from the SPP 1 Well. Information on the water quality of the South Well was provided in data responses numbers 67 and 68 to provide a worse case, yet were not used in the analysis.

Another concern is that the flow values used to calibrate the modeling do not represent a reasonable worse case analysis. Flow measurements used for the water quality analysis for metals were taken in May when flows in the field drains were high

due to storm water runoff and/or irrigation return water (Russel 1998). For example, flows half way down the field drains were calculated at 13.7 cfs (Foster-Wheeler 1998c). It appears that during the portions of the Fall, the only flow present within the field drains is wastewater from Greenleaf 1. Since the proposed project's wastewater discharge flow was calculated to be 2.6 cfs, a significant amount of dilution was provided in the modeling analysis. Given the large amount of dilution assumed in the modeling, the results still indicate that the wastewater discharge would approach or exceed the aquatic life standard for both copper and arsenic (Foster-Wheeler 1998c). Given concerns about the endangered giant Garter Snake, staff concluded that the discharge could cause a significant impact to this species. For further discussion of this issue, see the Biological Resources section.

Paul Russel (1998) of the Sutter Extension Irrigation District feels that the culverts where the field drains run beneath the district's laterals need to be expanded to accommodate the Sutter Power Project's peak wastewater discharges and stormwater runoff. Calpine also needs to indicate whether it has established access to these field drains or at least the status of its efforts to do so.

The temperature of the wastewater will be elevated; Calpine (1997) estimates the temperature of the effluent in the summer to be as high as 92^0F., in the winter 72^0F Thermal effluent may adversely impact biological resources as well as violate water quality standards. Water quality objectives for warm interstate waters prohibit thermal waste discharges greater than 5^0F. above the natural temperature of the receiving water (State Water Resources Control Board 1971). For Greenleaf 1, the compliance point for this standard is in the North Drain, 500 feet downstream from the confluence with the field drains.

The applicant used an instream water temperature model, the Stream Network Temperature Model (SN-Temp) to determine thermal increases in the receiving waters. This model incorporates the effects of climate, shading, channel morphology as well as discharge and receiving water temperature (Calpine 1998f, data response no. 36). The model analyzed temperature changes in April, July and October with meteorological data reflecting drought conditions (Foster-Wheeler 1998b). Flow data, however, was taken in the spring of 1998 when flows were high due to stormwater runoff and/or irrigation return flows. Therefore, staff did not consider this a worse case analysis. The modeling results indicated that temperature increases in the North Drain would be approximately 0.9^0 F. in April and October and 0.2^0F. in July (Foster-Wheeler 1998b). Although this temperature increase would not exceed water quality standards, the U.S. Fish and Wildlife Service requested that there be no temperature increase in the North Drain from the proposed project's wastewater discharge.

Calpine (1998f, data response No.38) identified potential wastewater treatment or pre-treatment options to reduce contaminant concentrations in the discharge. In addition, Calpine considered discharge of the wastewater to the Yuba City wastewater treatment plant. This disposal alternative would require a new pipeline representing addition cost and delay for the project.

Calpine (1998q), to address concerns regarding wastewater discharge, is proposing as a mitigation measure that SPP be a zero effluent discharge facility. Use of dry cooling technology removes the need to dispose of cooling tower blowdown, which represented the major portion of the wastewater discharge stream. Remaining wastewater flows, including boiler blowdown and sanitary waste from the package sewage treatment plant also will not be disposed of as originally proposed. These flows, including wastewater from the oil/water separator, filter backwash, HRSG blowdown, sanitary wastes and evaporative cooler blowdown, will be directed to a waste treatment basin. After treatment to remove suspended solids, this water can be recycled (Calpine 1998q).

Calpine (1998q) has identified three approaches to dispose of the concentrated brine from the evaporator. This brine is high in TDS, ranging from 5,000 mg/l to 120,000 mg/l. Flows of this waste stream are estimated to be 1,000 gpd for average conditions to 4,500 gpd under peak conditions. The three potential disposal options includes use of an evaporation pond, a crystallizer or trucking the brine off-site. The evaporation pond would be sized to accommodate the wastewater flow and rainfall incident on the pond. Such an evaporation pond will require a Waste Discharge Requirement issued by the Central Valley Regional Water Quality Control. Generally, such ponds are required to be lined and have leechate collection and monitoring systems. A crystallizer works as an evaporator to distill off the water, which can be reused, leaving a precipitate which can be disposed off-site in the appropriate landfill. See the Waste Management Section for further discussion of this topic. Off-site disposal would require a tank with several days capacity to hold the brine before being trucked off-site.

The only flows that will be discharged to surface water will be stormwater runoff, which is discussed below. Stormwater will not be discharged to the evaporation pond if that option for evaporator brine disposal is selected.

Measures to ensure that contaminated stormwater runoff is not discharged off-site have been proposed by Calpine (1997). These include an oil/water separator and the placement of impervious surfaces and berms around storage tanks to contain spills. As noted above, the project will have to operate under the provisions of the Industrial general Stormwater Activity Permit. This permit requires the preparation and implementation of a stormwater pollution prevention plan to ensure contaminated runoff is not discharged off-site. A site specific NPDES permit to discharge process wastewater will now not be required.

Drainage and Flooding

The proposed project is located in Zone X which is defined by the Federal Emergency Management Agency (FEMA) as an area protected from the 100-year flood by levees. Calpine (1997) estimates that flooding at the SPP site due to levee failure or overtopping during larger storms could inundate the site with six to eight feet of water.

There is no way to accurately estimate the extent of flooding due to levee failure. Given the large area that would likely be flooded given a major leave failure or overtopping, increasing the site elevation by five feet should not significantly increase flood levels elsewhere.

Calpine (1997, 1998f, data response no. 34) indicates site storm drainages facilities will be designed to handle flows resulting from a 50-year, 24-hour rainfall. Sutter County General Plan Policy 3.D-1 requires that all new development outside the Special Flood Hazard Area as defined by the Federal Emergency Management Agency (FEMA) be protected from a 50 year storm event (Sutter County 1996).

As noted above, the stormwater runoff will be discharged from the facility at the southwest corner of the power plant and flow by gravity through 3.5 miles of irrigation canals from the SPP to the North Drain, emptying into the Sutter Bypass through Pumping Plant No. 2 (See Project Description Figure 1). This system of field drains currently carries wastewater from the Greenleaf 1 Powerplant to the North Drain as well as seasonal flows of irrigation water and stormwater runoff. As noted above, the field drain system parallels and crosses several Sutter Extension Irrigation District laterals. Where the field drains cross the laterals, the drain flows are routed through culverts underneath the irrigation laterals. The North Drain carries flows from the Live Oak Canal and the Snake River which drain areas to the north of the project site. The Snake River flows into the drain approximately four miles north of the drain's terminus at Pumping Plant No. 2 at O'Banion Road. The Live Oak Canal flows into the North Drain approximately three miles north of the pumping plant. The design capacity of the North Drain is 450 cfs (MHM 1995).

At Pumping Plant No. 2, the North Drain meets the Gilsizer Drain (also known as South Drain), a canal which conveys flows from Gilsizer Slough to Pumping Plant No. 2. A weir separates the two drains and water in the North Drain can flow into Gilsizer Drain, contributing to flooding problems in the Gilsizer Slough area. Gilsizer Slough handles most of the stormwater runoff flows from Yuba City and has had extensive flooding problems in recent years.

Pumping Plant No. 2 has six pumps, two for the North Drain and the remaining four for the South Drain (MHM 1995, Dickerson 1998). Pumping of water from the North Drain into the Sutter Bypass begins when the water elevation within the drain reaches 32.0 feet. Based upon the design capacity of the North Drain and the two pumps, MHM (1995) estimates that the pumping capacity for the North Drain is 405 cfs. MHM (1995; Table 8.2) estimates that flows under existing conditions for a ten year storm would be approximately 400 cfs in the North Drain at Pumping Plant No. 2, essentially the pumping capacity of the drain. For the 100 year storm, MHM (1995) estimates that under existing conditions for a 100 year storm, flows would reach 900 cfs, greatly exceeding drain capacity. MHM (1995) estimates that under future conditions, the 100 year storm could generate flows of 1550 cfs.

In light of these constraints, it is likely that stormwater runoff from the proposed project site, generated by 10-year or greater storms, will need to be retained on-site until the

discharge does not contribute to drainage problems at the North Drain or adjacent drainages. Retention on-site of stormwater from a 10-year or greater storm would need to be continued until the threat of flooding has subsided. This should be done by actual measurement of flows to identify when on-site retention should begin and when it may end.

Paul Russell (1998) of the Sutter Extension Irrigation District feels that the culverts where the field drains run beneath the district's laterals need to be expanded to accommodate the Sutter Power Project's peak wastewater discharges and stormwater runoff. Although there will be no wastewater discharge from the project, a need to evaluate the ability of these drains, especially where they cross the irrigation canals is necessary.

Sutter County (Carpenter 1998; Gault 1998b) and CEC staff (Richins 1998) have requested Calpine to demonstrate that it has established access to use these field drains for stormwater discharge. Calpine has not responded to these requests. In addition, Sutter County (Gault 1998b) is requesting that Calpine, to be consistent with requirements for other development within the county, receive approval of the proposal from all public and private downstream entities that own or maintain these drainage facilities.

Therefore, staff is recommending that prior to certification, Calpine indicates whether it has established access to these field drains for stormwater discharge. Staff is also recommending as a condition of certification that prior to construction, Calpine conduct a field study to evaluate the ability of the drainage system to accommodate stormwater runoff flows from the project and to identify and implement any improvements necessary to the system.

CUMULATIVE IMPACTS

SPP, with the proposed mitigation should not contribute to adverse cumulative impacts to groundwater supplies, drainage and flooding, and water quality.

FACILITY CLOSURE

Typically, closure raises concerns in regard to potential erosion. Since, however, there should be no significant cut and fill slopes vulnerable to erosion, this is not a significant concern for the project. In addition, groundwater wells to be used by the project will be closed following DWR procedures, minimizing groundwater contamination and safety issues.

MITIGATION

Calpine (1998f, data response no. 33) has submitted a draft Erosion Control and Revegetation Plan. This plan addresses both the power plant and the switchyard. Erosion control measures for the linear facilities associated with the project are identified in the AFC and subsequent filings (Calpine1997, page 8.9-20-22; 1998h).

The draft Erosion Control and Revegetation Plan identifies both temporary and permanent erosion control measures for both construction and operation of the project. Temporary construction measures are intended to control the flow of stormwater runoff across disturbed areas. Temporary drainage facilities will be sized to accommodate a 10-year, 24 hour storm (Calpine 1997, page A-6). To ensure sediment does not leave the site, silt fences, straw bales and sandbag dikes will be used. Dust control will be also used to minimize PM_{10} For further discussion of this issue see the Air Quality section.

The plan also proposes revegetation of certain disturbed areas. Revegetation would be achieved through the application of a grass-wildflower seed mix. The seed bed will be prepared prior to the application of the seed mix. The seed mix may be manually applied or through hydroseeding. Fertilizer, tackifier, mulch and slope stabilizers may be used as necessary. Monitoring and restoration, if necessary, will be conducted for five years following seeding.

Calpine (1997, page 8.9-22) indicates that construction of the gas line through the Sutter Bypass will probably not occur during the rainy season-Nov. 15 to April 15. If appropriate, disturbed areas in the bypass will be revegetated as soon as possible. Soil piles will be stabilized and/or covered if left on-site for long periods of time. Sediment barriers will be used to prevent sediment moving into adjacent water bodies and sensitive habitats such as wetlands. For the transmission line, a crane will be use to set the towers and a helicopter will be used to string the conductors (Calpine 1998h, page S-38).

Calpine (1997, page 8.14-36) has prepared and submitted a stormwater pollution prevention plan as required under the General Construction Activity Stormwater Permit issued by the State Water Resources Control Board (Wardlow 1998). In addition, a seperate permit may be necessary for the natural gas pipeline and the transmission line.

Water quality mitigation measures include secondary containment berms around all chemical storage facilities to control accidental discharges (Calpine 1997, page 8.14-33). In addition, SPP will comply with NPDES permit requirements for wastewater and storm water discharges during operation. The permit will include wastewater discharge standards for constituents of concern and monitoring measures to insure compliance with these standards.

Calpine (1998q) has proposed additional mitigation measures which make the project a zero discharge facility. Therefore, only stormwater runoff would be discharged from the facility. These measures include either the use of a crystallizer, an evaporation pond or trucking off-site the evaporator brine. Other wastewater streams will be treated on-site, with clean water recycled within the facility and solids disposed of in an appropriate landfill. Therefore, an NPDES permit for wastewater discharges will not be required. If an evaporation pond is the selected disposal method for evaporator condensate, a Waste Discharge Requirement (permit) will be required from the Regional Water Quality Control Board.

To address concerns about potential impacts to groundwater supplies during project operation, Calpine has proposed a groundwater monitoring plan that will identify changes in groundwater levels and quality on and off the project site (Foster Wheeler 1998a). The plan identifies a program using six monitoring wells, two on-site and the remaining four within a two mile radius of the Calpine property boundary. Monitoring wells would be approximately 200 feet deep. Calpine (1998g) has proposed additional mitigation in which the project 100 percent dry cooling technology, reducing project groundwater demand by 95 percent.

Since Calpine (1998q) is proposing as mitigation the use of dry cooling, which drastically reduces project water consumption. Average annual groundwater demand for the project has been reduced to 225 acre feet. Staff concludes that this measure mitigates potential significant impacts to groundwater and is not recommending that Calpine implement the groundwater monitoring plan. Staff is recommending that Calpine do provide water consumption amounts, groundwater levels and total dissolved solids (TDS) concentrations to provide information about groundwater conditions at the project site. In addition, the staff recommends a general condition that requires Calpine to participate in resolving complaints from neighbors. This condition will allow any property owners in the project vicinity to file a complaint with the CEC over any groundwater impacts potentially caused by the project.

Therefore, staff's recommended conditions of certification are to ensure implementation of Calpine's recommended mitigation measures and to address neighboring property owners concerns about groundwater impacts of the proposed project as well as Sutter County concerns about drainage.

COMPLIANCE WITH APPLICABLE LAWS, ORDINANCES AND STANDARDS

For soil and water resources, the proposed project should comply with all applicable laws, ordinances and standards. With adoption of Calpine's (1998g) recently proposed mitigation measure of zero discharge of all process wastewater, a project specific NPDES permit is not required. As noted above, however, the project will be required to operate under the requirements of the general NPDES permits regulating the discharge of stormwater runoff during project construction and operation and the discharge of incidental wastewater during pipeline construction and testing. In addition, if Calpine selects the use of an evaporation pond to dispose of evaporator brine, a Waste Discharge Requirement will need to be issued by the RWQCB.

CONCLUSIONS AND RECOMMENDATIONS

The SPP is not likely to cause significant impacts to soil resources through erosion and sedimentation. With Calpine's (1998q) recommended mitigation, staff concludes that the project will not significantly impact groundwater quantity nor groundwater and surface water quality. Staff recommends that the proposed project be approved with the recommended mitigation measures. Staff does request that Calpine identify the method of disposal for evaporator brine prior to certification and identify the method of on-site retention for stormwater runoff.

CONDITIONS OF CERTIFICATION

SOIL&WATER-1 The Sutter Power Project will utilize a 100 percent dry cooling technology. Wet or wet/dry cooling technology will not be used.

Verification: Once operation has begun, the Calpine shall provide to the CPM in the annual compliance report, a record of the average month groundwater consumption, the monthly average groundwater levels as measured in the project well(s), and the monthly average total dissolved solid (TDS) concentration in the project water supply.

SOIL&WATER-2 No project wastewater streams shall be discharged to surface water.

Verification: The volume and method of disposal for all wastewater streams shall be provided to the CEC CPM in the annual compliance report.

SOIL&WATER-3 Prior to the initiation of any earth moving activities, the project owner shall submit a final erosion control and revegetation plan for staff approval. The final plan shall contain all the elements of the draft plan with changes made to address the final design of the project.

Verification: The final erosion control and revegetation plan shall be submitted to the CPM for approval at least 30 days prior to the initiation of any earth moving activities.

SOIL&WATER-4 Prior to beginning any clearing, grading or excavation activities associated with construction of the power plant, transmission and gas lines, the project owner must submit a notice of intent to the State Water Resources Control Board to indicate that the project will operate under provisions of the General Construction Activity Storm Water Permit. As required by the general permit, the project owner will develop and implement a Storm Water Pollution Prevention Plan (SWPPP).

Verification: At least two weeks prior to the start of construction, the project owner will submit to the CPM a copy of the Storm Water Pollution Prevention Plan (SWPPP) for review and approval. This includes SWPPPs developed for all linear facilities.

SOIL&WATER-5 The project owner shall submit to the California State Water Resources Control Board a notice of intent to comply with the provisions of the General Industrial Activities Storm Water Permit. The project owner shall develop and implement the required Storm Water Pollution Prevention Plan.

Verification: At least thirty 30 days prior to operation, the project owner shall submit to the CPM a copy of the Storm Water Pollution Prevention Plan that was prepared.

SOIL&WATER-6 The project owner shall provide on-site retention of stormwater during periods of high runoff to ensure that the project will not contribute to drainage problems. Periods of high runoff shall be considered 10-year, 24-hour storms or greater. The project owner shall prepare a report evaluating potential effects of stormwater runoff from the project site on downstream drainage facilities. Specifically, this report shall identify the volume of runoff anticipated from the proposed site for a 50-year, 24-hour storm, how this runoff will be accommodated on-site and the ability of the field drains, the North Drain and Pump Plant No. 2 to accommodate these flows, especially during 10-year, 24-hour or greater storms. The plan shall identify any improvements needed to be made to these facilities to ensure their ability to accommodate stormwater flows from the project. The plan shall also verify that the project's use of these drainage facilities and any necessary improvements to them has been approved by all public and private entities that own and/or are responsible for the operation and maintenance of all downstream drainage facilities affected by project runoff.

Verification: Thirty (30) days prior to the start of construction, the project owner shall submit for review and approval to the CEC CPM and the Sutter County Department of Public Works the proposed drainage plan.

SOIL&WATER-7 If an evaporation pond is the method selected for evaporator brine disposal, the project owner shall submit to the CPM a copy of the Report of Waste Discharge at the same time it is submitted to the Central Valley Regional Water Quality Control Board (RWQCB) as part of the application for Waste Discharge Requirement. The project owner shall provide a copy of the approved Waste Discharge Requirement to staff and notify staff of any changes to the permit.

Verification: Within thirty (30) days of applying for a Waste Discharge Requirement (WDR) to the Central Valley Regional Water Quality Control Board (RWQCB), the project owner shall submit to the CPM a copy of all information submitted to the RWQCB. The project owner shall submit to the CPM a copy of any additional information the RWQCB staff requires to make the application complete. The project owner shall submit to the CPM a copy of the RWQCB approved permit thirty (30) days after receipt from the RWQCB. The project owner shall notify the CPM in witting of any proposed changes to the WDR, either initiated by the project owner or by the RWQCB.

REFERENCES

Army Corp of Engineers. (ACOE). 1997. Final Public Notice for Revised Nationwide Permits. January.

Bechtel Power Corporation. 1984. Environmental Information Document. Greenleaf Unit No. 1, Sutter County, California. Feb.

California Urban Water Agencies. 1998. Letter to Paul Richins, California Energy Commission regards data adequacy for the Sutter Power Project. January 6.

Central Valley Regional Water Quality Control Board. 1994. Water Quality Control Plan (Basin Plan). Sacramento River and San Joaquin River Basins. Third Edition.

County of Sutter. 1996. General Plan 2015 Policy Document. Community services Department. November.

County of Sutter. 1996. Draft Environmental Impact Report. General Plan 2015. Community Services Department.

Department of Water Resources. (DWR). 1978. Evaluation of Groundwater Resources: Sacramento Valley. Bulletin 118-6. August.

Department of Water Resources. (DWR). 1992. Historic Groundwater Levels in Sutter County. Central District. February.

Department of Water Resources. (DWR). 1994. Butte and Sutter Basin Water Data Atlas. Northern District. February.

Dickerson, Ken. 1998. Assistant Supervisor, Department of Water Resources. Telephone conversation with Joseph O'Hagan (California Energy Commission), June 22.

Gault, Leslie. 1998a. Associate Engineer, Sutter County Department of Public Works. Telephone conversation with Joseph O'Hagan (California Energy Commission), various.

Gault, Leslie. 1998b. Associate Engineer, Sutter County Department of Public Works. Fax communication to Joseph O'Hagan (California Energy Commission), October 12, 1998.

Lewis, William. 1998. Yuba City Utilities Director. Comments at Data Response Workshop. March 31.

National Oceanic and Atmospheric Agency. 1973. Precipitation Frequency Atlas of the Western United States.

Russell, Paul. 1998. General Manager, Sutter Extension Water District. Telephone conversation with Joseph O'Hagan (California Energy Commission), June 10.

Soil Conservation Service. 1988. Soil Survey of Sutter County, California.

State Water Resources Control Board. (SWRCB). 1971. Control Plan for Temperature in Coastal and Interstate and Enclosed Bays and Estuaries in California (Thermal Plan)

Wardlow, C. 1998. Calpine Corporation. Personal communication at the August 4 workshop.

PALEONTOLOGIC RESOURCES

Testimony of Kathryn M. Matthews

INTRODUCTION

This analysis discusses paleontologic resources which include the fossilized remains or trace evidence of prehistoric plants or animals preserved in soil or rock. Paleontologic resources are considered non-renewable resources, because the plants and animals they represent were extinct long before the present. Fossils are scientifically important because they can be used to document the evolution of particular groups of organisms and to reconstruct the environment in which they lived. Fossils can also be used to date the rocks in which they are found; fossils also can date the geologic events by which the rock units were formed, either by deposition of eroded materials or through deformation by crustal movement.

Paleontologic resources may be found nearly anywhere in California, and they are becoming increasingly vulnerable to the ongoing development and urbanization of the state. Fossil evidence indicates that California has provided a rich and varied environment for numerous species of plants and animals, for millions of years before ancient humans migrated to the state.

Fossil evidence of ancient life-forms and environmental conditions may be found weathering out on the surface due to erosion, or fossils may be buried far beneath the modern-day ground surface. Most often, fossils are found in rock units comprised of sedimentary deposits. Beneath the surface may lie layer upon layer of sediment, each with the potential to produce new information on conditions that existed long before humans arrived in the state. If paleontologic resources and their temporal and spatial context receive proper protection and analysis through project mitigation, these resources can add to the understanding of ancient environments and life forms. Analysis of fossil materials also can provide the single most important key to dating changes in ocean levels or earth movement along fault lines.

Determination of potential impacts to paleontologic resources from the proposed Sutter Power Project (SPP) is required by the Warren-Alquist Act and the Siting Regulations of the California Energy Commission (Energy Commission) and by the California Environmental Quality Act (CEQA). Impacts to paleontologic resources may result either directly or indirectly during pre-construction or construction of the project.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

The following laws, ordinances, regulations, standards, and policies apply to the protection of paleontologic resources in California. Projects licensed by the Energy Commission are reviewed for compliance with these laws.

FEDERAL

Federal protection for significant paleontologic resources would apply to the federally-owned lands within the Sutter National Wildlife Refuge (Sutter NWR). Federal legislative protection for paleontologic resources stems from the Antiquities Act of 1906 [PL 59-209; Title 16, United States Code, § 431-433: 34 Stat. 225], which calls for protection of historic landmarks, historic and prehistoric structures, and other objects or historic or scientific interest on federal land.

- National Environmental Policy Act (NEPA): Title 42 United States Code, § 4321-4327; 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, * 1701-1784; requires the Secretary of 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 [*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].

STATE

- California Environmental Quality Act (CEQA): Public Resources Code sections 5020.1, 5024.1, 21083.2, 21084.1, *et seq*; requires analysis of potential environmental impacts of proposed projects and requires application of feasible mitigation measures.

- California Environmental Quality Act (CEQA) Guidelines: California Code of Regulations, § 15000, *et seq*, Appendix G (j)], specifically defines a potentially significant environmental effect as occurring when the proposed project will "...disrupt or adversely affect...a paleontological site, except as part of a scientific study."

- Public Resources Code, § 5097.5. Any unauthorized removal of paleontologic resources or sites located on public lands 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.

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.

Sutter County

Sutter County has developed specific requirements for the protection of natural resources. If fossil resources were encountered, they could potentially be addressed in goals and policies related to protection of natural resources (Carpenter 1998; Farhar 1998a, 1998b).

Colusa County

Colusa County has no ordinances, plans, or policies specifically related to paleontologic resources (Kelley 1998).

PROFESSIONAL GUIDELINES AND CRITERIA

In 1994, the Society for Vertebrate Paleontology (SVP), a national professional organization, distributed final revisions to a set of draft guidelines that outline acceptable professional practices in the conduct of paleontologic resource surveys, monitoring and mitigation, data and fossil recovery, sampling, preparation, analysis, and curation (SVP 1994). Prior to the adoption of the final guidelines, many practicing professional paleontologists in California had chosen to adhere to the proposed mitigation and monitoring requirements in the guidelines. At the annual meeting in late 1994, the revised guidelines for mitigation were adopted by the membership of the society and published in the society journal (SVP 1995).

In its guidelines for monitoring and mitigation, the SVP established three categories of sensitivity for paleontologic resources: high, low, and undetermined (SVP 1995). Areas where fossils have been previously found are deemed to have a high sensitivity and a high potential to produce fossils. In areas of high sensitivity, full-time monitoring is typically recommended during any project disturbance. Areas that are not sedimentary in origin and that have not been known to produce fossils previously, typically are deemed low sensitivity and monitoring is usually not needed during project construction. Areas that have not had any previous paleontologic resource surveys or fossil finds are deemed undetermined until surveys and mapping is done. After reconnaissance surveys, observation of exposed cuts, and possibly sub-surface testing, a qualified paleontologist can determine whether the area should be categorized as having high, low, or undetermined sensitivity; that is, whether there is a high or low potential to encounter fossil resources (SVP 1995).

ENVIRONMENTAL SETTING

REGIONAL SETTING

The SPP project area is located in the Great Valley Geomorphic Province of California. This valley is generally characterized by broad lowlands that are bounded on the west by the Coast Range and on the east by the foothills of the Sierra Nevada Mountains. The valley is filled with a thick sequence of marine and non-marine sediments that range in age from the Jurassic period [which occurred some 145 million to 210 million years before present (BP)], to some relatively recent sediments that may only be 10,000 years old.

To put these vast time periods into human context for this analysis, we can use a generally-accepted geologic time line. Based on geologic time, we are now living in the Holocene epoch, of the Quaternary period, of the Cenozoic era. The Cenozoic Era began about 67 million years ago, the Quaternary period began about 1.6 million years ago; the Pleistocene epoch began about 3 million years ago and ended about 10,000 years ago (Calpine 1997).

About 26 million years BP, the sedimentary deposits laid down in the valley were continental in origin, produced by erosion of materials from the mountain ranges and by episodes of volcanic activity. In some areas of the Great Valley, the sediments from just the Pleistocene epoch may be as much as 100 feet thick and the overlying recent alluvial deposits may reach as much as 125 feet in thickness. Often the boundaries between these two groups of sediments is irregular and inter-mingled due to crustal movement and directional changes in river channels (Calpine 1997).

The SPP project has been proposed for construction in the northern portion of California's great valley, near the eastern edge of the valley, and east and south of the confluence of the Feather and Sacramento rivers. Refer to **Project Description Figure 1** for a regional map of the project development area. Very little work has been done on the geology in Sutter County. However, mapping studies conducted in the northern Sacramento county area have indicated that remnants of older, Pleistocene river terraces still remain in some areas along the east side of the Sacramento River, occurring as low plains (Calpine 1997).

Within each group of sediments, individual components may be named and identified by certain characteristics that are consistently present in that formation. Within a named formation, there may also be a sequence of rock units that also exhibit relatively consistent characteristics. In the SPP project area, the youngest of the Pleistocene-aged terraces is named the "Modesto Formation" and it is underlain by the next older formation which is the "Riverbank". Terrace remnants in both of these Pleistocene formations have produced large vertebrate fossils during recent construction of local facilities such as the Sacramento airport and the sports arenas (Calpine 1997).

On most large-scale geologic maps, the boundaries between the Pleistocene-aged river terraces and the more recent alluvial deposits are very generalized. Consultants to Calpine suggested in the AFC that a more accurate means of identifying these boundaries is through soil survey maps. In the project area, they found a general correlation between Pleistocene terrace remnants of the Modesto Formation and the Conejo-Tisdale (C-T) soil group. In Sutter County, the soil survey maps show that the C-T group is found on low terraces that form a band running north/south, parallel to the Feather River, and extend along the Gilsizer Slough located south of the SPP project site. In some places the C-T soils are overlain at varying thicknesses by recent alluvial deposits. It is the presence of the Modesto Formation and the C-T soils that have led to the determination that several areas affected by the SPP project have a high sensitivity and may produce paleontologic resources (Calpine 1997; Calpine 1997b).

Pre-AFC Literature and Records Search

Prior to preparation of the AFC, consultants to Calpine reviewed literature and maps at the Sacramento State, U.C. Davis, and U.C. Berkeley universities. Pertinent literature and geologic maps were reviewed for information on fossil resources within and near the project area and to assess the potential to encounter sensitive paleontologic resources in the project area. Results of the literature review were summarized in the AFC and site-specific information was filed with the Energy Commission under separate cover to maintain confidentiality of sensitive resource locations (Calpine 1997).

In July 1997, a record search was conducted by the Curator of Vertebrate Paleontology at the University of California at Berkeley Museum of Paleontology (UCMP). The records indicated there are two fossil localities in the vicinity of the project site and both were found in the older, Pleistocene-age terrace deposits (Calpine 1997*). In one locality, a lower jaw and teeth from a bison were recovered from a depth of about four feet. At the second locality, a partial vertebra was recovered during well drilling at a depth of about 140 feet and was tentatively identified as mammoth (Holroyd 1997).

These finds indicate the potential for fossils to occur in the sediments at or near the surface, as well as deep below the surface. After the record search indicating previous fossil finds, consultants to the project owner indicated that areas potentially affected by project construction met the SVP recommendations for high sensitivity. The consultant recommended continuous monitoring by a qualified professional paleontologist during the project construction in these areas.

Pre-AFC Field Survey

An on-the-ground reconnaissance survey of the project area was conducted by the archeological resource specialists in May and July of 1997. Additional surveys were conducted in September and October 1997 and in March and April 1998. The cultural resource specialists were asked to note any potential fossil materials and record their location for further follow-up. No surface evidence of paleontologic resources were found during the pre-AFC surveys (Calpine 1997).

For the power plant site and switchyard, surveyors walked in parallel transects ten meters apart and, where ground visibility was obscured, they made periodic shovel tests. For the gas and electric transmission routes, each surveyor walked on one side of the access roads, scanning alongside and outward. Where visibility was good, they could see up to twenty meters from the road. But visibility for about 13 percent of the total area potentially affected by the SPP project was fair to poor. Natural and manmade exposures were examined, both for cultural materials, as well as evidence of fossils, on the surface (Calpine 1997).

PROJECT SETTING

The project site is located within a 77-acre parcel that contains an existing power generation project and a food drying plant. The site is relatively level, ranging in elevation 36 to 38 feet above mean sea level. The site is surrounded by lands in agricultural use and there are rural residential units in the vicinity. Generally, the routes for the proposed linear facilities follow local road ways, property lines, or field boundaries to minimize impacts on agricultural use and natural resources (Calpine 1997; 1998a; 1998h). Please refer to the **Project Description** section of this report for a more detailed description of the project and related facilities. Refer to **Project Description Figure 2** for a project site map.

Maps of geologic formations indicate the project site is underlain primarily by recent and Quaternary alluvium with some ridges or terraces of older, late Pleistocene-age sediments. The older sediments are known to have produced fossil materials in recent times. A Pleistocene-age fossil was recovered near the proposed gas pipeline route along Oswald Road, at a depth of about four feet. Maps of the soil types indicate that the project site and portions of the two natural gas pipeline routes are underlain by soils of the Conejo-Tisdale group. The presence of this soils group was deemed to be an indicator that fossil-bearing sediments may be present at, or just below the ground surface (Calpine 1997; 1997c).

Power Plant

The ground surface at the 12-acre power plant site has been disturbed by previous agricultural use and by the construction of the existing Greenleaf No 1 and the food drying plant; there is some vegetation. Pre-AFC geotechnical studies and soil borings, indicate that the site is underlain by a sequence of sedimentary deposits comprised of a varyied mixture of sands, silts, clays, and gravels. Based on the boring logs, Calpine prepared a schematic cross-section of the sediments under the power plant site. The cross-section can provide paleontologists with clues to the boundaries between geologic units, the patterns of sediment deposition, and the possible depth to sensitive resources within the sediments.

Water Supply

The water supply for the SPP project is to be provided by three new wells that are proposed to be drilled within the 12-acre power plant site. A short service pipeline, also within the power plant site would connect the wells with the project (Calpine 1997).

Electric Transmission Line Route(s)

The AFC description of the ground surface along the transmission corridor indicates it is variable - some areas have been previously disturbed and some areas are relatively undisturbed and are covered to varying degrees with vegetation. Portions of the

initially proposed corridor were also crossed by existing high voltage transmission facilities and access roads; other portions of the corridor run parallel to existing local roads. Construction placement of the transmission structures will require drilling of the soil to variable depths for foundation footings for the poles (Calpine 1997).

The corridors for the 4.0-mile transmission route identified in the AFC and for the 5.7-mile route identified in a later supplement to the AFC, generally run along existing roadways, within the rights-of-way that extend about 50 feet on either side of the roadway. During pre-AFC surveys, the center of the roadways was used as the proposed center line for each segment of the proposed transmission line route. The width of the ultimate right-of-way for the proposed transmission line is expected to vary from 100 to 125 feet. Over half of the 4.0-mile transmission route is rated as having high sensitivity for paleontologic resources (Calpine 1997).

As described the May 11th supplement to the AFC, Calpine plans to use tubular poles for the electrical transmission facilities. The AFC supplement indicates that the average span length would be 750 to 800 feet between the poles. Based on this average span length, about 25 poles would be required for the proposed 4.0-mile route and over 35 poles, for the 5.7-mile alternative route. Nearly all of the 5.7-mile alternative route will pass through the remnant river terraces comprised of the Modesto Formation and Pleistocene-age sediments, both of which are rated as having a high sensitivity for paleontologic resources (Calpine 1997).

Natural Gas Pipelines

The AFC and supplements indicate that two gas pipelines will be needed to maintain adequate pressure and supply natural gas to the SPP project. One pipeline will be sixteen inches in diameter and run for about twelve miles, much of it along existing roadways. The second gas pipeline will be four inches in diameter and it will consist of an upgrade of portions of an existing pipe, plus construction of an additional 8,000 feet of new pipe. The ground surface along the gas pipeline route is described as considerably disturbed and much of the alignment is paved or otherwise covered by development.

Portions of the proposed pipeline route are to be bored under the Sutter By-pass levees and channel, and under several of the local sloughs. Other portions of the proposed corridor are crossed by existing high voltage transmission facilities and access roadways. However, about one-quarter of the 16-inch pipeline route will pass through areas along the Sacramento River that have been identified as having high sensitivity for paleontologic resources. Based on previous recorded finds, any undisturbed soils underlying the sensitive portions of these routes may contain fossil resources (Calpine 1997).

IMPACTS

Since project development and construction usually entail surface and sub-surface disturbance of the ground, the proposed SPP project has the potential to adversely

affect paleontologic resources. Impacts to paleontologic resources may result either directly or indirectly during the pre-construction, construction, and operation of the project. 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 are those which may result from increased erosion due to site clearance and preparation.

Based upon the California Environmental Quality Act (CEQA), the Warren-Alquist Act, and Energy Commission siting regulations, the Commission staff must evaluate the potential for significant impacts from a proposed project on significant paleontologic resources. The significance of any fossil materials recovered during project construction is determined by a qualified paleontologic resource specialist, based upon established criteria.

SIGNIFICANCE CRITERIA FOR PALEONTOLOGIC RESOURCES

When a potential for discovery of paleontologic resources has been identified through literature search and reconnaissance surveys, there is a potential for project-related impacts to any resources actually present. However, the potential for discovery does not measure the full significance of individual fossils present, since it is impossible to accurately predict what individual fossils could be discovered. The significance of recovered fossil materials can only be determined after they have been collected, prepared, and studied by professional paleontologists.

Significant paleontologic resources are those that meet established scientific criteria which are generally accepted by professional paleontologists. Nearly all vertebrate fossils are considered to be significant, as well as many invertebrate fossils, footprints and other faunal impressions, and various types of floral impressions and root casts.

The following criteria are considered by professional paleontologists when making a determination of significance for paleontologic materials recovered from areas of fossil-bearing sediments. This list is a combination of criteria published by Repenning (1980) and Petty (1978) and is not arranged in order of significance; resource materials may meet one or more of the criteria. A paleontologic resource (specimen, sample, or deposit) shall be considered significant if it meets any of the following criteria:

- It represents a rare species or one that has not been recorded previously in the literature.

- it illustrates previously unknown sexual dimorphism, phenotypic variation, or an ontogenic series of a given taxon.

- It is from a locality that marks either a geographical or temporal range extension for given species.

- It is exceptional in that it represents an exhibit-quality specimen.

- It represents material that assists in refining the age assignment of an otherwise poorly dated litho-stratigraphic unit.

- It represents a concentration of vertebrate specimens in a bed or series of beds. The sample may include either associated skeletal material referable to an individual or an aggregate of specimens referable to more than one individual. In either case, the material yields potentially significant taphonomic information that can be utilized in paleontologic resource analyses.

- It provides important information of the evolutionary trends among organisms, relating living inhabitants of the earth to extinct organisms.

- It provides important information regarding development of biological communities or interaction between botanical and zoological biotas.

- It demonstrates unusual or spectacular circumstances in the history of life.

- It is in short supply and in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and is not found in other geographic locations.

- All vertebrate fossils are of scientific value.

IMPACTS TO PALEONTOLOGIC RESOURCES

As described in the AFC, the potential for significant project impacts to paleontologic resources is directly related to likelihood that such resources ~~are~~ would be present in areas affected by the project and whether any such resources are actually encountered during project development activities. A determination of the potential for discovery of fossil resources is based on the results of the literature review and field surveys. Basically, the more fossil localities reported from a specific sedimentary deposit in an area, the greater the potential for future discovery in similar sediments. Since the sediments underlying the SPP project site and linear facility routes have a history of producing fossils in adjacent areas, there is an increased potential that fossils would be encountered during project-related site clearance and excavation (Calpine 1997).

Often the potential for fossil materials to be found during project construction activities, remains uncertain until the ground surface has been broken and excavation of sub-surface soils takes place. Staff's objective is to ensure that there will be no adverse impacts to significant paleontologic resources during project development, construction, and operation.

Power Plant

The ground surface at the power plant site has been previously disturbed by agricultural use and by the construction of the existing Greenleaf No 1. To prepare

the site for the project, the existing soil will be excavated, fill materials will be added and then compacted to meet foundation requirements needed to support various generation facilities (Calpine 1997).

Site clearance and grading associated with the power plant site preparation and the excavations and foundation development associated with power plant construction will potentially impact sedimentary deposits known to produce fossil materials. The extent of impact to paleontologic resources will depend on the extent of surface area to be disturbed during site preparation and the depth of excavation into previously undisturbed sedimentary deposits as project foundations are built (Calpine 1997).

Water Supply

The proposed project water supply would be drawn from three wells that are to be drilled within the 12-acre power plant site. Any pipeline would also be routed within the project site. The wells would be drilled within the same geologic formation and sediments as the power plant so the potential for impacts would be virtually the same and would be subject to the same monitoring and mitigation requirements (Calpine 1997).

Electric Transmission Line Route(s)

The AFC description of the ground surface along the transmission corridor indicates it is variable - some areas have been previously disturbed, while some areas were undeveloped and are covered to varying degrees with vegetation. Construction of foundations for the transmission structures will require drilling of the soil to variable depths for each power pole. The depth of soil disturbance will depend on the height and diameter of the individual poles designed for each portion of the route. The width and extent of surface soil disturbance would depend upon the size of equipment needed to set and erect the poles (Calpine 1997).

Most of the 4-mile route proposed for construction of the electric transmission lines is generally underlain by Pleistocene-age remnant terrace deposits and sediments known to have produced fossil materials. While no surface evidence of fossil materials was observed during pre-AFC surveys of the proposed transmission route, construction in this route would encounter the inter-mingled mix of fossil-bearing sediments identified in the literature and records searches. The major portion of this route crosses through open lands that have experienced episodic flooding and inundation over the surface, with little or no disturbance below the surface (Calpine 1997).

In the May 1998 supplemental filing, Calpine discussed a 5.7 mile alternative transmission route. The majority of the alternative transmission route is generally underlain by sedimentary geologic units similar to those underlying the SPP project site and the transmission route described in the AFC. No surface evidence of fossils was observed during the surveys for the alternative route for the transmission line.

With the local history of agricultural use, the depth to undisturbed layers of sediments underlying the alternative route is unknown.

Where not previously disturbed, the underlying remnant Pleistocene terrace sediments have an increased potential to produce fossil materials. The sediments underlying nearly all of the alternative transmission routes meet the SVP criteria for high sensitivity, but the potential for impacts cannot be fully evaluated until the sub-surface soils are excavated for foundation footings and the soils are examined for evidence of fossil materials.

Natural Gas Pipelines

The ground surface along the two gas pipeline routes is described as considerably disturbed and much of the alignment is paved or otherwise covered by development. Portions of the pipeline routes are proposed to be bored under the Sutter By-pass levees and channel, and under several of the local sloughs. Other portions of the proposed corridor are crossed by existing high voltage transmission facilities and access roads.

The new 16-inch gas pipeline will be buried in trenches approximately 32 to 36 inches wide and 72 to 84 inches deep. Estimated surface disturbance of twenty-five to as much as fifty, or possibly seventy-five feet, in width would occur during pipeline trenching and pipe placement. For boring under levees, sloughs, and roadways, additional areas of surface disturbance may occur at the points of entry for the boring equipment. The new sections of 4-inch gas pipeline will be buried in trenches approximately 52 to 56 inches deep. The cuts through road pavement would be approximately 12 to 18 inches wide. In some areas, trenching for the 4-inch pipeline might cause surface disturbance of five to ten feet in width within the shoulder of the roadway (Calpine 1997; 1998f).

Portions of the 12-mile route proposed for the 16-inch gas pipeline are proposed for construction in an area underlain by the Modesto Formation which is known to produce fossil materials. Portions of the pipeline route are to be constructed alongside or under existing local streets that have been built on top of these sensitive sediments. Where not previously disturbed, each of these underlying sediments still has a potential to produce fossil materials (Calpine 1997).

The depth to undisturbed layers of the underlying sediments is unknown, so the potential for impacts cannot be fully evaluated until the sub-surface deposits are exposed by trenching. Given the large amount of excavation associated with the two gas pipelines to be constructed for this project, the greatest potential for impact on paleontologic resources is associated with construction of these proposed linear facilities.

CUMULATIVE IMPACTS

Impacts on paleontologic resources result when qualified paleontologists are unable to participate in the exposure of sub-surface geologic units, in the observation and mapping of the exposed features, and in the recovery of any fossil materials present. Impacts to paleo resources result when fossil materials are destroyed during project development when a professional paleontologist is not available to monitor construction-related excavating and trenching in fossil-bearing rock units. The cumulative effects of these impacts are difficult to measure, since it is hard to determine what specimens were not seen and destroyed in the absence of a professional monitor or in the absence of a detailed mitigation plan (Calpine 1997).

Based upon previous paleontologic surveys and research, California has been inhabited by prehistoric animal species for hundreds of thousands of years. The sediments and fossil materials found in the project area can provide valuable information on environmental conditions and animal adaptations to an earlier, wetter climate pattern. The continuation of additional development, extending farther into the Central Valley can accelerate the disturbance of fossil-bearing sedimentary deposits and the potential loss of significant paleontologic resources. The degree of cumulative impact is related to the increasing disturbance or removal of fossil-bearing rock units.

With proper planning and appropriate mitigation, proposed developments can help to preserve valuable fossil resources and can also provide opportunities for increasing our understanding of the past environmental conditions and life-forms. Examination of excavations by a professional paleontologist will allow for the collection of the necessary information to help in the interpretation of the geologic history of the region (Calpine 1997).

FACILITY CLOSURE

The anticipated lifetime of the SPP project is expected to be in excess of thirty years. At the time of closure all then-applicable LORS will be identified and the 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 paleontologic resources would be expected.

MITIGATION

The Pleistocene-age sediments underlying the power plant site and vicinity also underlie each of the other facility sites or linear corridors proposed for project-related facilities. As discussed in the AFC, no paleontologic resources were found on the surface during pre-AFC reconnaissance surveys of areas potentially affected by the SPP project construction and operation. The inter-mingled points of contact between the sediments underlying the project area are difficult to define so the extent of potential impacts can not easily be evaluated until the ground is opened by excavation, trenching, or augering (Calpine 1997).

Fossil resources have been encountered at several locations in the project area so the project area meets SVP criteia for high sensitivity. Since project development and

construction usually entail disturbance of the ground surface, as well as disturbance below the surface, the proposed SPP project has the potential to adversely affect sensitive paleontologic resources. Staff's objective is to ensure that there will be no significant adverse impacts to paleontologic resources during project development and construction. This goal can be achieved by avoiding, if possible, any project-related disturbance of fossil resources. Should impacts to significant paleontologic resources be unavoidable, the Commission staff has recommended Conditions of Certification that would ensure necessary mitigation of impacts if previously unknown cultural resources are encountered during project construction.

Critical to successful mitigation efforts is the selection of a qualified professional paleontologic resource specialist. The Commission staff must review the qualifications and approve of the professional paleontologists designated to lead and participate in project monitoring and mitigation efforts.

Mitigation measures are developed to reduce the potential for significant adverse project impacts on the region's paleontologic resources to a less than significant level. Typical mitigation requirements may include: preparation of a monitoring and mitigation plan; determination of the location and frequency of monitoring; recovery of any sensitive paleontologic materials prior to impact by project activities; selective sampling and wet screening of matrix materials for micro-fossils; recordation and analysis of all pertinent data and scientific information from the site(s) and any recovered fossil resources; preparation of recovered materials to the point of identification and completion of an inventory of materials prepared for curation; delivery of the data and materials recovered for curation in a qualified public repository; preparation of a final report on data and fossil recovery efforts associated with project mitigation; and filing of pertinent maps, photos, and other information with the curated fossil materials.

The proposed mitigation measures would apply to the potential impacts to significant paleontologic resources in those project areas determined to be sensitive. Mitigation measures are derived from good professional practice and they are based on the guidelines of the Society of Vertebrate Paleontologists (SVP) and Commission staff experience. All of these mitigation measures have previously proven successful in protecting sensitive paleontologic resources from construction-related impacts, while allowing the timely completion of many projects in California.

Calpine has recommended full-time monitoring of construction-related activities for the power plant site, the switchyard site, and for portions of the 16-inch gas pipeline route, most of the 4-mile electric transmission route, and portions of the 5.7-mile alternative transmission route. Commission staff have proposed contingency mitigation measures which are to be implemented if significant paleontologic resources are unexpectedly encountered during pre-construction site preparation or in such activities as coring, boring, augering, excavation, and trenching during project construction.

CALPINE'S PROPOSED MITIGATION

The AFC indicates that paleo resource sites have previously been found within or near the project area, and there is a possibility that sub-surface excavation for project construction could encounter additional sub-surface paleontologic resources. The most likely place to encounter fossil materials would be in areas where Conejo-Tisdale soil types overlie the low, remnant terraces of the Pleistocene-age Modesto Formation. Calpine recommends that a qualified paleontologic resource specialist monitor excavations, trenching, or augering during construction in these remnant terrace areas found along portions of the routes for the 16-inch natural gas pipeline and the revised, 5.7 mile electric transmission line (Calpine 1997).

As set forth in the AFC, Calpine also recommends that a five-point paleontologic resource monitoring program should be implemented, following the SVP standard procedures for areas identified as having a high sensitivity for fossil resources. This five-point program is summarized here and has also been incorporated into the Conditions of Certification. The Applicant's five-point program for paleontologic resources includes the following:

Preconstruction Assessment and Construction Training

- The designated paleontologic resource monitor will visit the project area before construction begins to become familiar with the site conditions and to conduct a brief pre-construction paleontologic reconnaissance designed to identify areas that might have particular sensitivity.

- As construction begins, the paleontologic monitor will conduct a worker education session can take place at the same time as the cultural resources training session, since both disciplines will involve the monitoring of excavation activities (although in different areas). Information about paleontologic resources may be combined with information about cultural resources in the training brochure that will be distributed to construction supervisory personnel.

Construction Monitoring

- The paleontologic resource monitor should be present at the construction site at all times when excavation is taking place within the zones of paleontological sensitivity, which include areas along Oswald, South Township, and Hughes roads at the following mileposts (MPs):

  For the 16-Inch Natural Gas Transmission Pipeline Route:

MP 0.00 to 2.07	2.07 miles
MP 3.58 to 3.70	0.12 miles
MP 4.10 to 4.50	0.40 miles
Subtotal	2.59 miles

  For the Proposed 4.0-Mile Electrical Transmission Route:

MP 0.00 to 1.40	1.40 miles
MP 1.80 to 2.60	0.80 miles
Subtotal	2.20 miles
Proposed Total	4.79 miles

For the 5.7-Mile Alternative Electric Transmission Route:

MP 0.00 to 1.40	1.40 miles
MP 1.80 to 2.60	0.80 miles
MP 2.60 to 5.2	2.60 miles
Subtotal	4.80 miles
Alternative Total	7.39 miles

- At the discretion of the paleontologist, the intensity of monitoring may be reduced to 50 percent of the time or less, depending on the paleontologist's reassessment of the paleontologic resource sensitivity of the excavated area as construction reveals sub-surface soil and geological conditions.

- The paleontologic resource monitor's role will be to watch for significant fossils during excavation for the 16-inch natural gas pipeline and to monitor subsurface excavation at the power plant site and the switchyard site.

- Though part of the electric transmission line will pass through the high sensitivity zone, excavation for the transmission line tower foundations will be minimal and will require spot checking, rather than monitoring 100 percent of the time.

- In order to check for the presence of significant small to microscopic-sized fossils, the paleontologic resource monitor will periodically inspect excavation spoil by sifting or washing (through 1/8 inch mesh screen) samples of excavation spoil to look for fragmentary or small preserved fossils.

- If the paleontologic resource monitor identifies fossil resources during construction, he or she will immediately notify the Site Superintendent, who will halt construction in the immediate vicinity of the find, as necessary. The Site Superintendent and paleontologist will use flagging tape, rope, or some other means as necessary to delineate the area of the find within which construction will halt. This area should include the excavation trench from which the paleontologic resource finds were unearthed, as well as any piles of dirt or rock spoil from that area.

- Construction should not take place within the delineated find area until the paleontologist, in consultation with California Energy Commission (CEC) staff, can inspect and evaluate the find.

- If a find is made, it may be possible to mechanically remove bulk samples of soil matrix to process the samples off-site for fossil extraction because soils and paleosols, rather than bedrock, underlie the project area. This would avoid delaying construction in a given area. Fossiliferous paleosols encountered should be investigated in this way by sampling, rather than processing of the entire fossiliferous soil horizon. The paleontologist should determine the sample size necessary to obtain a representative description of the soil unit's contents. In accordance with SVP standard procedures, this amount should not be greater than 6,000 pounds per fossiliferous geological horizon, stratum, or paleosol, unless special circumstances such as unusual fossil abundance or significance warrant that a larger sample be taken. Depending on the density of individual soils, this would amount to between 12 and 15 cubic yards of soil.

- Finds will be considered significant if they consist of complete or nearly complete members of any vertebrate species, large or small. Finds may be designated significant if they:

  - Provide important information regarding evolutionary trends among organisms;

  - Provide important information regarding the development of biological communities or interaction between plants and animals;

  - Demonstrate unusual or remarkable circumstances in the history of life; or

  - Are in short supply and danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation.

Specimen Preparation

- The project paleontologist will prepare recovered specimens (clean and remove attached rock matrix) to the extent that identification is possible and the find is stabilized for preservation.

- All recovered specimens shall be identified and cataloged.

Curation

- The paleontologist will arrange for curation of significant fossils collected during the monitoring of project construction at a qualified curation facility. A qualified curation facility is a recognized, non-profit paleontological repository with a permanent Curator, such as the Museum of Paleontology at the University of California at Berkeley.

- The paleontologist shall submit field notes, geological maps, and other materials developed as part of the fossil recovery program to the curation facility along with the fossil specimens.

Report of Findings

- If significant fossils are found during construction, the paleontologist shall prepare a report summarizing the monitoring and fossil salvage program.

- This report should describe the site geology and stratigraphy and list and describe significant fossils recovered and explain their significance.
- This report should be submitted to the curation facility with the collection.

Calpine states in the AFC that implementation of these mitigation measures would lower any potential project effects on paleontological resources below the threshold of significance. While it is possible that the project could encounter significant fossils, the paleontologic resource monitor would be present to detect, evaluate, and recover them. The AFC also indicates that these measures would therefore be effective.

COUNTY REQUIRED MITIGATION

Neither Sutter County nor Colusa County have mitigation requirements that specifically address mitigation of potential impacts to paleontologic resources (Carpenter 1998; Farhar 1998a, 1998b; Kelley 1998).

STAFF'S PROPOSED MITIGATION MEASURES

Commission staff concur with the mitigation measures proposed by Calpine in the AFC. Staff has suggested additional language to clarify the measures presented by Calpine and the agencies. The changes would extend the mitigation contingency planning to address the following aspects in greater detail: the selection criteria for the designated paleontologic resource specialist; the steps involved in the recovery, analysis, preparation and identification of fossil materials that were encountered during project construction; the inventory and curation of any fossil materials recovered; and the preparation and filing of reports on the paleo resource monitoring and mitigation activities.

Staff have also drawn upon the requirements and criteria set forth in the mitigation and curation guidelines of the Society of Vertebrate Paleontologists.

Project-Specific Mitigation Measures

Rather than setting forth project-specific measures here, the mitigation requirements and guidelines have been incorporated into the proposed Conditions of Certification which follow the text of this staff analysis.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The project site is located on the eastern side of the mid-section of the Sacramento central valley where a sequence of Quaternary age sedimentary *rock* units are intermingled with, and are overlain by, layers of recent alluvial deposits. The underlying Pleistocene-age sediments in the remnant terraces of the Modesto Formation have been found to contain fossil materials. Monitoring and mitigation for the presence of significant fossil materials and implementation of full data and fossil recovery is essential to reduce the potential for project impacts to paleontologic resources to a less than significant level.

RECOMMENDATIONS

Staff recommends that the Commission adopt the mitigation measures described above, which have been incorporated into the following proposed Conditions of Certification, to ensure adequate mitigation of potential impacts to sensitive paleontologic resources during the construction of the Sutter Power Plant Project.

PROPOSED CONDITIONS OF CERTIFICATION

REQUIREMENTS

PAL-1 Prior to the start of project construction (defined as any construction-related vegetation clearance, ground disturbance and preparation, and site excavation activities), the project owner shall provide the California Energy Commission Compliance Project Manager (CPM) with the name(s) and qualifications of its designated paleontologic resources specialist and mitigation team members.

The designated paleontologic resources specialist shall be responsible for implementing all the Conditions of Certification and for using qualified personnel to assist him or her in project-related field surveys; monitoring; fossil stabilization, removal, and transport; data collection and mapping; direction and implementation of mitigation procedures; matrix sampling, screen washing, and other micro-fossil recovery techniques; preparation and analysis of recovered fossils and data; identification and inventory of recovered fossils; preparation of recovered fossils for delivery and curation; and report preparation.

After CPM approval of the Paleontologic Resources Monitoring and Mitigation Plan, described below in Condition PAL-4, the designated paleontologic resources specialist and team shall be available to implement the mitigation plan prior to, and throughout construction of the project.

Protocol: The project owner shall provide the CPM with a resume or statement of qualifications for its designated paleontologic resources

specialist and mitigation team members. The resume(s) shall include the following information:

1) The resume for the designated paleontologic resource specialist shall demonstrate that the specialist meets the following minimum qualifications: a graduate degree in paleontology or geology, or paleo resource management; at least three years of paleontologic resource mitigation and field experience in California, including at least one year's experience leading paleontologic resource field surveys; leading site mapping and data recording; marshalling and use of equipment necessary for fossil recovery, sampling, and screen washing; leading fossil recovery operations; preparing recovered materials for analysis and identification; recognizing the need for appropriate sampling and/or testing in the field and in the lab; directing the analyses of mapped and recovered fossil materials; completing the identification and inventory of recovered fossil materials; and the preparation of appropriate reports to be filed with the receiving curation repository, the UC Museum of Paleontology at Berkeley, all appropriate regional information center(s), and the Commission.

2) The resume for the designated paleontologic resource specialist 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.

3) If additional personnel will be assisting the designated paleontologic resources specialist in project-related field surveys, monitoring, data and fossil recovery, mapping, mitigation, fossil analysis, or report preparation, the project owner shall also provide names, addresses, and resumes for these paleo resource team members.

4) If the CPM determines that the qualifications of the proposed paleontologic resources specialist are not in concert with the above requirements, the project owner shall submit another individual's name and qualifications for consideration.

5) If the previously approved, designated paleontologic resources specialist is replaced prior to completion of project mitigation, the project owner shall obtain CPM approval of the new designated paleontologic resources 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 paleontologic resources specialist.

Verification: At least ninety (90) days prior to the start of construction on the project, the project owner shall submit the name and resume for its designated paleontologic

resources specialist, to the CPM for review and approval. The CPM shall provide written approval or disapproval of the proposed paleontologic resources specialist.

Thirty (30) days prior to start of construction, the project owner shall confirm in writing to the CPM that the previously approved, designated paleontologic resources specialist and the team of assistants are prepared to implement the monitoring and mitigation measures for paleo resources, as described in the CPM-approved Paleontologic Resources Monitoring and Mitigation Plan, prepared per Condition PAL-4, below.

At least ten (10) days prior to the termination or release of a designated paleontologic resource specialist, the project owner shall obtain CPM approval of the new designated paleontologic resource specialist by submitting to the CPM the name and resume of the proposed replacement specialist.

PAL-2 Prior to the start of project construction, the project owner shall provide the designated paleontologic resource specialist and the CPM with maps and drawings for the Sutter Power Plant Project. The final center lines and right-of-way boundaries shall be provided on 7.5 minute quad maps, and the location of all the various areas where surface disturbance may be associated with project-related access roads, storage yards, laydown sites, pull sites, pump or pressure stations, switchyards, electrical tower or pole footings, etc.

Where the potential for impacts to significant paleontologic resourcelic repository(ies), by which the project owner has provided for delivery for curation of all the paleontologic resource materials collected during data recovery and site mitigation for the project.

REFERENCES

CEC (California Energy Commission). 1998a. Data Requests Numbers 1 through 59. Submitted to Charlene Wardlow, Calpine Corporation, February 2, 1998.

CEC (California Energy Commission). 1998b. Sutter Power Project Issue Identification Report. Submitted to the Proof of Service List, February 11, 1998.

CEC (California Energy Commission). 1998c. March 25 and March 31 workshop Data Requests 60 through 69. Submitted to Charlene Wardlow and Curt Hildebrand, Calpine Power project, April 7, 1998.

CEC (California Energy Commission). 1998*. Preliminary Staff Assessment for the Sutter Power Plant Project. Published June **, 1998.

CEC (California Energy Commission). 1998*. Staff Workshop on Preliminary Staff Assessment. Conducted on July 14, 1998.

CEC (California Energy Commission). 1998*. Summary of July 14 workshop on Preliminary Staff Assessment. July **, 1998.

Calpine Corporation (Calpine). 1997a. Application for Certification, Sutter Power Plant Project (97-AFC-2). Submitted to the California Energy Commission, December 15, 1997.

Calpine Corporation (Calpine). 1997b. Calpine Corporation, Sutter Power Plant Project (97-AFC-2); Geotechnical Investigation Report, dated August 1997 [Black & Veatch File 37023.41.0403]. Submitted to the California Energy Commission, December 15, 1997.

Calpine Corporation (Calpine). 1997c. Commission Staff Site Visit, to proposed Sutter Power Plant Project (97-AFC-2) site. Conducted on December 16, 1997.

Calpine Corporation (Calpine). 1998a. Additional Data for Sutter Power Plant (97-AFC-2). Submitted to the California Energy Commission, January 8, 1998.

Calpine Corporation (Calpine). 1998b. Additional Biological Data for Sutter Power Plant (97-AFC-2). Submitted to the California Energy Commission, January 20, 1998.

Calpine Corporation (Calpine). 1998f. Sutter Power Plant, Responses to February 2, 1998 Data Requests. Submitted to the California Energy Commission, March 4, 1998.

Calpine Corporation (Calpine). 1998h. Supplemental Filing Changing Transmission Route. Submitted to the California Energy Commission, May 18, 1998.

Calpine Corporation (Calpine). 1998i. Supplemental Filing Changing Size of Cooling Tower from Six to Ten. Submitted to the California Energy Commission, May 21, 1998.

Carpenter, George (Carpenter). 1998. Senior Planner, Sutter County Community Services Department. Telephone conversation with Kathryn Matthews (California Energy Commission), June 3, 1998.

Farhar, John (Farhar). 1998a. Planner, Sutter County Community Services Department. Telephone conversation with Kathryn Matthews (California Energy Commission), June 3, 1998.

Farhar, John (Farhar). 1998b. Planner, Sutter County Community Services Department. Telephone conversation with Kathryn Matthews (California Energy Commission), August 12, 1998.

Holroyd, Patricia, PhD (Holroyd). 1997. Letter to Doug Davy, PhD, Foster Wheeler, Corp, RE UC Museum of Paleontology Record search for known paleontologic resource localities. *** 1997.

Petty, Grissold E. 1978. Memorandum from the Associate Director of the US Bureau of Land Management, outlining the significance criteria for paleontologic resources.

Repenning, C. A. (Petty). 1980. Paleontologic Resource Evaluation, Naval Petroleum Reserve No. 1 (Elk Hills); prepared by Repenning at the US Geological Survey, Branch of Paleontology and Stratigraphy in Menlo Park; prepared for the Naval Facilities Engineering Command, San Bruno, California; 1980.

Society for Vertebrate Paleontology (SVP). 1995. Revised Draft Guidelines for Mitigation of Potential Impacts to Paleontologic Resources. October 1995.

Society of Vertebrate Paleontology (SVP). 1996. Measures for Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources: Standard Procedures (Final). News Bulletin, Number 163; January 1995.

Sutter County. 1996. Sutter County General Plan, Background Report; Chapter 8: Cultural Resources; published November 25, 1996.

Sutter County. 1997. Sutter County General Plan Revision, Draft Environmental Impact Report; Section 4.9 Historic and Cultural Resources; published ** 1997.

FACILITY DESIGN

Testimony of Steve Baker, Kisabuli, Bob Brand and Al McCuen

INTRODUCTION

The purpose of the Facility Design analysis is to verify that applicable laws, ordinances, regulations and standards (LORS) 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 establishes conditions of certification to ensure that a design review and construction inspection process will be employed that carries out 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 which are essential to ensuring protection of the environment and/or public health and safety;
- proposed modifications and additions to comply with applicable LORS; and
- conditions of certification (COCs) 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

The SPP will occupy 12 acres of a 77-acre parcel[8]. The project site is located in Seismic Zone 3, as delineated on Figure 16-2 of the 1995 California Building Code (CBC). Additional engineering details of the proposed project are contained in the Application for Certification (AFC), in Appendices 9A through 9G (SPP 1997). Calpine proposes to start construction in 1999, and enter commercial operation in the year 2000.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

The applicable LORS proposed by the Applicant are contained in the Application for Certification (AFC), in Appendices 9A through 9G (SPP 1997).

ANALYSIS

The basis of this analysis is Calpine's proposed analysis methods, construction methods, list of LORS, and design criteria, set forth in the AFC. Applicable engineering sections include:

Section 1.1	Project overview
Section 1.2	Project schedule
Section 1.3	Project ownership
Section 2	Project description
Section 4	Facility closure
Section 7	Natural gas supply
Section 8.15	Geologic Resources and hazards
Section 9	Engineering

--	Appendix 9A	Foundation and Civil Engineering Design Criteria
--	Appendix 9B	Structural Engineering Design Criteria
--	Appendix 9C	Mechanical Engineering Design Criteria
--	Appendix 9D	Electrical Engineering Design Criteria
--	Appendix 9E	Control Systems Engineering Design Criteria
--	Appendix 9F	Chemical Engineering Design Criteria
--	Appendix 9G	Geotechnical 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 line and electric

[8] The legal description of the 77-acre parcel (Assessor's Parcel number 21-230-25), of which the site occupies 12 acres is: the North half of the Northeast quarter of Section 24, Township 14 North, Range 2 East, Mount Diablo Base and Meridian, Sutter County.

transmission line. Calpine proposes to use accepted industry standards (see AFC Appendix 9A for a list of the applicable industry standards), design practices, and construction methods in preparing and developing the site.

Calpine's proposed methods follow industry standard practices. Staff concludes that the project can comply with the applicable site preparation and development LORS, and proposes conditions of certification (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 (below).

The AFC contains a list of the civil, structural, mechanical and electrical design criteria which demonstrate the likelihood of compliance with applicable LORS, and which staff believes are essential to ensuring that the project is designed in a manner which protects the environment and/or public health and safety.

Proposed Modifications

The AFC (SPP 1997, AFC Appendices 9A and 9B) identifies applicable LORS, which include the 1995 CBC. Actual design and construction of the project could begin immediately after certification, or could be delayed for a period of time thereafter.

The project should be designed and constructed to the latest edition of the CBC (and other applicable codes and standards) in effect at the time initial design plans are submitted to the Chief Building Official (CBO) for review and approval. The current CBC is the 1995 edition. In the event the design for the SPP is submitted to the CBO[9] for review when the 1998 CBC is in effect, the 1995 CBC provisions identified herein shall be replaced with the applicable successor provisions.

Staff can conclude that the SPP will, in fact, be designed and constructed to the applicable facility design LORS. In order to provide assurance that this will occur as intended, staff proposes a condition of certification (GEN 1, below) to monitor compliance.

Dynamic Analysis

Structures, major equipment and large components of the facility can be structurally analyzed either statically or dynamically. While static analysis is often preferable due

[9] CBO is the City or County Chief Building Official, his or her representative or the California Energy Commission's duly appointed representative.

to its relative simplicity and cost effectiveness, it relies upon certain assumptions of regularity regarding the structural makeup of the item being analyzed. If the structure is regular, and not critical to safety or reliable plant operation, then static analysis may be adequate. If the structure is irregular, as are many power plant structures and components, or if the structure's integrity is critical to safety or reliable operation, then dynamic analysis may be in order.

Dynamic analysis is required to satisfy the configuration requirements of Section 1627.5 and Tables 16-L and 16-M of the 1995 CBC. The provisions of Sections 1627.8 and 1630 of the 1995 CBC should be used as a guide for design analysis. Because of structural irregularity, the following major structures, equipment and components are likely to be subjected to dynamic analysis requirements of the 1995 CBC: Combustion turbine generator (CTG) pedestal and foundation, steam turbine generator (STG) pedestal and foundation, heat recovery steam generator (HRSG) structure and foundation, exhaust stack and foundation, and cooling tower. Others may also be candidates for dynamic analysis; see the list of major structures and equipment included in Proposed Condition of Certification GEN-2 below. In order to ensure that those structures, components and pieces of equipment requiring dynamic analysis to comply with the code actually receive this treatment, staff proposes that Calpine and staff agree to a list of such items before design progresses. This requirement is incorporated in Proposed Condition of Certification STRUC-1 below.

MECHANICAL SYSTEMS

Mechanical features of the project include two gas turbine generators burning natural gas in dry low-NOx combustors and equipped with steam injection for power augmentation; two heat recovery steam generators (HRSG) equipped with duct burners, burning natural gas; a steam turbine generator, condenser and cooling water system; a wet cooling tower; turbine inlet air evaporative cooling systems; 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, ventilating, air conditioning (HVAC), potable water, plumbing and sanitary sewage systems.

The application (Calpine 1997, AFC Appendix 9C) 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 Calpine 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 include the generators, 13.8 kV system, 4160 volt switchgear, motors, 480 volt system, 230 kV substation, protective relaying, cable trays and grounding system.

- 230 kV Substation. The SPP 230 kV Substation will include a new breaker ring bus on the southwest portion of the Calpine property. The layout will include ties to the three 200 million volt amperes (MVA) generator step-up transformers to the north, and to a single 230 kV tie in line which will exit the station to the east.

- 4,000 Volt Squirrel Cage Induction Motors. Design and construction of 4,000 volt motors will be coordinated with the driven equipment requirements. All 4,000 volt motors will be totally enclosed, fan cooled (TEFC) or National Electrical Manufacturers Association (NEMA) standards.

- 460 Volt Integral Motors. Design and construction of each 460 volt integral motor will be coordinated with the driven equipment and the requirement of NEMA MG1 Standards.

- Direct Current Machines. All direct current machines will be designed and constructed for continuous operation and in accordance with the requirement of NEMA MG1.

- Protective Relaying. These relays protect equipment in the auxiliary power supply system, generator terminal systems, 230 kV system, turbine-generator system, and the electrical loads powered from these systems.

- Grounding. The station grounding system will be tied to the generating facility grounds and will be designed to provide safe step and touch potentials for personnel in accordance with American National Standards Institute/Institute of Electrical and Electronics Engineers Standard 80 (ANSI/IEEE 80). The station will have a lightning shield wire system to provide coverage of the site.

- Site Lighting. The site lighting system will provide personnel with illumination for the performance of general yard tasks, safety, and plant security.

- Freeze Protection. A freeze protection system will be provided for selected outdoor piping as required.

- Cable Trays, Raceways and Conduits. The design and specifications for the cable trays, raceways and conduit systems used in supporting and protecting electrical cables will be in accordance with the provisions of the National Electrical Code (NEC) and NEMA standards.

- Cathodic Protection System. Consideration will be given to the need for 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.

The Application (SPP 1997, AFC Appendix 9D) 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 Calpine 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 Calpine 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 (SPP 1997, Appendix 9D). Staff has proposed conditions of certification (ELEC-1 and ELEC-2, below) to monitor this compliance.

LINEAR FACILITIES

Gas Pipeline Route

Approximately 12 miles of new 16-inch diameter gas transmission line will be constructed to deliver natural gas to the SPP project. This new line will follow the existing gas line corridor that contains the 8-inch line currently serving the Greenleaf 1 project. The corridor goes west of the site and connects with a PG&E gas line at the Sacramento River. Figure 1.1-4 of the AFC shows the location of these routes. Also see AFC Section 7 and AFC Appendix 8.4A for a detailed description of the natural gas pipeline route and proposed construction methods.

Transmission Line Route

The proposed 230 kV line will exit the power plant to the east and then parallel South Township Road south for approximately 4 miles to Tudor Road. It will then either 1) follow Tudor Road west to Murray Road, then run south along Murray Road to the Sutter Bypass levee, finally paralleling the levee southeast to the switchyard site; or 2) continue directly south across farmland to the switchyard site at the levee. Total length of the line will be approximately 5.7 miles. See Section 6.1.2 of this document for additional information on the transmission line.

Water

The water source for the SPP will be from an on-site well system that will be developed as part of the project. It is expected that three 1,500 gallon-per-minute (gpm) wells will be developed. One well is expected to be on standby, while the

remaining wells will provide the approximately 3,000 gpm of water needed under normal operating conditions.

GEOLOGIC HAZARDS

Staff, using professional experience with the area, evaluated the applicant's AFC geologic hazards discussions (Sutter Power Plant Project, Application for Certification, 1997) of the power plant site and linear corridors. Geologic phenomena that staff assessed for the project area include seismic shaking, ground rupture due to surface faulting, liquefaction, hydroconsolidation, landsliding, subsidence, and design limitations due to subsurface mineral deposits. Soil erosion potential is described in the Soil and Water Resources section of the staff analysis.

The applicant performed a subsurface investigation of the area to determine geologic conditions and pertinent geotechnical engineering properties of the underlying soils.

The site overlies natural gas fields, but the construction of the project would not hinder future development of the fields. Due to the nearly flat topography of the site, no landslide potential exists. No known active or potentially active faults cross the site, therefore, the site is not in an Alquist-Priolo Special Studies Zone and is not subject to surface fault rupture.

Seismic Shaking

The site is located in CBC Zone 3, the lowest level of potential shaking in California. The project will be designed to the Zone 3 requirements or greater.

Liquefaction

Liquefaction of soils is a condition in which seismic shaking of relatively loose, cohesionless soils, with the water table less than about 50 feet from the surface, can result in loss of shear strength and near-surface ground failure with subsequent loss of foundation bearing strength and/or differential settlement. The water table in the site area is within 1 to 2 feet below the surface of the ground and relatively loose cohesionless soils exist within 50 feet of the surface. The applicant's analysis of the potential for liquefaction at the project area (Black and Veatch, 1997) using test data from on-site borings, indicates that with the expected earthquake induced acceleration at the site of 0.15 g, the factor of safety against liquefaction is generally greater than one. Staff agree with this liquefaction analysis.

Hydroconsolidation

Hydroconsolidation is the process by which certain earth materials decrease in volume upon the addition of water. The soils at the power plant site and along the linear facilities are already under water, therefore, the potential for hydroconsolidation is nil.

Subsidence

Subsidence is defined as a lowering of the ground surface over a large area, or region, due to extraction of such things as groundwater or oil. The project area is not a known area of subsidence, but the potential for subsidence exists if groundwater is extracted in excess in the future. Please see the Soil and Water Resources section of the staff analysis for further discussion of subsidence potential.

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PROCEDURES

The AFC describes a quality assurance and quality control (QA/QC) system which conforms to typical industry practices (Calpine 1997, AFC §2.4.5). A quality assurance program will be followed which entails proper review and documentation of design work. Materials, equipment and services will be procured and inspected under approved quality control programs, utilizing approved guidelines and following the appropriate codes and standards. Compliance with design requirements will be verified through an appropriate program of inspections and audits. Employment of this QA/QC program will likely ensure that the project is designed, procured, fabricated and installed in accordance with LORS.

COMPLIANCE MONITORING

Staff has developed conditions of certification (see section below titled "Proposed Conditions of Certification") to ensure that the design measures and LORS requirements are carried out in a manner that results in the protection of the environment and of public health and safety. Some of these facility design conditions address the roles, responsibilities and qualifications of 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 proceeds 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.

FACILITY CLOSURE

Staff has not identified any specific closure plan issues affecting the Facility Design technical area. As additional information is received from the project owner or other sources, this analysis may be modified accordingly to reflect the new information.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

- The laws, ordinances, regulations, and standards (LORS) which are identified in the AFC and supporting documents, and included herein, 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 and construction of the project can 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.

- The conditions of certification proposed below will ensure that the proposed facilities are designed, constructed and operated 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.

RECOMMENDATIONS

If the commission certifies the project, staff recommends that:

- the project be designed and built to the most recently adopted edition of all applicable LORS in effect at the time initial design plan are submitted to the CBO for review and apporval including the latest version of the CBC[10] or its successor standard;

- the conditions of certification proposed herein be adopted to ensure that the project is designed and constructed to protect environmental quality, assure public health and safety, and comply with applicable LORS; and

- 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.

[10] 1995 CBC or later. Conditions of certification presented herein are based on the 1995 CBC, including references to specific sections, tables and coefficients. If the project is designed and built to a successor standard, the 1995 CBC specific references may need to be modified to the successor standard.

CONDITIONS OF CERTIFICATION

GEN-1 The project owner shall design, construct and inspect the project in accordance with the California Building Code (CBC)[11] and all other applicable LORS listed in Appendices 9A through 9G of the Application for certification (AFC), 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 the SPP is subject to the 1998 CBC, the 1995 CBC provisions identified herein shall be replaced with the applicable successor provisions.

The purpose of the code is to provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location and maintenance of all buildings and structures and certain equipment regulated by the CBC. 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 CPM a statement of verification, signed by the responsible engineer, attesting that all design, construction, installation and inspection requirements of the applicable LORS and the Commission's Decision have been met for facility design. The project owner shall provide the CPM a copy of the Certificate of Occupancy in the next Monthly Compliance Report after receipt of the permit from the CBO [Section 109 — Certificate of Occupancy.]

GEN-2 The project owner shall furnish to the California Energy Commission Compliance Project Manager (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 equipment (see a list of major structures and equipment below). To facilitate audits by commission staff, the project owner shall provide designated packages to the CPM when requested.

[11] All the Sections, Chapters, Appendices and Tables, unless otherwise stated, refer to Sections, Chapters, Appendices and Tables of the 1995 California Building Code.

Major Structures

Combustion Turbine Generator (CTG) Pedestal and Foundation
Steam Turbine Generator (STG) Pedestal and Foundation
CTG Enclosure Structure
STG Enclosure Structure
Air Inlet Filtration with Evaporative Cooler Structure
Cooling Tower
Heat Recovery Steam Generator (HRSG) Structure and Foundation
Exhaust Stack and Foundation
Field-Fabricated Tanks and Foundations
Shop-Fabricated Tanks and Foundations
Condenser Support Structure and Foundations
Equipment Foundations (compressors, pumps, transformers)
Switchyard
Control/Administration Building
Pipe Rack Structures
Transformer Dead end Structure

Major Equipment

CTG
STG
Fired HRSG
Shop-Fabricated Pressure Vessels
STG Condenser
Main Step-up Transformers
Boiler Feed Pumps
Condensate Pumps
Switchgear
Cycle Water Chemical Storage

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.

GEN-3 The project owner shall make payments to the CBO equivalent to the fees listed in 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 Yuba City, Sutter County or Colusa 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 site preparation, 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 (part 1, title 24, C.C.R.), Section 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 the design intent;

2. ensure that construction of all the facilities conforms, in every material respect, to the applicable LORS, 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 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 site preparation, 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 who is 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 Section 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. [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 to comply with the Energy Commission Decision. 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:

1. review all the engineering geology reports, and prepare a final soils grading report;

2. prepare the soils engineering reports required by 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 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 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. [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 the design intent;

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 Decision.

Protocol: - E: The electrical engineer shall:

1. be responsible for the electrical design of the project; and

2. sign and stamp all 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 15 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 Chapter 17, Section 1701 — Special Inspections and Section 1701.5

— Type of Work (requiring special inspection), 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.

Welding performed on-site requiring special inspection (including structural, piping, tanks and pressure vessels) shall be inspected by a certified weld inspector (certified AWS and/or ASME as applicable).

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 construction. If any discrepancy is discovered during construction, the project owner shall prepare and submit a non-conformance report (NCR) describing the nature of the discrepancy to the CBO. The NCRs shall reference this condition of certification, and applicable sections of the applicable edition of the CBC.

Verification: The project owner shall submit NCRs, as necessary, within five days, and shall submit a periodic construction progress report to the CBO according to the reporting frequency required by the CBO. A list of the NCRs for the reporting month shall also be included in the next Monthly Compliance Report.

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 with 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. [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) 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.

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 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 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 shall carry out the duties required by Appendix Chapter 33, Section 3309.4 — Engineered Grading Requirement, and Section 3318.1 — Final Reports. Those duties are:

1. Prepare the Engineering Geology Report. This report shall accompany the Plans and Specifications when applying to the CBO for the grading permit.
2. Monitor geologic conditions during construction.
3. Prepare the Final Geologic Report.

Protocol: The Engineering Geology Report required by Appendix Chapter 33, Section 3309.3 — Grading Designation, and 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 Geologic Report to be completed after completion of grading, as required by Appendix Chapter 33, Section 3318.1, and shall contain the following: A final description of the geology of the site and any new information disclosed during the grading and the effect of same on recommendations incorporated in the approved grading plan. Engineering geologists shall submit a statement that, to the best of their 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 Geologic Report required by Appendix Chapter 33, Section 3309.3, to the CPM and the CBO.

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 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. [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 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. [Section 109 — Certificate of Occupancy]

Verification: Within 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) 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 applicable designs, plans and drawings, and a list of those project structures, components and major equipment items that will undergo dynamic structural analysis. Designs, plans and drawings shall be those for:

1. major project structures;
2. major foundations, equipment supports and anchorages;
3. large field fabricated tanks;
4. turbine/generator pedestal; and
5. switchyard structures.

Protocol: The project owner shall:

1. obtain agreement with the CBO on the list of those structures, components and major equipment items to undergo dynamic structural analysis;

2. meet the pile design requirements of the 1995 CBC. Specifically, Section 1807 — General Requirements, Section 1808 — Specific Pile Requirements, and Section 1809 — Foundation Construction (in seismic zones 3 and 4).

3. 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, [Section 108.4 — Approval Required];

4. 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 prior to the start of on-site fabrication and installation of each structure, equipment support, or foundation, [Section 106.4.2 — Retention of plans, Section 106.3.2 — Submittal documents.]; and

5. 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. [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 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 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 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, within five days, advise the CPM of 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 Chapter 1, Section 106.3.2 — Submittal documents, and 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 hazardous materials exceeding those amounts specified in Table 3E of Chapter 3, in the 1995 California Building code shall, at a minimum, be designed to comply with Occupancy Category 2 (Hazardous facilities). Table 16-K of Chapter 16, in the 1995 CBC which requires use of the following seismic design criteria: $I = 1.25$, $I_p = 1.5$ and $I_w = 1.15$.

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 sufficient 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 equal to or 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. [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 Commission 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, as necessary, to employ special inspectors to report directly to the CBO to monitor shop fabrication or equipment installation. [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 proposed final design plans, specifications, calculations and quality control procedures for that increment of construction of piping systems, including a copy of the signed and stamped engineer's certification of conformance with the Commission 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. [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.

Protocol: 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. [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. [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, 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 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 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 13.8 kV and lower 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. [Section 108.4 — Approval Required, and Section 108.3 Inspection Requests.]

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, 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. 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.

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: [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 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 the items 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.

REFERENCES

Calpine (Calpine Corporation) 1997. Application for Certification, Sutter Power Project (97-AFC-2). Submitted to the California Energy Commission, December 15, 1997.

Calpine (Calpine Corporation) 1998h. Supplemental Filing Changing the Transmission Route. Submitted to the California Energy Commission, May 18, 1998.

POWER PLANT RELIABILITY

Testimony of Steve Baker

INTRODUCTION

In this analysis, staff addresses the reliability issues of the Sutter Power Plant Project to determine if the power plant is likely to be built in accordance with typical industry norms for reliability of power generation. Such a level of reliability is selected as a benchmark because it would likely not degrade the overall reliability of the electric system it serves, and because no special reliability requirements pertain to the project.

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 Calpine has predicted a level of reliability for the power plant (see below), staff believes Calpine 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 the 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 not yet thoroughly understood; protocols are now 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.).

These mechanisms 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.

Calpine proposes to operate the project only to satisfy any contracts that Calpine may be able to sign with electricity users, and to sell power on the spot market through competitive bid (Calpine 1997, AFC § 2.2.14). Calpine speaks of no plans to sell reliability-related power services, such as voltage support or spinning reserve. In the new competitive electric power industry, if such service were desired, the market would put a price on that service. If the price were high enough, Calpine or others would move to serve the need.

Since the Sutter project does not profess to provide voltage support, spinning reserve or other reliability-related services, staff proposes to place no special reliability requirements on it.

In a supplement to its application, Calpine proposes to cool the steam turbine with an air-cooled condenser (also referred to as a dry cooling tower) in order to reduce impacts on water supply and wastewater disposal (Calpine 1998q).

ANALYSIS

A reliable power plant is one that is available when called upon to operate. Achieving this reliability is accomplished by ensuring equipment availability, plant maintainability, fuel and water availability, and adequate resistance to natural hazards.

Throughout its intended life, the Sutter project will be expected to perform reliably in baseload and load following duty. Such plants are expected to provide uninterrupted service for very long durations. Baseload 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; by procuring equipment from qualified vendors and suppliers; and by providing for adequate maintenance and repair of the equipment and systems (discussed below).

QA/QC Program

The QA/QC program delineated by Calpine (Calpine 1997, AFC § 2.4.5) describes a program typical of the power industry. Project designs and procurement specifications will be checked by qualified reviewers, equipment and supplies will be purchased from qualified suppliers and will be inspected upon receipt, and construction and installation will be inspected and systems tested, all in accordance with the approved QA plan. Staff expects implementation of this program to yield typical reliability of design and construction.

Qualified Vendors and Suppliers

Vendors of plant equipment and materials will be selected from lists of qualified suppliers, those with known capabilities. To appear on the list of qualified suppliers, a vendor must show satisfactory personnel qualifications, production capability, past performance, and quality assurance programs (Calpine 1997, AFC § 2.4.5.2). Procured items will be subjected to an inspection and audit process that ensures the expected quality. This describes an industry standard approach to vendor selection, which staff expects to lead to the acquisition of quality, reliable equipment and materials.

PLANT MAINTAINABILITY

Equipment Redundancy

A generating facility called on to operate in baseload service for long periods of time, such as the Sutter project, 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.

Calpine plans to provide some redundancy of function (Calpine 1997, AFC Table 2.4-1). For example:

- The following plant components are provided in sets of two 100 percent capacity units:
  -- condensate pumps;
  -- air compressors and dryers;
  -- demineralizers; and
  -- closed cycle cooling water pumps and heat exchangers.
- The following components are provided in sets of two 60 percent capacity units:
  -- circulating water pumps.[12]
- The following components are provided in sets of three 50 percent units:
  -- well water pumps; and
  -- boiler feed pumps.[13]
- The computerized control and protective system for the gas turbine generators, steam turbine generator and HRSGs, known as the Distributed Control System (DCS), will exhibit typical redundancy. The DCS will be powered by an uninterruptible power supply (UPS) to ensure plant control under power failure conditions (Calpine 1997, AFC § 2.2.11.3).

While many power plants exhibit slightly greater levels of equipment redundancy, the fact that the project consists of multiple 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, allowing the plant to continue to generate (at reduced output). If a boiler feed pump fails, for example, that gas turbine generator and HRSG must be shut down until repairs or replacement can be effected. The remaining gas turbine/HRSG, however, can continue to operate, providing steam to power the steam turbine. If the steam turbine/ condenser/cooling system fails, both gas turbines can continue to operate, bypassing steam from the HRSGs directly to the condenser (Calpine 1997, AFC § 2.4.2.1). On an exceedingly hot day (with temperatures at or above 110°F), the effectiveness of the air cooled condenser would diminish to the point that the steam turbine would be shut down. In this instance, the gas turbines could continue to operate at reduced output, bypassing steam directly to the condenser (Hildebrand 1998). With these opportunities for continued operation in the face of equipment failure or hot weather, staff believes that the equipment redundancy described here represents an adequate design approach for a power plant project such as this.

Maintenance Program

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[12] Loss of a single 60 percent capacity circulating water pump typically allows the steam cycle portion of the plant to continue operating above 65 percent capacity. Since the steam cycle accounts for only 1/3 of the output of a combined cycle plant, overall capacity with loss of one circulating water pump would drop only to about 90 percent of full load.

[13] Each of the two HRSGs will be equipped with a single 100 percent boiler feed pump; a spare pump will be stored on site (Calpine 1997, Table 2.4-1).

Calpine proposes to establish a plant maintenance program in accordance with those typical in industry (Calpine 1997, AFC § 2.4.5.2). In conjunction with an overall plant quality control program (Calpine 1997, AFC § 2.4.5) that promises to follow industry norms, 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

Fuel (natural gas) will be supplied to the project by a 12 mile-long, sixteen-inch diameter gas pipeline to be built by PG&E (Calpine 1997, AFC §§ 2.1, 2.2.5, 7.3). This pipeline connects with a PG&E intrastate pipeline that, in turn, can draw from interstate pipelines taking gas from Canada. Staff agrees with Calpine's prediction (Calpine 1997, AFC §§ 2.4.3, 7) that there will be adequate natural gas supply and pipeline capacity to meet the project's needs.

Water Supply Reliability

Water will be used in the power plant chiefly to feed the gas turbine generators' evaporative inlet air coolers. Water will be supplied to the project from groundwater wells (see that portion of this document entitled **Soil and Water Resources**). Staff regards this as an adequately reliable supply. Once on the project site, a portion of the water will be treated in one of two fully redundant demineralizers before being used in the power plant (Calpine 1997, AFC Table 2.4-1, § 2.4.2.1).

POWER PLANT RELIABILITY IN RELATION TO NATURAL HAZARDS

Natural forces can threaten the reliable operation of a power plant. High winds, tsunamis (tidal waves) and seiches (waves in inland bodies of water) will not likely represent a hazard for this project, but seismic shaking (earthquake) and flooding present real threats to reliable operation (see that portion of this document entitled **Facility Design**).

Seismic Shaking

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 titled **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.

Flooding

The Sutter project will be constructed in an area "...protected by levees from 100-year flood" (Calpine 1997, AFC § 8.14.1.3). The site elevation varies from 36 to 38 feet above mean sea level; the estimated flood depth in the event of a levee break is from six to eight feet. The plant's ground floor will be built at an elevation of 44 feet above sea level (Calpine 1997, AFC § 2.3.1); this should be adequate to largely protect against flooding resulting from a levee break. Calpine's Greenleaf 1 power plant, adjacent to the project site, has been exposed to flooding in years past. Staff believes Calpine's previous experience with Greenleaf 1 is an indication that adequate design and construction can yield acceptable reliability in the face of flood potential.

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 (www.nerc.com). NERC reports the following summary generating unit statistics for the years 1992 through 1996 (NERC 1997):

For Simple Cycle Gas Turbine units (over 50 MW)
Availability Factor = 89.76 percent

For Combined Cycle units (of all sizes)
Availability Factor = 90.48 percent

For all Gas Turbine units (of all sizes)
Availability Factor = 90.11 percent

Both the GE Frame 7FA and the Westinghouse 501F gas turbines that may be employed in the project have been on the market for several years now, and can be expected to exhibit typically high availability. Calpine's prediction of an equivalent availability factor of 92 to 98 percent (Calpine 1997, AFC §§ 2.2.2, 2.2.14, 2.4.1) exceeds somewhat the NERC figure (90.48 percent) for similar plants throughout North America (see above). While Calpine's estimate of plant availability may be slightly optimistic, the stated procedures for assuring design, procurement and construction of a reliable power plant appear to be in step with industry norms, and staff believes they are likely to yield an adequately reliable plant.

CONCLUSION

Calpine predicts an equivalent availability factor of 92 to 98 percent, which slightly exceeds the industry norm of 90 percent for this type of plant. While this may be optimistic, 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.

REFERENCES

Butler, G. 1997. Gil Butler of SMUD, quoted in Draft Minutes, WRTA (Western Regional Transmission Association) Planning Committee Meeting, November 21, 1997.

Calpine (Calpine Corporation). 1997. Application for Certification for the Sutter Power Plant Project (97-AFC-2). Submitted to the California Energy Commission, November 17, 1997.

_____. 1998 q. AFC Mitigation Program Supplement. Submitted to the California Energy Commission, October 1998.

GTW (Gas Turbine World). 1997. "Takasago 330-MW combined cycle in testbed for steam-cooled 501G." *Gas Turbine World*, March-April 1997, pp. 15-18.

Hildebrand, C. 1998. Project Manager, Calpine. Telephone conversation with Steve Baker (California Energy Commission), October 5, 1998.

Mavis, Steve. 1998. Transmission Planner, California Independent System Operator. Telephone conversation with Steve Baker (California Energy Commission), January 23, 1998.

McGraw-Hill (McGraw-Hill Energy Information Services Group). 1994. Operational Experience in Competitive Electric Generation, an Executive Report, 1994.

NERC (North American Electric Reliability Council). 1997. 1992-1996 Generating Availability Report.

Sabet, M. 1997. Morteza Sabet of Western Area Power Administration, quoted in Draft Minutes, WRTA Planning Committee Meeting, November 21, 1997.

POWER PLANT EFFICIENCY

Testimony of Steve Baker

INTRODUCTION

The Energy Commission makes findings as to whether energy use by the project 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 project's consumption of energy is a significant adverse impact, it must determine whether there are any feasible modifications, mitigation measures, alternatives or other conditions 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

CEQA requires that environmental impacts be considered in power plant siting to identify the significant effects of a project on the environment, identify alternatives to the project, and indicate how those significant effects can feasibly be mitigated or avoided (Pub. Resources Code, § 21002.1).

CEQA Guidelines state that a "...project will normally have a significant effect on the environment if it will...(n) [e]ncourage activities which result in the use of large amounts of fuel, water, or energy; (o) [u]se fuel, water, or energy in a wasteful manner..." (Cal. Code Regs., tit. 14, CEQA Guidelines, Appendix G). CEQA continues, " 'Feasible' means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors" (Pub. Resources Code, § 21061.1).

In addition to a finding that the project does not waste significant quantities of energy, CEQA requires a comparison with alternatives that consume less energy (Cal. Code Regs., tit. 14, § 15126(d)(3)).

LOCAL

No local or county ordinances apply to the efficiency of this project.

SETTING

Calpine proposes to construct and operate a 500 MW combined cycle, base load or load following power plant (Calpine 1997, AFC §§ 1.1, ~~§~~ 2.1.1). The power generating portion of the project will consist of two 170 MW (nominal) F-class gas turbine generators equipped with evaporative inlet air coolers and dry low-NOx combustors, capable of accepting steam injection for power augmentation; two heat recovery steam generators (HRSGs) with duct burners; and a 160 MW steam turbine generator. In a supplement to its application, Calpine proposes to cool the steam turbine with an air-cooled condenser (also referred to as a dry cooling tower) in order to reduce impacts on water supply and wastewater disposal (Calpine 1998q).

IMPACTS

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 as defined under CEQA Guidelines. This adverse impact is considered significant if it will encourage activities that result in the use of large amounts of fuel, or will use fuel or energy in a wasteful manner.

Any power plant large enough to fall under Energy Commission siting jurisdiction will likely consume large amounts of energy. The Sutter Power Project will burn natural gas fuel at a maximum rate between 30 and 35 trillion Btu per year (Calpine 1997, AFC § 9.3), or between 300 and 350 million therms per year. This is a substantial rate of energy consumption.

Calpine has described its sources of supply of natural gas for the project (Calpine 1997, AFC §§ 1.1, 2.4.3, 9.2.1). These sources have access to far more gas than would be required for a project of this size. It is therefore highly unlikely that the project could pose a substantial increase in demand for natural gas in California, or require development of any new sources of energy.

While no substantial increase in demand on energy resources is likely, the fact that project energy consumption will be sizable requires further examination of the efficiency with which the project consumes energy, in order to determine if the project presents any significant adverse impacts on energy resources.

PROJECT SPECIFIC IMPACTS

Project fuel efficiency is determined by the configuration of the power producing system and by the selection of equipment to generate power.

Project Configuration

The project 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 turbine operating alone. Such a configuration is well suited to the large, steady loads met by a baseload plant, intended to supply large quantities of energy cheaply and 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, Calpine 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. Loads down to approximately fifty percent of full load allow one gas turbine, operating at full load, and the steam turbine to maintain peak efficiency.

Equipment Selection

Modern gas turbines, at the leading edge of design and manufacturing progress, embody the most fuel-efficient electric generating technology available today. The F-class gas turbines to be employed in the Sutter project represent some of the most modern and efficient such machines available at this time. Calpine will select a two-gas-turbine, single-steam-turbine power train from one of two prominent manufacturers (Calpine 1997, AFC § 2.2.3.1):

- the General Electric S207FA, nominally rated at 529.9 MW and 56.5 percent efficiency at ISO conditions;[14] and
- the Westinghouse 2x1 501F, nominally rated at 537.8 MW and 57.1 percent efficiency (GTW 1997b).

Under the initial proposal (Calpine 1997, AFC § 9.3), electricity would have been generated at a peak load efficiency of approximately 54 percent[15], under actual site conditions. This is compared to the average efficiency of a typical utility company baseload power plant at approximately 32 percent. Calpine's switch from a wet cooling tower to an air-cooled condenser (Calpine 1998q) will reduce this to

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[14] International Standards Organization (ISO) standard conditions are 15°C (59°F), 60 percent relative humidity, and one atmosphere of pressure (equivalent to sea level). These ratings assume that the steam turbine's condenser is cooled by a wet cooling tower.

[15] At lower heating value (LHV). LHV is the convention commonly used by gas turbine manufacturers to measure efficiency; the remainder of industry typically uses higher heating value (HHV). Efficiency figures expressed in LHV are always greater than in HHV.

approximately 52.5 percent during most of the year, with efficiency dropping as low as 49 percent on very hot days (Hildebrand 1998, pers. comm.).[16]

EFFICIENCY OF ALTERNATIVES TO THE PROJECT

The project objectives include the cost-competitive generation of 500 MW of baseload or load-following power at an equivalent availability factor of 92 to 98 percent (Calpine 1997, AFC §§ 2.2.2, 9.2.2).

Alternative Generating Technologies

Calpine presents a thorough assessment of alternative technologies in the AFC (Calpine 1997, AFC § 5.4). Oil- and gas-burning, coal-burning, nuclear, hydroelectric, ocean conversion, geothermal, biomass-burning, municipal solid waste-burning and solar technologies are all considered. Given the project objectives and location, staff agrees with Calpine 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 cost.

The machine chosen for this project, either of two F-class gas turbines in combined cycle, represent the current state of the art in fuel efficiency. One possible alternative is the Westinghouse 501G, a machine only recently available.[17] While the 501G promises slightly higher fuel efficiency than the F-class machines, the difference is small (one percentage point). Selecting between the two classes of machine is thus

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[16] Plant efficiency is predicted to drop to this level when ambient temperatures reach or exceed 100°F. This may occur as much as 250 hours per year (Hildebrand 1998).

[17] The first 501G machine, at Mitsubishi Heavy Industries' Takasago Works facility in Japan, began operation on April 7, 1997 (GTW 1997a).

based on other factors, such as generating capacity,[18] cost and commercial availability. While the F-class machines have already amassed a service record in numerous power plants around the world, Westinghouse is only beginning to deliver 501G machines to customers.[19] Given the marginal efficiency improvements promised by the G-class turbine, Calpine's decision to purchase an F-class power train is a reasonable one.

With the gas turbine chosen, selection of an appropriate steam turbine for the combined cycle is straightforward; any number of manufacturers can tailor a machine precisely to the needs of the gas turbine.

The choice of cooling process for the steam turbine's condenser also affects efficiency. The wet cooling tower system described in the AFC would have yielded the highest achievable efficiency. The switch to an air cooled condenser (Calpine 1998q) will reduce efficiency, more so on hot days than cooler. As described above, efficiency is expected to be approximately 1.5 percent lower with the air cooled condenser than with a wet cooling tower for the majority of the year. Temperatures at or above 100°F, expected up to 250 hours per year, can reduce efficiency as much as five percent below wet cooling levels. The net effect is a reduction of year-round efficiency to approximately 98 percent of that level achievable with wet cooling. Staff deems this a minor reduction, and reasonable in light of the vast improvements in the mitigation of water supply and wastewater disposal impacts to be derived from the switch to dry cooling.

A further choice of alternatives involves the selection of gas turbine inlet air cooling methods. The two commonly used techniques are the evaporative cooler selected by Calpine, 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. The project location, however, typically offers low relative humidity on the hot days during which inlet air cooling is most needed; the chiller thus holds no great advantage. The evaporative cooler, however, holds three advantages over the chiller:

- Net efficiency of the combined cycle plant is typically greater with an evaporative cooler; the electrical load of a chiller reduces overall efficiency by increasing parasitic power loads.
- The low relative humidity at the project site on hot days allows the evaporative cooler to increase gas turbine performance at very low cost.
- Capital and operating costs are much lower for an evaporative cooler than for a chiller.

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[18] The 501G is available in a single-gas-turbine, single-steam-turbine combined cycle configuration at 345.3 MW, and a double-single configuration at 693.5 MW (GTW 1997b).

[19] Westinghouse recently accepted the first order for a 501G machine from a U.S. customer. The turbine will be sold to the Lakeland, Florida, Department of Electric & Water Utilities (Power 1998). GE had planned to offer a G-class machine, but recently decided not to (Bosworth 1998).

In conclusion, the project configurations and generating equipment chosen appear to represent the most efficient feasible combination to satisfy the project objectives.

CONCLUSIONS AND RECOMMENDATIONS

While the project will consume substantial amounts of energy, it will do so in the most efficient manner practicable. Utilizing wet cooling towers would yield a minor improvement in efficiency, however, the benefits of dry cooling in terms of water supply and wastewater disposal far outweigh any such advantage. In actual operation, the project may displace power that would have been generated by other, less efficient plants serving the utility system. The end result is thus likely to be a beneficial, rather than adverse, impact on energy resources. Staff therefore concludes that the proposed project will result in no significant adverse impacts upon energy resources.

CONCLUSIONS

The project, if operated as proposed, would generate 500 MW of electric power at an annual average thermal efficiency of approximately 52 percent. Representing the most fuel-efficient power plant configuration feasible for the intended service, the project would present no significant adverse impacts upon energy resources.

RECOMMENDATION

From the standpoint of power plant efficiency, staff recommends that the project be certified as proposed. Staff recommends no conditions of certification for this subject area.

REFERENCES

Calpine (Calpine Corporation). 1997. Application for Certification for the Sutter Power Plant Project (97-AFC-2). Submitted to the California Energy Commission, November 17, 1997.

Calpine. 1998 q. AFC Mitigation Program Supplement. Submitted to the California Energy Commission, October 1998.

Bosworth, Gib. 1998. Applications Engineer, GE Industrial & Power Systems Sales. Telephone conversation with Steve Baker (California Energy Commission), January 6, 1998.

Gas Turbine World (GTW). 1997 a. "Takasago 330-MW combined cycle is testbed for steam-cooled 501G," *Gas Turbine World*, March-April 1997, pp. 15-18.

_____. 1997 b. *Gas Turbine World Performance Specs 1997-98*, Volume 17, December 1997.

Hildebrand, C. 1998. Project Manager, Calpine. Telephone conversation with Steve Baker (California Energy Commission), October 5, 1998.

Power (Power Magazine). 1994. "Operating and maintaining IPP/cogen facilities," *Power*, September 1994, p. 14.

_____. 1998. "Westinghouse secures first US order for 'G' machine," *Power*, January/February 1998.

TRANSMISSION SYSTEM ENGINEERING

Al McCuen and Ean O'Neill

INTRODUCTION

Transmission System Engineering (TSE) analysis is conducted to provide a basis for the findings required in the Energy Commission's decision identified below. This final staff analysis provides an indication of whether the transmission facilities associated with the proposed project appropriately conform to all applicable laws, ordinances, regulations and standards (LORS) required for safe and reliable electric power transmission.

Calpine proposes to connect their project to the Western Area Power Administration (Western) transmission system. The California Independent System Operator (Cal-ISO) is responsible for ensuring system reliability and must determine both the standards necessary to achieve reliability and a proposed project's conformity with those standards for all participating transmission owning utilities. While Western is not a participating transmission owner, theCal-ISO's assessment is important in determining acceptable reliability of the interconnected transmission system and staff's analysis includes input from the Cal-ISO.

This analysis is based on studies conducted by Western and the Sacramento Area Transmission Planning Group (SATPG). Staff anticipates that the authors of these studies will be available and where appropriate provide expert witness testimony on these studies in the adjudicatory hearings to support the Commission's findings.

Staff's analysis also evaluates outlet alternatives identified by Calpine and provides preliminary conditions of certification to ensure that applicable LORS are complied with during the design, construction and operation 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 (Cal. Code Regs., tit. 14, §15378). Therefore, the Energy Commission must identify and evaluate any environmental effects 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 will

ensure adequate service and safety to persons engaged in the construction, maintenance, operation or use of overhead electric lines and to the public in general.

- National Electric Safety Code (NESC-1997). The NESC recommends electrical safety and reliability standards for generating stations, powerplant switchyards, and transmission lines.

- Western Systems Coordinating Council (WSCC) Reliability Criteria provide the performance standards used in assessing the reliability of the interconnected system that provides continuity of service to loads as a 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 to a performance level which 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 1997). Western uses the WSCC reliability criteria in their service area.

- North American Electric Reliability Council (NERC) Planning Standards 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. 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 1997). The Cal-ISO under its Grid Planning Criteria Subcommittee is evaluating and interpreting the NERC, WSCC, and California local area transmission owners planning criteria in consideration of adoption of consistent planning criteria for 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 in assessing the system reliability implications of the Sutter Power Plant Project (SPP). Also of major importance to the SPP and other privately funded projects which may sell through the California Power Exchange (Cal-PX) is 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 dispatch not violate system criteria as market participants are requesting 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 the effects on total transmission losses at each generating unit and scheduling point. Additional calculations are performed to determine if the participant will be paid more or less than, for instance, the generating units dispatched net power output (Cal-ISO 1997a, Cal-ISO 1997b).

SETTING

PROJECT DESCRIPTION

The SPP is located in Sutter County, seven miles southwest of Yuba City and north of Sacramento, California. The SPP will provide a nominal electrical output of 500 megawatts. The transmission system will consist of a 230 kilovolt powerplant switchyard[20] 5.7 mile double circuit configuration line operated as a single circuit transmission line and a 230 kilovolt switching station. The switchyard will be located on the southwest portion of the Calpine property. The 230 kilovolt transmission line will exit the switchyard to the east, turn south along South Township Road and terminate in a new switching station at the south end of an extension of south township road next to the Sutter Bypass.

EXISTING FACILITIES AND RELATED SYSTEMS

The proposed SPP site will be located approximately 2.5 miles east of the California-Oregon Intertie corridor. PG&E owns a 500 kilovolt line, which is controlled by the Independent System Operator in California. This line connects the Table Mountain 500 kilovolt substation to the Vaca Dixon 500 kilovolt substation and is critical for wheeling northwest hydroelectric resources into central California. Western owns and operates a double circuit 230 kilovolt line in the same corridor. One line connects the Keswick hydroelectric facility to the Olinda 500 to 230 kilovolt substation and then continues down to the Elverta 230 kilovolt substation. The second line originates out of the Keswick facility and terminates at the Elverta 230 kilovolt substation. The Elverta substation is located approximately 26 miles southeast of the site and 15 miles south of the Rio Oso substation (SATPG 1998b, figure 2).

Calpine also owns and operates an existing Greenleaf 1 generating plant on the SPP site. This plant is connected to PG&E's Rio Oso 115 kilovolt transmission line which

[20] switchyard is also referred to as substation in the Application for Certification (Calpine 1997, page 6-3).

serves the Yuba City distribution system. The Rio Oso substation provides service to the west and north and is located approximately 15 miles southeast of the SPP site.

The Sacramento region has had a longstanding problem maintaining acceptable voltage levels and supporting load growth. In 1996 the Sacramento Valley Study Group completed its report entitled the Sacramento Valley System Limitations Report. The group established a reactive margin criteria prior to its study (see attached Technical Terms). In their report they concluded that imports into the Sacramento region are limited by the reactive margin criteria. As a result of these findings an undervoltage load shedding scheme was implemented by the utilities in the Sacramento Valley to avert a system voltage collapse following a severe multiple-contingency disturbance (SATPG 1998b, page 5).

The SATPG was formed after the Sacramento Valley Study Group, to study long-term transmission system reinforcements needed to support load growth and mitigate low voltages in the Sacramento valley region. This planning group, of which Calpine and Western are members, are continuing to study system modifications and additions in order to improve system reliability, voltage security, and load handling capability of the transmission system over the next ten years (Calpine 1997, AFC page 6-31, SATPG 1998b).

ANALYSIS

INTERCONNECTION FACILITIES

The SPP Project's facilities will consist of a 230 kilovolt switchyard, double circuit 230 kilovolt transmission line and a 230 kilovolt switching station. Western's Elverta-Keswick and Elverta-Olinda 230 kilovolt lines and the proposed 230 kilovolt line will terminate into the proposed switching station (Calpine 1997, AFC page 6-1).

Project Switchyard

The project switchyard configuration will consist of a four circuit breaker ring bus. The layout will include three 200 million volt ampere generator step-up transformer positions, and the tie line position. The station grounding system will be tied to the generating facility grounds (Calpine 1997, AFC page 6-3). The configuration and grounding system are in accordance with standard utility practices for power plant switchyards.

Short circuit analyses are conducted to assure that breaker ratings are sufficient to withstand high levels of current during a fault (e.g., when a line touches the ground). Western's interconnection study indicates a preliminary maximum fault current of 15,700 amperes on the 230 kilovolt bus. The station circuit breakers will have an interruptable rating of 40,000 amperes. The ring bus will be designed with switches, breakers, and buswork ratings of 2,000 amperes continuous. Staff considers these facilities acceptable (Calpine 1997, AFC page 6-3).

Outlet Line

The outlet line to the Tudor-Murray switching station site will be a 230 kilovolt line approximately 5.7 miles long and will be a double circuit configuration operated as a single circuit design with one 1272 thousand circular mills aluminum conductor steel reinforced conductor per phase[21] (See attached Technical Terms). The line will utilize a single steel pole with davit arm and polymer suspension insulators (see Project Description Figure 4). The ruling span (distance between poles) will be 750 to 800 feet. The minimum ground clearance will be 30 feet at a 90°Centigrade conductor temperature which meets CPUC General Order No. 95 requirements. The right of way will be approximately 100 to 125 feet wide. The 1272 thousand circular mill conductor has a normal/emergency current rating of 1178/1332 amperes and at 230 kilovolts with a power factor of 0.95, the thermal rating is 446/504 megawatts, respectively. The normal conductor rating is based on a maximum conductor temperature of 80°Centigrade with a 40°Centigrade ambient. The emergency rating is based on a maximum summer conductor temperature of 88°Centigrade with a 40°Centigrade ambient[22]. The generating units produce 525 megawatts with a current of 1387 ampere which is essentially within the conductor capability when operated as a single circuit or double[23] circuit line. The Cal-ISO, Western and staff consider the 1272 conductor as the minimum conductor size acceptable for the SPP in order to reliably meet a single circuit outage criteria.

Three alternative outlet line terminations were considered by Calpine (See Alternative Section below).

Sutter Bypass Switching Station Termination

The Sutter Bypass switching station will be located at the south end of an extension of South Township Road next to the Sutter Bypass Tudor-Murray switching station site. The station will consist of a five breaker ring bus arranged to accommodate the two existing Western 230 kilovolt lines, the project's proposed 230 kilovolt line, and a potential future line to Western's Elverta substation. The station maximum fault current will be 17,200 amperes with the circuit breakers having an interrupting rating of 40,000 amperes. The ring bus will be designed with switches, breakers, and buswork ratings

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[21] There will be two phase a, two phase b and two phase c conductors bused together at both the powerplant switchyard and at the Sutter Bypass switching station.

[22] Staff calculation using the EPRI TLW Workstation DYNAMP Program. Wind speed four feet per second, 104 degree Fahrenheit ambient temperature, 80 degree Centigrade maximum normal conductor temperature, 88 degree Centigrade maximum emergency conductor temperature, time 2:00 p.m., date July 8, conductor emissivity 0.9, conductor absorbtivity 1.0, latitude 40 degrees, longitude 122 degrees, incident solar flux 100 percent, line orientation north/south.

[23] Transient analysis during high temperatures (104 degrees Fahrenheit) indicate some temperature excursions above 88 degrees Centigrade but none above 90 degrees Centigrade. Staff considers the conductor as adequate for reliable operation under a single circuit outage.

of 3,000 amperes continuous (Calpine 1997, AFC page 6-5). Staff finds these ratings and configuration acceptable.

SYSTEM RELIABILITY

Introduction

An evaluation of system reliability consists principally of determining if there would be thermal overloads, that voltages are within specified criteria (not too high or low), and that the system is stable (the system should not oscillate excessively). Additional criteria may include assurance that there is sufficient reactive power available. The evaluation of these criteria must be conducted for credible "emergency" conditions that the system might sustain, such as the loss of a single or double circuit line or loss of a transformer, or a combination of these facilities. Planning analyses are conducted in advance of potential system changes, such as the addition of the SPP into the system, in order to prevent a criteria violation. The criteria being used in this evaluation to determine conformance include the WSCC Reliability Criteria for Transmission System Planning, Western, Sacramento Municipal Utility District (SMUD), and PG&E reliability criteria.

Scope of Reliability Studies

The SPP will have a total capacity of 460 to 540 megawatts at 0.85 power factor with three generating units. System studies were conducted at a plant output of 525 megawatts because this is the maximum plant output during the summer season when ambient temperatures are high, corresponding to stressed system conditions. Stressed system conditions for the Sacramento Valley are characterized by high summer loads, high Northern California hydro generation levels, and high flows on the California Oregon Intertie (COI) 500 kilovolt system. Because of existing Sacramento valley voltage problems, an undervoltage load shedding scheme (400 megawatts) has been installed to avert a system voltage collapse under worst case conditions. Worst case conditions would include very high load, high imports and loss of a double circuit line[24]. The SATPG is studying long range transmission alternatives to meet load growth, provide adequate reactive margin, and mitigate voltage problems so the load dropping scheme can be removed (Calpine 1997, Feasibility Study, SATPG 1998b).

A predicted 2003 heavy summer base case power flow was used to represent the Sacramento Valley's highly stressed conditions to determine conformance with system reliability criteria. The power flow case assumed that generation at PG&E's Contra Costa, Moss Landing, and Pittsburg units were displaced by the SPP generation. This resulted in about 75 percent of SPP generation flows on the Sutter Bypass switching station to Elverta substation 230 kilovolt lines, and the remaining 25 percent on the

[24] The shedding occurs at 210 kilovolt with time delay to trip set at 5 to 10 seconds. The loads tripped are SMUD (230 megawatts), PG&E (150 megawatts), and Roseville (20 megawatts).

Sutter Bypass switching station to Keswick and Sutter Bypass switching station to Olinda 230 kilovolt lines (Calpine 1997, Feasibility Study). Northern California hydro generation was approximately 90 percent and the case assumed COI flows of 4800 megawatt (maximum level), Midway to Vincent flows of 2000 megawatt, and Pacific DC Intertie flows of 2400 megawatts into California. Loss of generation at the SPP was accommodated by increasing generation in the PG&E control area. Additionally, the studies evaluated Northern California hydro at 83 percent, 75 percent and at 50 percent to determine the sensitivity of overloads and voltage criteria to this variable.

The standards applied in the studies to determine conformance with system reliability criteria include WSCC, and local area reliability criteria (PG&E, SMUD, Northern California Power Agency (NCPA) and Western). These criteria require generally that the system be evaluated for single facility[25] outages, double facility outages, overlapping outages, and the concomitant loss of generating units and transmission facilities. During such outages, voltages must be within limits, the system should not oscillate excessively, frequency should be within criteria, and load should not be dropped except in extreme conditions. The local area reliability criteria also require that a 150 megavar reactive margin be maintained for loss of a single transmission facility and that voltages must recover to 218 kilovolt upon loss of two circuits, with a positive reactive margin at a critical bus.

Reliability Study Results

The Western conducted SPP Interconnection Study assessed 44 outage cases which simulated single and double circuit outages in the Sacramento valley area. Seven base[26] and outage cases were also conducted to compare existing system response without the SPP project (Calpine 1997, Attachment 3 and attachment 5). Without SPP generation in 2003 and with all facilities in service, the system is expected to have 22 substations with undervoltage levels in violation of criteria (0.95 per unit voltage or lower) and 11 circuits or transformers loaded above 100 percent of their rating under assessed system conditions. With an important line or transformer out of service, system voltages and overloads worsen (Calpine 1997, Feasibility Study, Attachment 3)[27].

In general, the addition of the SPP project improves the performance of the Sacramento valley system. The system studies with the SPP in service and all facilities in service indicates only one substation on the 60 kilovolt system at undervoltage. The worst outage studied was loss of the Table Mountain 500/230

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[25] Transmission circuit, transformer, breaker, etc.

[26] A base or base case study is one in which all generation and transmission facilities which are scheduled are operating under normal but generally stressed conditions and there are no outages.

[27] On August 3, 1998 Calpine submitted a new Sutter Powerplant Interconnection Study(Calpine 1998). This study with improved data assumptions verified the conclusions reached based on the Feasibility Study. Overloads observed with the new study were preexisting and not related to the SPP or were outside the transmission study area.

kilovolt transformer. With or without the SPP generation, there are numerous, serious overloads on the 230 and 115 kilovolt systems. The overloads are slightly less in the case with the SPP generation. Voltages are slightly higher with the SPP generation which helps the area voltage profile. Loss of the Table Mountain to Rio Oso or the Colgate to Rio Oso 230 kilovolt lines cause some minor overloading without the SPP generation. The overloads are slightly less with the SPP generation on line. Bus voltages are slightly higher with the SPP project generating. Loss of the Tracy to Hurley Number one or two lines or loss of the Hurley to Elverta Number one or two lines produce minor overloading in the case without the SPP. Voltages are slightly higher with the SPP project. Loss of the Bellota to Rancho Seco 230 kilovolt lines produces some minor overloading of the 115 kilovolt system without the SPP project. Again, voltages are slightly higher with the SPP on line.

The major overloads that are related to the SPP project are during an outage of the Sutter Bypass switching station to Elverta substation Western lines. While it appears that absent the SPP generation the Elverta Keswick and Elverta Shasta circuits would not overload upon loss of one of the circuits, when the SPP generation is injected into the existing Western lines, overloads of approximately 75 percent occur with the SPP generation in service and one Sutter Bypass switching station to Elverta line out. Alternatives to mitigate the criteria violation included tripping SPP generation or Western's lines or upgrading or building new circuits from the Sutter Bypass switching station to the Elverta substation (Calpine 1997, Feasibility Study, Calpine 1998, Sutter Powerplant Interconnection Study). A remedial action scheme (a control provision) to trip[28] SPP generation down was concluded to be the preferred alternative for the short term and was designated as stage I action (Calpine 1998 page 1). For the longer term a second stage (stage II) consisting of a single or double circuit line from the Sutter Bypass switching station to the Elverta substation may be constructed. This is Western's and staff's preferred mitigation from a reliability perspective but phase II development is highly uncertain at present because of the absence of joint financing resolution and pending Commission approval of the SPP Application. The SATPG has indicated that a decision on system alternatives[29] to resolve the area voltage and load growth problems will not be made until after a consensus on Sacramento valley area alternatives is made (December 31, 1998) and permitting of the SPP is complete. At that time a decision on potential stage II construction will also be made (SATPG 1998b, page 11).

Stability studies were performed by Western to determine system response upon loss of one or both of the Sutter Bypass switching station to Elverta lines or faults at the Rancho Seco, Hurley, or SPP bus (Western 1997, Western 1998). With the remedial action scheme discussed above, loss of one or both of the Sutter Bypass switching

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[28] Depending on loading on the line before the single circuit outage either one unit of 175 megawatts or two units totaling 350 megawatts would be essentially shut down immediately. Under worst case conditions both units may be shut down and the remaining generator ramped down.

[29] These alternatives include 230 and 500 kilovolt transmission facilities not related to the SPP (SATPG 1998).

station to Elverta lines maintains stability. The study results for faults at the Rancho Seco, Hurley, or the SPP bus show no transient dynamic instability.

With the remedial action scheme in place, system reliability criteria would be met and staff finds the measure acceptable. Staff also concludes that the stage II concept is highly uncertain.

Load Growth, Voltage and Reactive Margin Performance

Although Calpine's project objectives do not include enhancing Sacramento Valley area reliability and they are not responsible for same, insertion of the SPP power into the system significantly improves the area voltage profile, provides power for load growth and provides reactive power needed by the area. Western studies indicate that the SPP can provide an additional 350 megawatts of power to the system and improve the reactive power capacity of the area by approximately 240 megavars with all lines in service. Under a Rancho Seco to Bellota line outage the SPP can provide about 265 megavars of reactive power (Calpine 1998).

Because the SATPG members can not count on the availability of the SPP generation to resolve the Sacramento Valley voltage and load growth problems, a renewed high priority effort is underway to study long range solutions, perhaps including a major 500 kilovolt line in Northern California (SATPG 1998b). Other alternatives to accommodate load growth and resolve the area voltage problems have included numerous transmission projects. Of these, three[30] have performed sufficiently to be considered feasible and would provide three to five years of load growth. The SPP project with the addition of a double circuit line from the Sutter Bypass switching station to Elverta substation (stage II) would provide about six years of load growth but this alternative is highly uncertain. Staff commends the efforts of Western and the SATPG to resolve the area load growth and voltage problems[31]. The Cal-ISO should continue to take an active role in resolving the area problems in a timely manner.

System Losses

System losses are very sensitive to generation patterns, generation location and imports. However, system losses will be reduced by 24 megawatts and 239 megavars with the SPP generation in service. If other generation rather than the Bay Area had been reduced in the system simulation, losses may have been quite different. The Cal-ISO Generation Meter Multiplier will be used in actual dispatch to identify loss impacts and to allocate costs of such losses (Cal-ISO 1997b).

ALTERNATIVES

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[30] The alternatives include a new 230 kilovolt circuit from Table Mountain to Elverta or from Elk Grove to Vaca-Dixon, or from Elk Grove to Tracy. Two 500 kilovolt alternatives are also under study.

[31] Calpine has also been quite responsive to the area's future needs in agreeing to finance the double circuit configuration.

Outlet Line

Calpine's proposed outlet is a double circuit configuration line operated as a single circuit 230 kilovolt steel pole line with 1272 thousand circular mill conductors. This alternative was recommended by the Western, the Cal-ISO and staff. As previously stated this conductor size can accommodate the project output. Calpine also considered three other conductor sizes, all of them to be bundled (two conductors per phase). The 1272 thousand circular mill conductors were selected by Calpine because they preliminarily appear to have the lowest present worth costs based on a twenty year analysis period (Calpine 97-AFC-2, Pages 25-28).

An additional outlet option was analyzed by Calpine at staff's request to asses undergrounding of the outlet line from the power plant switchyard to the Sutter Bypass Tudor-Murray switching station site (Calpine 1998n). While underground lines at 230 kilovolt are technically feasible staff considers undergrounding of the outlet highly inappropriate and perhaps infeasible on balance. First, as previously discussed the use of a double circuit outlet is imperative to stage II construction should it go ahead in the future. Staff, Western and the Cal-ISO consider a single circuit outlet unacceptable. The cost increase for an underground double circuit line is about six million to seventeen million dollars. Second, while underground lines (especially the pipe type system) are reliable they do none the less suffer forced outages. Locating and repairing an underground fault can take one to four weeks. During this time the SPP which is needed for the reliable operation of the system could be unavailable[32] if the remaining circuit were forced out of service. Third, underground lines have very high reactance and can introduce significant megavars into the system. While the insertion of megavars into the system at some locations can be beneficial, no studies of this impact have been done. Also, an underground transmission line is a non-switchable source of reactive power that could cause elevation of 230 kilovolt voltages during off peak periods; this also has not been assessed. Before the 5.7 mile or a 4 mile underground option could be approved by the Commission power flow, stability and fault current studies must be conducted and conformance with system reliability criteria reassessed. Fourth, underground transmission lines historically have not been justified except where there was insufficient room for an overhead line, where reliability implications from aircraft were serious, or where there would be significant impact to suburban or city areas. Finally, although beyond the scope of the transmission system engineering discipline underground lines in the Sutter site area are not without environmental impacts (Calpine 1998n). Staff believes at this level of analysis that the underground option should be rejected and additional power flow, stability, and fault current analysis not be conducted.

Route and Switching Station Site Alternatives

[32] A forced outage of the 5.7 mile outlet circuit could also, if stage II construction occurs, take out a 22 mile circuit to Elverta.

Calpine initially considered two outlet/Sutter Bypass switching station alternatives for the O'Banion North switching station site, alternative A and alternative B. Alternative A would have used two, two-circuit lines which would have "looped" the existing Western Keswick and Olinda lines. This would have eliminated the Sutter Bypass switching station because the existing Western lines would have been interrupted with power flowing to the SPP switchyard and then returning on a double circuit line. This alternative was rejected by Calpine.

A second option, alternative B which would terminate on existing Western 230 kilovolt lines, was to use a single circuit 230 kilovolt, steel pole line terminated in a new Sutter Bypass switching station at the O'Banion North site. This option was originally selected by Calpine as their preferred and proposed configuration but was subsequently rejected by Calpine.

As previously discussed, a third switching station site O'Banion-South on the west or east side of the PG&E and Western lines is under evaluation by Calpine, Western and staff. It is a shorter route than the Tudor-Murray switching station site which may reduce costs. It is slightly inferior to the Tudor-Murray site from a reliability perspective because the O'Banion-South site requires undercrossing of the 500 kilovolt line which is not required for Tudor-Murray site. It is likely that the O'Banion-South site can be constructed and operated to fully meet reliability criteria and safety criteria (Personal Cons Mike DeBortoli, Oct 13, 1998), however, additional information from Calpine is needed to verify this. The switchyard size and design will be similar to the switching station site at the Tudor-Murray site. The decision to put the switchyard on the west as opposed to east side of the PG&E and Western lines will be made in the future and will be based partially on the potential stage II construction and operating needs (Calpine 1998q). It appears that there is sufficient room on both the west or east side of the 500 kilovolt and 230 kolovolt lines (Personal Cons, Mike DeBortoli, Oct 13, 1998). It is anticipated that sufficient information will be available by the adjudicatory hearings to determine conformance with reliability and safety criteria and identify relative merit if appropriate. The Tudor-Murray site and switching station configuration is considered acceptable.

Staff has identified an alternative route to the O'Banion South switching station site that would potentially reduce the visual impacts of the route along O'Banion Road. The route proceeds south from the proposed switchyard at the power plant site approximately 0.3 mile to a dirt road that runs west from South Township Road. The route then turns west and proceeds to the existing PG&E 500 kilovolt transmission line. The route then runs south parallel to the PG&E line to the O'Banion South switching station site. The route is approximately 3.8 miles long and would be substantially farther from residences and public roads than the route along South Township Road and O'Banion Road. While this route to the O'Banion South switching station site does not provide access to all of the poles, 230 kilovolt lines infrequently require maintenance. It has not been determined how close the SPP poles could be to the existing PG&E 500 kilovolt lines. It is to be noted also that the adjacent 500 kilovolt and 230 kilovolt lines do not always have road access to the Towers. This route to the degree it parallels existing transmission facilities and could potentially

share existing right or way would also comport with the siting criteria stated in Transmission System and Right of Way Planning for the 1990's and Beyond which put forth the findings pursuant to Senate Bill 2431.

These criteria include:

- TSE-Upgrades: The use of existing right of way should be encouraged by upgrading existing facilities where technically and economically feasible;
- TSE-Existing Right of Way: Expansion of existing right of way should be encouraged whenever construction of new transmission lines is required;
- TSE-New Right of Way: New right of way should be created when justified by environmental, technical, or economic reasons, as determined by the appropriate licensing agency; and
- TSE-Efficient Use of New Capacity: Agreement among all interested parties should be sought on efficient use of new transmission capacity whenever there is a need to construct such capacity.

Termination Point and Facilities

Calpine considered three termination alternatives to deliver project output to the system. Alternative 1 would have been a double circuit 115 kilovolt line to the PG&E Rio Oso substation some 14 miles southeast of the SPP site. This substation is heavily loaded and could not likely accommodate the project output and was eliminated from consideration (Calpine 1997, Section 6, page 29). Alternative 2 would have terminated at Rio Oso also but with a single circuit 230 kilovolt line. This alternative was eliminated for the same reason. Alternative 3 is a single circuit 230 kilovolt line proposed to terminate at the Sutter Bypass switching station which has been previously discussed. As previously discussed, a two circuit configured line is now proposed by Calpine and would terminate in a Sutter Bypass Switching station which has provisions for additional lines for the future. From a transmission System Engineering perspective staff considers the Sutter Bypass switching station at the Tudor-Murray site termination acceptable. Staff anticipates receipt of sufficient additional information by the adjudicatory hearings, to make recommendations on the O'Banion South switching station sites.

FACILITY CLOSURE

CPUC GO-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 conformance in the event of closure of the SPP.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Staff concludes that the power plant switchyard, double circuit outlet line, termination point and Sutter Bypass switching station at the Tudor-Murray site acceptable. The adoption of the proposed conditions of certification will assure compliance with applicable LORS including reliability criteria.

The SPP provides significant power to the Sacramento Valley area, would help mitigate local system voltage problems and provides moderate power for load growth.

RECOMMENDATIONS

From a transmission system engineering perspective staff recommends that the Commission approve the SPP. Staff recommends that the Commission adopt the following findings and the conditions of certification, if it approves the SPP project:

- The SPP provides significant power to the Sacramento Valley area, would help mitigate local system voltage problems and provides moderate power for load growth.
- With the conditions of certification included herein the switchyard, transmission outlet line, and Sutter Bypass switching station at the Tudor-Murray site will likely comply with applicable transmission system engineering 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 1a through 1e listed below. The substitution of CPM approved "equivalent" equipment and equivalent switchyard configurations is acceptable.

a. The project 230 kilovolt project switchyard shall include a four circuit breaker ring bus with breaker ratings of 40,000 amperes (interrupting) and ring bus, switches, breakers and buswork rated at 2,000 ampere continuous.

b. An approximately 5.7 mile double circuit configuration line operated as a single circuit 230 kilovolt line using steel pole construction with conductors sized at a minimum of 1272 thousand circular mill Aluminum Conductor Steel Reinforced shall be constructed to the Sutter Bypass switching station.

c. Termination facilities at the Sutter Bypass 230 kilovolt switching station, the powerplant switchyard, and transmission line shall comply with applicable Western interconnection standards (CPUC General Order 95 and National Electric Safety Code). Bus work, switches and breakers

at the Sutter Bypass switching station shall be rated 3000 ampere continuous with breaker interrupting ratings of 40,000 ampere.

d. Outlet line crossings shall be coordinated with the transmission line owner/operator and comply with the owner's standards.

e. A direct transfer tripping scheme (remedial action scheme) which shuts down one 175 megawatt, two 175 megawatt units, or reduces the plant output upon loss of one of the Sutter Bypass switching station to Elverta lines shall be provided and activated where appropriate.

Verification: At least 30 days prior to start of construction of transmission facilities, the project owner shall submit for approval to the CPM, electrical one-line diagrams signed and sealed by a registered professional electrical engineer in responsible charge, a route map, and an engineering description of equipment and the configurations covered by requirements 1a through 1e above. Substitution of equipment and switchyard 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 of 1a through 1e of TSE-1, and request CPM 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 switchyard configurations shall not begin without prior written approval of the changes by the CPM.

Verification: At least 30 days prior to construction of transmission facilities, the project owner shall inform the CPM of any impending changes which may not conform to requirements 1a through 1e of TSE-1 and request CPM 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 General Order 95 and Western's interconnection standards and these conditions. In case of non-conformance, the project owner shall inform the CPM in writing of 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), one-line drawings of the "as-built" facilities signed and sealed by a registered electrical engineer in responsible charge. A statement attesting to conformance with CPUC General Order 95, Western's interconnection standards and these conditions shall be concurrently

provided. Within 10 days of any non-conformance, the project owner shall submit a written notification to the CPM as described in this condition.

REFERENCES

Cal-ISO (California Independent System Operator). 1997a. Cal-ISO Tariff Scheduling Protocol, Posted April 1998, Amends 1,4,5,6,7 incorporated.

Cal-ISO (California Independent System Operator) 1997b. Cal-ISO Dispatch Protocol, Posted December 1997.

Calpine (Calpine Corporation). 1997. Application for Certification. Sutter Power Plant Project (97-AFC-2). Submitted to the California Energy Commission, December 15, 1997.

Calpine (Calpine Corporation). 1998m. Sutter Interconnection Study. Submitted to the California Energy Commission, August 5, 1998.

Calpine (Calpine Corporation). 1998n. Underground Transmission Line Feasibility Study. Submitted to the California Energy Commission, August 14, 1998.

Calpine (Calpine Corporation). 1998q. Calpine's Mitigation Measures, October 8, 1998.

Hildebrand, C. 1998. Project Director, Calpine Corporation. Telephone conversation with Paul Richins (California Energy Commission), March 17.

NERC (North American Electric Reliability Council) 1997. NERC Planning Standards, September 1997.

SATPG (Sacramento Area Transmission Planning Group). 1998a. Draft Progress Report, Results of Phase 1 Screening study, January 1998.

SATPG (Sacramento Area Transmission Planning Group). 1998b. Progress Report, Results of Phase 1 Screening study, April 27, 1998.

WSCC (Western Systems Coordinating Council) 1997. Reliability Criteria, March 1997.

Western (Western Area Power Administration) 1997. Transient Stability Analysis, August 25, 1997.

Western (Western Area Power Administration) 1998. Transient Stability Analysis II, March 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.
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.
Emergency	See Single Contingency
Gentie	Generation tie or Gentie. The transmission line connecting a generating unit with the utility grid. See also "Outlet".
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.
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 which must be fed by generation units in the system.
Megavolt ampere	MVA. A unit of apparent power, equal to 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	When all customers receive the power they are entitled to without interruption and at steady voltage, and no element of the transmission system is loaded beyond its continuous rating.

N-1 Condition	See Single Contingency
Outlet	Transmission facilities (circuit, transformer, circuit breaker, etc.) linking generation facilities to the main grid. Also referred to as a generation tie or gentie.
Single Contingency	Also known as emergency or N-1 condition, occurs when one major transmission element (circuit, transformer, transmission line, etc.) or one generator is out of service.
Thermal rating	See ampacity.
TSE	Transmission System Engineering.
Undercrossing	A transmission configuration wherein a transmission line crosses below the conductors of another transmission line--generally at 90 degrees.
Underbuild	A transmission or distribution configuration wherein a transmission or distribution circuit is attached to a transmission tower or pole below (under) the principle transmission line conductors.

FACILITY CLOSURE

Testimony of Steve Munro

INTRODUCTION

This section pertains to plans and conditions of certification for the safe and responsible closure of the Sutter Power Plant facility.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

Resource Conservation and Recovery Act (42 U.S.C. §6901 et seq.)

The Act, known as RCRA, sets forth standards for the management of hazardous solid wastes. The provisions of RCRA may be administered in each state by the U.S. Environmental Protection Agency (EPA). However, the law allows EPA to delegate the administration of RCRA to the various states. When a state receives final EPA authorization, its regulations have the force and effect of federal law. EPA grants final authorization when a state program is shown to be equivalent to the federal requirements. The Department of Toxic Substances Control in California received final authorization on August 1, 1992.

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.

The Resource Conservation and Recovery Act also establishes requirements applicable to hazardous waste transporters, including record keeping, compliance with the manifest system, and transportation only to permitted facilities.

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

Public Resources Code, Division 15 (Warren-Alquist Act of 1973)

This law regulates the siting, construction, operation and related aspects of thermo-electric power plants producing 50 or more MW (net) of electrical generation.

Public Resources Code section 40000 et seq. (California Integrated Waste Management Act of 1989)

These sections, comprising Division 30 of the Public Resources Code, regulate solid waste management in California and created the California Integrated Waste Management Board. The Board is required to adopt and revise minimum standards for solid waste handling and disposal, including design, operation, maintenance and ultimate reuse of solid waste processing or disposal facilities.

California Water Code section 13000 et seq. (Porter-Cologne Water Quality Control Act)

This law regulates the discharge of wastes which could affect water quality and is designed to protect surface and groundwaters of the state against contamination and loss of beneficial use. The Act requires the State Water Resources Control Board to classify wastes according to the risk of impairing water quality and the types of disposal sites according to the level of protection provided for water quality. Regional boards issue waste discharge requirements addressing the nature and limiting the release of any wastes which could degrade waters of the state.

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.

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 22, California Code of Regulations, section 66262.10 et seq. (Generator Standards)

These sections establish requirements for generators of hazardous waste. Under these sections, waste generators must determine if their wastes are hazardous according to either specified characteristics or lists of 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, hazardous waste must only be handled by registered hazardous waste transporters. Generator requirements for record keeping, reporting, packaging, and labeling are also established.

California Public Utilities Commission (CPUC) General Order 95 (GO-95), "Rules for Overhead Electric Line Construction"

This order formulates uniform requirements for construction of overhead lines. The order mandates that abandoned electrical transmission lines must be removed.

SETTING

At some point in the future, it is virtually certain that the Sutter Power Plant will cease operation and close down. The closure may be unexpected, or it may be planned. It could be short-term or permanent. Whichever is the case, 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 does not appear to present any special or unusual foreseeable problems at this time, it is impossible to foresee what the situation will be when the project ceases operation which could be in 30 years or more. 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.

IMPACTS

CLOSURE SCENARIOS

There are two circumstances in which a facility closure can take place:

1. When the facility is closed suddenly and/or unexpectedly due to unplanned circumstances such as a natural or other disaster or economic emergency either temporarily or permanently.

2. When the facility is closed permanently in a planned, orderly manner such as at the end of its useful economic or mechanical life or due to gradual obsolescence.

Unexpected Closure

In order to ensure that public health and safety and the environment are protected in the event of an unplanned and/or sudden facility closure or interruption of operations, it is essential to have a plan in place to ensure that necessary mitigating steps are taken at that time. The plan, depending on the nature and expected duration of the closure, may include the following:

- safe shutdown of all equipment,
- draining of all chemicals from storage tanks and other equipment,
- security of the site,
- removal of hazardous materials, and
- other measures as needed.

Planned Closure

A planned permanent closure occurs at the end of a project's life, or when there is a deliberate decision on the part of the project owner to close the facility due to the end of the project's useful life for any reason. In order to ensure that a planned facility closure does not create adverse impacts, the closure process should provide for a careful consideration of available options and applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of closure.

The project owner will submit a facility closure plan to the Commission. The facility closure plan will include the following:

- identification and discussion of the proposed facility closure activities, schedule, and disposition of the power plant, transmission line and all appurtenant facilities constructed as part of the project;
- identification of all applicable laws, ordinances, regulations, and standards (LORS) in effect at the time, including conditions of certification; and
- discussion of how the proposed facility closure activities will comply with those LORS and conditions of certification.

MITIGATION

In the Sutter Power Plant project AFC, the project owner has indicated the steps which would be taken in the event of both a temporary and permanent closure of the facility (SPP 1997a). In the case of a temporary closure, the project owner proposes to notify the Commission of the event and provide 24 hour security coverage. A contingency plan for temporary cessation of operations is proposed. The contingency plan is proposed to address all applicable LORS and protection of public health and safety. It is proposed that the plan, depending on the expected duration of the

shutdown, may include draining of chemicals from storage tanks and other equipment, and the safe shutdown of equipment, and all wastes would be disposed of according to applicable LORS.

With regard to permanent facility closure, the project owner states that the project has an expected life of 30 years, although that may be longer or shorter depending upon circumstances. The proposed closure plan of the project owner could range from "mothballing" the facility to removal of all equipment and appurtenant structures depending on conditions at the time. It is proposed that the plan be developed near the time of the expected closure when more information is available on conditions and LORS as they will exist. At that time, when the proposed facility closure plan is submitted to the Commission for review, it will be distributed to the public and to other agencies for their review and comments. If necessary, a public workshop will be held to discuss the proposed plan.

Commission staff will review the project owner's proposed plan and consider recommendations from all commenters. Based on these recommendations and staff's own analysis, the proposed plan and any mitigation measures will either be accepted without change, or changes to the plan will be drafted for incorporation, and conditions of closure may be recommended to implement the project owner's proposed mitigation, or to implement modified or additional mitigation measures. The resulting recommended closure plan and closure conditions will then be presented for approval by the full Commission.

Staff's proposed mitigation measures are consistent with what the project owner has proposed in the AFC. They set up a mechanism to ensure that proper procedures and steps are followed at the time of closure.

CONCLUSION AND RECOMMENDATIONS

With implementation of the following conditions of certification, the Sutter Power Plant Project can be closed according to an approved plan, ensuring that the closure will have no significant impacts on public health and safety or the environment, and ensuring compliance with applicable laws, ordinances, regulations, and standards in effect when the closure occurs.

PROPOSED CONDITIONS OF CERTIFICATION

CLOSURE-1 Prior to first energization of the project, the project owner shall submit a contingency plan for dealing with an unplanned and/or sudden facility closure or interruption of operations other than those required for normal maintenance. The contingency plan shall provide for the following:

1. taking immediate steps to secure the facility from trespassing or encroachment,

2. removal of hazardous materials,

3. removal of hazardous wastes for closures more than 90 days in duration,

4. draining of all chemicals from storage tanks and other equipment,

5. the safe shutdown of all equipment, and

6. other necessary or prudent measures.

Verification: At least 90 days prior to the first energization of the project, the project owner shall submit to the CPM for review and approval a contingency plan identifying the steps that will be taken in case of an unplanned permanent or temporary facility closure.

CLOSURE-2 In the event of an unplanned and/or sudden facility closure or interruption of operations, the project owner shall notify the Energy Commission CPM, as well as other responsible agencies, by telephone or fax within 24 hours.

The project owner shall take all necessary steps to ensure that there is no immediate danger to health and safety or the environment from materials on the site as provided in the contingency plan described in condition CLOSURE-1.

If the CPM determines that the closure is likely to be permanent or for a duration of more than twelve months, then a plan consistent with the Protocol of condition CLOSURE-3 below shall be submitted to the CPM within 90 days of the CPM's determination (or other mutually agreed upon period of time).

Verification: The project owner shall maintain on-site the contingency plan required by Condition CLOSURE-1 identifying the steps that will be taken in case of an unplanned permanent or temporary facility closure. Within seven days of any unplanned and/or sudden facility closure or interruption of operations, the project owner shall submit a letter to the CPM describing the situation, the expected duration, and any planned actions to protect health, safety, and the environment.

CLOSURE-3 In the event of a planned facility closure, at least 12 months (or other mutually agreed-upon period of time) prior to commencing facility closure activities, the project owner shall file a proposed

facility closure plan with the Energy Commission for review and approval.

Protocol:

1. The plan shall:

    a. Identify and discuss the proposed facility closure activities, mitigation measures, and schedule for the power plant site, transmission line corridor, and all other appurtenant facilities constructed as part of the project;

    b. Identify any facilities or equipment intended to remain on site after closure and the reason, including any potential future use; and

    c. 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.

2. Prior to submittal of the 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.

3. In the event that significant issues are associated with the 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.

4. The project owner shall not commence facility closure activities, with the exception of measures to eliminate any immediate threats to health and safety or the environment, until Commission approval of the facility closure plan is obtained, and the project owner shall comply with any requirements the Commission may incorporate as a condition of facility closure plan approval.

Verification: The project owner shall file 125 copies (or mutually agreed upon lesser number) of the proposed facility closure plan with the Commission. At least six months (or other mutually agreed-upon time) prior to commencing facility closure, the project owner shall participate in a workshop, if the CPM determines that a workshop is necessary, to allow the Sutter County Planning Department and other interested

agencies and parties to comment on the proposed closure plan and determine if there are any changes or additional measures needed in the plan.

REFERENCES

CALPINE (CALPINE) 1992a, Application for Certification, Sutter Power Project, 97-AFC-2, Submitted to the California Energy Commission, December 15, 1997.

COMPLIANCE MONITORING PLAN AND GENERAL CONDITIONS

Testimony of Steve Munro

The project Compliance Monitoring Plan and General Conditions (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 and operated 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 (Commission) and specified in the written decision on the Application for Certification or otherwise required by law.

The Compliance Plan is composed of two 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 Commission approved conditions.

(2) Specific conditions of certification which are found following each technical area that contain the measures required to mitigate any and all potential adverse project impacts to an insignificant level. Each condition of certification also includes a verification provision which describes the method of verifying that the condition has been satisfied.

GENERAL CONDITIONS

COMPLIANCE PROJECT MANAGER (CPM) RESPONSIBILITIES

A CPM will oversee the compliance monitoring and shall be responsible for:

1) Ensuring that the design, construction, operation, and closure of the project facilities is in compliance with the terms and conditions of the Commission's Decision;

2) Resolving complaints;

3) Processing post-certification changes to the conditions of certification, project description, and ownership or operational control;

4) Documenting and tracking compliance filings; and,

5) Ensuring that the compliance files are maintained and accessible.

The CPM is the contact person for the Energy Facilities Siting and Environmental Protection Division and will consult with the appropriate responsible agencies and Commission management when handling disputes, complaints, and amendments.

All required compliance documentation must be 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 will involve all appropriate staff and management.

Pre-Construction and Pre-Operation Compliance Meetings

The CPM shall schedule a pre-construction and, if necessary, a pre-operational compliance meeting prior to the projected start-dates of construction and plant operation. The purpose of these meetings will be to assemble both the Commission's and the project owner's technical staff to review the status of all pre-construction or pre-operation requirements contained in the 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. These meetings shall be scheduled in time to ensure, to the extent possible, that 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.

The CPM shall write letters to the project owner, prior to the start of construction and operation, notifying the project owner when all pre-construction or pre-operation conditions have been satisfied. Any pre-construction conditions not satisfied will be identified, and an explanation provided if approval to start construction or operation is not being given. Approval will be given when outstanding conditions are either satisfied, or the CPM approves, in writing, an agreement to satisfy them.

Commission Record

The 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):

1) All documents demonstrating compliance with any legal requirements relating to the construction and operation of the facility;

2) All monthly and annual compliance reports filed by the project owner;

3) All complaints of noncompliance filed with the Commission; and,

4) All petitions for project or condition changes and the resulting staff or 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 Commission certification, an administrative fine, or other action as appropriate.

Access

The CPM, designated staff, and delegated agencies or consultants, shall be guaranteed and granted 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.

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.

Commission staff and delegate agencies shall, upon request to the project owner, be given 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 providing 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 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 Commissions'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, in most cases without full Commission approval.

Verification of compliance with the conditions of certification can be accomplished by:

1) 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;

2) Appropriate letters from delegate agencies verifying compliance;

3) Commission staff audit of project records; and/or

4) Commission staff inspection of mitigation and/or other evidence of mitigation.

Compliance Reporting

There are two different compliance reports that the project owner must provide to assist the CPM in tracking activities and monitoring compliance with the terms and conditions of the Commission's Decision. During construction, the project owner or authorized agent will submit Monthly Compliance Reports. During operation, an Annual Compliance Report must be provided to the CPM. 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:

1) The technical area,

2) The condition number,

3) A brief description of the verification action required by the condition,

4) The date the submittal is required (e.g., 60 days prior to construction, after final inspection, etc.),

5) The expected or actual submittal date,

6) The date a submittal or action was approved by the CBO, CPM, or delegate agency, if applicable, and

7) An indication of 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. The CPM will provide the project owner with an example of a compliance matrix upon request.

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 clearly identify the report month. The reports shall contain at a minimum:

1) A summary of the current project construction status, a revised/updated schedule if there are significant delays, and an explanation of any significant changes to the schedule;

2) Documents required by specific conditions of certification should be included 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;

3) 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);

4) A list of conditions which have been satisfied during the reporting period, and a description or reference to the actions which satisfied the condition;

5) A list of any deadlines that were missed accompanied by an explanation and an estimate of when the information will be provided;

6) A cumulative listing of any changes to compliance activities which have resulted from negotiations between the project owner and the CPM or Commission or its delegate agencies (Note: changes to conditions, verifications, or other terms of compliance must be approved by the Commission or cleared with the CPM prior to implementation);

7) A listing of any filings to or permits issued by other governmental agencies during the month;

8) A projection of project compliance activities scheduled during the next two months;

9) A listing of the month's additions to the on-site compliance file; and

10) Any requests to dispose of items that are required to be maintained in the project owner's compliance file.

The first Monthly Compliance Report is due the month following the Commission business meeting date that the project was approved, unless the project owner notifies the CPM in writing that a delay is warranted. The first Monthly Compliance Report shall include an initial list of dates for each of the events identified on the Key Events Table (see last page 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 calendar year of commercial operation and are due to the CPM by February 15th of the year immediately following the reporting year. Annual Compliance Reports shall be submitted over the life of the project unless otherwise specified by the CPM. Each Annual Compliance Report shall be identified by year and shall contain the following:

1) 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);

2) A summary of the current project operating status and an explanation of any significant changes to facility operations during the year;

3) Documents required by specific conditions to be submitted along with the Annual Compliance Report. Each of these items must be identified in the transmittal letter, and should be submitted as attachments to the Annual Compliance Report;

4) A cumulative listing of all post-certification changes approved by the Commission or cleared by the CPM;

5) An explanation for any submittal deadlines that were missed, accompanied by an estimate of when the information will be provided;

6) A listing of filings made to or permits issued by other governmental agencies during the year;

7) A projection of project compliance activities scheduled during the next year; and

8) A listing of the year's additions to the on-site compliance file.

Facility Closure

Facility closure requirements are described in the Facility Closure section of this Commission Decision. Upon receipt of the proposed closure plan, the CPM will initiate the Commission's closure plan review process, which is substantially the same as the amendment review process. A description of the closure plan review process can be obtained from the CPM.

Confidential Information

Any information which the project owner deems proprietary shall be submitted to the 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 must remit to the California Department of Fish and Game (CDFG) the required filing fee. The fee must be paid on or before the tenth day following the Commission Business Meeting at which the project was approved by the Commission. No construction may commence until the fees are paid in full, and proof of payment is submitted to the CPM.

The project owner shall submit a copy of the CDFG receipt to the CPM within 30 days of the Commission Business Meeting at which the project was approved by the Commission. The receipt shall identify the project, and indicate the date paid and the amount paid.

DELEGATE AGENCIES

To the extent permitted by law, the Commission may delegate authority for compliance verification and enforcement to various state and local agencies which 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 Commission staff will establish an alternative method of verification and enforcement. Commission staff reserves the right to independently verify compliance.

In performing construction and operation monitoring of the project, the 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.

Employee Awareness Training

Prior to the start of construction and throughout construction, the project owner must present employee awareness training, as needed, to all project managers, construction supervisors, construction workers, and ground disturbance equipment operators. The training will cover the potential to encounter cultural, paleo, or biological resources in the field, the sensitivity and importance of these resources, and the legal obligation to preserve and protect the resources. The training must specify the actions which employees must take, and reporting procedures to follow, when resources are encountered. Refer to the cultural, paleologic, and biological resources conditions of certification for specific training content requirements. The training may be coordinated or conducted separately for each technical area and may include other subjects of concern such as hazardous materials and hazardous waste handling. Proof of employee training shall be maintained on-site for at least one year, and be available for CPM inspection.

Biological resource training, revised as appropriate, shall also be provided to all employees during the operational phase of the project.

Project Construction Monitoring Maps

Prior to the start of construction, the project owner shall provide two copies of a 7.5 minute quadrangle project map, and other maps of suitable scale if specified in the paleologic, cultural, and biological resources conditions of certification, showing rights of way and final alignment of all structures and linear facilities. These maps must identify the geographical areas of concern in the areas of paleontologic, cultural, and biological resources. They must show details including center lines, areas of disturbance associated with project-related access roads, storage yards, laydown sites, pull sites, pump or pressure stations, switchyards, and electrical transmission line tower or pole footings, sensitive animal nesting or burrowing sites, and other features of paleontological, cultural, or biological significance.

Coordination With Designated Project Resource Specialists

Representatives of the project owner shall coordinate with their designated paleontologic, cultural and biological specialists on a weekly basis during construction to ensure that they are kept informed about upcoming construction activities, work locations, and the possible impact on sensitive resources.

ENFORCEMENT

The Commission's legal authority to enforce the terms and conditions of its Decision is specified in Public Resources Code sections 25534 and 25900. The 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 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

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 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 procedure described below.

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 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 Commission's delegate agents.

The 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. The informal procedure may not be used to change the terms and conditions of certification as approved by the Commission, although the agreed upon resolution may result in a project owner, or in some cases 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 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 Commission to conduct an informal investigation of alleged noncompliance with the 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 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 (7) 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 (48) hours, followed by a written report filed within seven (7) days.

Request for Informal Meeting

In the event that either the party requesting an investigation or the 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 (14) days of the project owner's filing of its written report. Upon receipt of such a request, the CPM shall:

1) Immediately schedule a meeting with the requesting party and the project owner, to be held at a mutually convenient time and place;

2) Secure the attendance of appropriate Commission staff and staff of any other agency with expertise in the subject area of concern as necessary;

3) Conduct such meeting in an informal and objective manner so as to encourage the voluntary settlement of the dispute in a fair and equitable manner; and,

4) After the conclusion of such a meeting, promptly prepare and distribute copies to all in attendance and to the project file, a summary memorandum 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, 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 Commission's General Counsel. Disputes may pertain to actions or decisions made by any party including the Commission's delegate agents. Requirements for complaint filings and a description of how complaints are processed is 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, section 1232).

POST CERTIFICATION CHANGES TO THE COMMISSION DECISION: AMENDMENTS, STAFF CHANGES AND VERIFICATION CHANGES

The project owner must petition the 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 informal and 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 determines which type of change process applies is explained below.

Amendment

The 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, it does not have a potential significant environmental impact, and it 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 change procedure can only be used to change verification requirements that are of an administrative nature, usually the timing of a required action. If the 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

October 1998

A

A - Ampere

AAL - all aluminum (electricity conductor)

AAQS - Ambient Air Quality Standards

AC - alternating current

ACSR - aluminum covered steel reinforced (electricity conductor)

AFC - Application for Certification

AFY - acre-feet per year

AHM - Acutely Hazardous Materials

ANSI - American National Standards Institute

APCD - Air Pollution Control District

APCO - Air Pollution Control Officer

AQMD - Air Quality Management District

AQMP - Air Quality Management Plan

ARB - Air Resources Board

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

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

BLM - Bureau of Land Management

BR - Biennial Report

Btu - British thermal unit

C

CAA - U.S. Clean Air Act

CAAQS - California Ambient Air Quality Standards

CALEPA - California Environmental Protection Agency

CALTRANS - California Department of Transportation

CAPCOA - California Air Pollution Control Officers Association

CBC - California Building Code

CCAA - California Clean Air Act

CDF - California Department of Forestry

CDFG - California Department of Fish and Game

CEERT - Coalition for Energy Efficiency and Renewable Technologies

CEC - California Energy Commission

CEM - continuous emissions monitoring

CEQA - California Environmental Quality 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

CO - carbon monoxide

CO_2 - carbon dioxide

CPCN - Certificate of Public Convenience & Necessity

CPM - Compliance Project Manager

CPUC - California Public Utilities Commission

CT - combustion turbine
- current transformer

CTG - combustion turbine generator

CURE - California Unions for Reliable Energy

D

dB - decibel

dB(A) - decibel on the A scale

DC - direct current

DCTL - Double Circuit Transmission Line

DEIR - Draft Environmental Impact Report

DEIS - Draft Environmental Impact Statement

DFG - California Department of Fish and Game

DHS - California Department of Health Services

DISCO - Distribution Company

DOC - Determination of Compliance

DOE - U.S. Department of Energy

DSM - demand side management

DTC - Desert Tortoise Council

DWR - California Department of Water Resources

E

EDF - Environmental Defense Fund

EFS&EPD - Energy Facilities Siting and Environmental Protection Division

EIA - U.S. Energy Information Agency

EIR - Environmental Impact Report

EIS - Environmental Impact Statement

ELFIN - Electric Utility Financial and Production Simulation Model

EMF - electric and magnetic fields

EPA - U.S. Environmental Protection Agency

EPRI - Electric Power Research Institute

ER - Electricity Report

ERC - emission reduction credit {offset}

ESA - Endangered Species Act (Federal)

- Environmental Site Assessment

F

FAA - Federal Aviation Administration

FBE - Functional Basis Earthquake

FCAA - Federal Clean Air Act

FCC - Federal Communications Commission

FEIR - Final Environmental Impact Report

FERC - Federal Energy Regulatory Commission

FIP - Federal Implementation Plan

FONSI - Finding of No-Significant Impact

FRAQMD - Feather River Air Quality Management District

FSA - Final Staff Assessment

G

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, ventilating and air conditioning

I

IAR - Issues and Alternatives Report

IEA - International Energy Agency

IEEE - Institute of Electrical & Electronics Engineers

IIR - Issues Identification Report

IOU - Investor-Owned Utility

IS - Initial Study

ISO - Independent System Operator

J

JES - Joint Environmental Statement

K

KCM - thousand circular mils (also KCmil) (electricity conductor)

KGRA - known geothermal resource area

km - kilometer

KOP - key observation point

KRCC - Kern River Cogeneration Company

kV - kilovolt

KVAR - kilovolt-ampere reactive

kW - kilowatt

kWe - kilowatt, electric

kWh - kilowatt hour

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

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

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

NCPA - Northern California Power Agency

NEPA - National Energy Policy Act
- National Environmental Policy Act

NERC - National Electric Reliability Council

NESHAPS - National Emission Standards for Hazardous Air Pollutants

NMHC - nonmethane hydrocarbons

NO - nitrogen oxide

NOI - Notice of Intention

NO_x - nitrogen oxides

NO_2 - nitrogen dioxide

NOP - Notice of Preparation (of EIR)

NOV - Notice of Violation

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

OSHA - Occupational Safety and Health Administration (or Act)

P

PG&E - Pacific Gas & Electric Company

PDCI - Pacific DC Intertie

PHC(S) - Prehearing Conference (Statement)

PIFUA - Federal Powerplant & Industrial Fuel Use Act of 1978

PM - Project Manager
- particulate matter

PM_{10} - particulate matter 10 microns and smaller in diameter

$PM_{2.5}$ - particulate matter 2.5 microns and smaller in diameter

ppb - parts per billion

ppm - parts per million

ppmvd - parts per million by volume, dry

ppt - parts per thousand

PRC - California Public Resources Code

PSD - Prevention of Significant Deterioration

PSRC - Plumas Sierra Rural Electric Cooperative

PT - potential transformer

PTO - Permit to Operate

PU - per unit

PURPA - Federal Public Utilities Regulatory Policy Act of 1978

PX - Power Exchange

Q

QA/QC - Quality Assurance/Quality Control

QF - Qualifying Facility

R

RACT - Reasonably Available Control Technology

RDF - refuse derived fuel

ROC - Report of Conversation
- reactive organic compounds

ROG - reactive organic gas

ROW - right of way

RWQCB - Regional Water Quality Control Board

S

SB - Senate Bill

SCAB - South Coast Air Basin

SCE - Southern California Edison Company

SCFM - standard cubic feet per minute

SCH - State Clearing House

SCIT - Southern California Import Transmission

SCR - Selective Catalytic Reduction

SCTL - single circuit transmission line

SDG&E - San Diego Gas & Electric Company

SIC - Standard industrial classification

SIP - State Implementation Plan

SMAQMD - Sacramento Metropolitan Air Quality Management District

SMUD - Sacramento Municipal Utility District

SNCR - Selective Noncatalytic Reduction

SNG - Synthetic Natural Gas

SO_2 - sulfur dioxide

SO_x - sulfur oxides

SO_4 - sulfates

SoCAL - Southern California Gas Company

STIG - steam injected gas turbine

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

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

USC(A) - United States Code (Annotated)

USCOE - U.S. 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

VOC - volatile organic compounds

W

W - Watt

WAA - Warren-Alquist Act

WEPEX - Western Energy Power Exchange

WICF - Western Interconnection Forum

WRTA - Western Region Transmission Association

WSCC - Western System Coordination Council

WSPP - Western System Power Pool

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DECLARATIONS & WITNESS QUALIFICATIONS