Final Staff Assessment

COSUMNES POWER PLANT PROJECT

(Part 1)

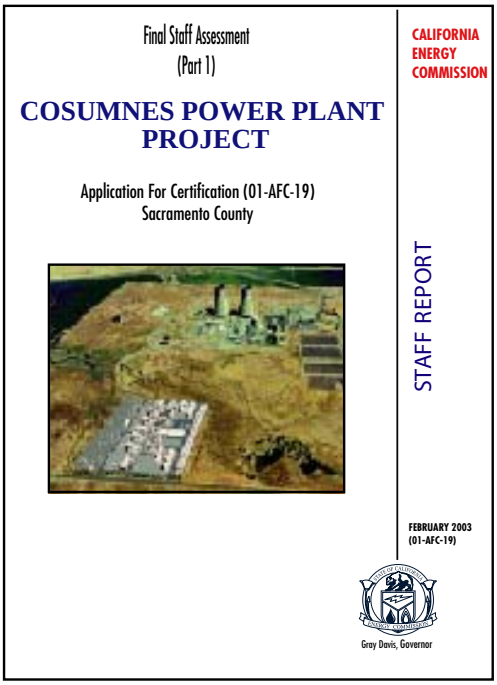
Application For Certification (01-AFC-19)
Sacramento County

CALIFORNIA
ENERGY
COMMISSION

STAFF REPORT

FEBRUARY 2003
(01-AFC-19)

Gray Davis, Governor



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EXECUTIVE SUMMARY

(FSA Part 1)

With the goal of facilitating timely project hearings, the Committee has directed staff to publish the Final Staff Assessment (FSA) in parts. This is Part 1 of the FSA. It contains staff's analysis and recommendations for all technical areas except Biological Resources, Alternatives, Water and Soil Resources, and Appendix A – Water Supply and Cooling Options. These sections will be published at a later date. (See discussion under Overview of Staff's Conclusions.)

On September 13, 2001, the Sacramento Municipal Utility District (SMUD) filed an Application for Certification (AFC) with the Energy Commission to construct and operate the Cosumnes Power Plant (CPP). The Energy Commission deemed the application complete at its November 14, 2001 business meeting. The analyses contained in this FSA are based upon information from: 1) the AFC; 2) workshops, site visits, and responses to data requests; 3) supplementary information from federal, state, and local agencies; 4) existing documents and publications; and 5) staff research.

This FSA contains the Energy Commission staff's independent analysis and recommendations on the CPP. The CPP and related facilities such as the electric transmission lines, water supply lines, natural gas line, and interconnection, valve, and compressor stations are under the Energy Commission's jurisdiction (Pub. Resources Code § 25500). When issuing a license, the Energy Commission acts as lead state agency (Pub. Resource Code § 25519(c)) under the California Environmental Quality Act (Pub. Resource Code §§ 21000 et seq.). The Energy Commission's licensing process has been certified by the Secretary for Resources, allowing the Commission's siting process documentation to be used in lieu of an environmental impact report (Cal. Code Regs., tit. 14 § 15251(k)).

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

This FSA is not the decision of the Energy Commission. It represents staff's assessment, conclusions and recommendations. A proposed decision on the CPP will be made by a committee of two Commissioners assigned to the procedure after evidentiary hearings in which testimony of the applicant, Energy Commission staff, and other parties are heard, and public comment taken. The Commissioners will consider the recommendations of all interested parties, including those of the Energy Commission staff; the applicant; intervenors; concerned citizens; and local, state, and federal agencies before making a final decision on the application to construct and operate the CPP.

PROJECT LOCATION AND DESCRIPTION

The proposed CPP project site is located approximately 0.5 miles south of the Rancho Seco Nuclear Plant (currently undergoing decommissioning), 25 miles southeast of the City of Sacramento, in Sacramento County. The site consists of approximately 30 acres of an overall 2,480-acre site owned by SMUD. See **Project Description Figure 1** for the regional location of the project and a more complete description of the plant. The following description describes the highlights of the project.

The project as proposed by SMUD would be a nominal 1,000 MW natural gas-fired, combined cycle facility, using cooling tower technology. Electricity generated by CPP would be transmitted over 0.4 miles of new 230kV double-circuit transmission line from the on-site switchyard to the existing switchyard at Rancho Seco. Plant cooling water for Phase 1 would be supplied from the American River, delivered by the Folsom-South Canal. Fuel for the natural gas-fired turbines would be piped through a new 26-mile natural gas line located between the project site and the Carson Ice-Gen Cogeneration Facility, also located in Sacramento County.

SMUD has proposed to build the project in two 500 MW phases, and plans to commence construction of the first phase in 2003. Commercial operation of the first phase would begin in 2005. SMUD has stated it would decide in 2003 whether to proceed with Phase 2 and whether to complete permitting. SMUD estimated that construction of Phase 2 would take 18 months and would not be operational prior to 2008, at the earliest.

To the extent sufficient information is available, staff analyzed the impacts of both phases of the proposed project. However, there are three technical areas for which staff could not fully assess both phases of the project: air quality, transmission system engineering, and water and soil resources. <u>As a result, only the first 500 MW is actually being considered for licensing during this proceeding</u>. When SMUD is prepared to move forward with Phase 2 of the project, at a minimum, a supplement to the AFC will be required for further analysis and licensing.

Originally, SMUD proposed to discharge process wastewater (plant cooling water) to Clay Creek, located northwest of the project site. On July 10, 2002, SMUD informed staff they have modified the project to include a zero-liquid discharge (ZLD) system designed to eliminate off-site disposal of wastewater. With a ZLD system, process wastewater would be reclaimed and reused, to the extent possible. Cooling water would be cycled approximately 12 times in the cooling tower; wastewater would then be directed to a brine crystallizer. Sanitary wastewater from sinks and toilets would be discharged to an onsite septic tank and leach field. ZLD would be used in both phases, interconnected for process redundancy.

Associated air quality equipment would include emission control systems necessary to meet the proposed air emission limits. NO_x emissions would be controlled using a selective catalytic reduction (SCR) system in the heat recovery steam generators (HRSGs). SMUD proposes to provide space in the HRSG for a high-temperature oxidation catalyst system in case the project cannot meet the proposed carbon monoxide emissions.

SMUD has only identified enough air emission offsets for Phase 1 of the project. Therefore, the Determination of Compliance from the Sacramento Metropolitan Air Quality Management District (District) only addresses a 500 MW facility. If and when SMUD decides to pursue Phase 2, SMUD would need to identify and provide additional air emission offsets.

Due to the uncertain future demands and constraints on the Northern California electric transmission system, staff is unable to assess impacts (e.g., overloads) that could occur in 2008 (the earliest Phase 2 would be operational). If and when SMUD decides to pursue Phase 2, SMUD would need to provide additional transmission system impact studies for the future on-line date of Phase 2.

PUBLIC AND AGENCY COORDINATION

Publicly noticed workshops were held on all topics of staff's assessment. Workshops were held in the community of Herald, at the Rancho Seco Plant conference room, and at the Energy Commission offices.

Several of the workshops were attended by local, state and federal agencies including, but not limited to: Sacramento Metropolitan Air Quality Management District (SMAQMD), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), California Department of Fish and Game (CDFG), Department of Toxic Substances Control, Central Valley Regional Water Quality Control Board (CVRWQCB), and Sacramento Regional County Sanitation District. These workshops have been held by staff to understand the issues and concerns of the public, intervenors, agencies, and the applicant. Many helpful comments were received during the workshops.

In addition to these workshops, extensive coordination has occurred with the numerous local, state, and federal agencies that have an interest in the project.

Written comments on the project and staff's Preliminary Staff Assessment have been received and are considered in the Response to Public and Agency Comments section and within the technical sections of this FSA as appropriate.

STAFF'S ASSESSMENT

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

- the environmental setting of the proposal;
- impacts on public health and safety, and measures proposed to mitigate these impacts;
- environmental impacts, and measures proposed to mitigate these impacts;
- the engineering design of the proposed facility, and engineering measures proposed to ensure the project can be constructed and operated safely and reliably;
- project closure;

- project alternatives;
- compliance of the project with all applicable laws, ordinances, regulations and standards (LORS) during construction and operation; and
- proposed conditions of certification.

OVERVIEW OF STAFF'S CONCLUSIONS

At this time, staff is unable to complete four sections of this FSA: Biological Resources (Section 4.2), Water and Soil Resources (Section 4.14), Alternatives (Section 6), and Appendix A – Alternative Water Supply and Cooling Options (Section 8). Staff intends to complete and file the Water and Soil Resources and the Alternative Water Supply and Cooling Options sections in the near future. The Biological Resources and Alternatives sections will be completed once staff has received all the pertinent information from the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and SMUD necessary to make a recommendation. Staff will file and distribute those sections under separate cover.

Aside from Biological Resources and Water and Soil Resources, based on the information to date, staff believes that the project's environmental impacts can be mitigated to less than significant levels. Staff's analysis also indicates that the project can comply with all LORS. Below is a summary of the potential environmental impacts and LORS compliance for each technical area.

Summary of Environmental Impacts and LORS Conformance		
Technical Discipline	**Environmental/ System Impact?**	**Conforms with LORS?**
Air Quality	Impacts mitigated	Yes
Biological Resources	Inconclusive	Inconclusive
Cultural Resources	Impacts mitigated	Yes
Power Plant Efficiency	No	N/A
Power Plant Reliability	No	N/A
Facility Design	N/A	Yes
Geology, Mineral Resources, & Paleontology	Impacts mitigated	Yes
Hazardous Materials	Impacts mitigated	Yes
Land Use	No	Yes
Noise and Vibration	Impacts mitigated	Yes
Public Health	Impacts mitigated	Yes
Socioeconomics	No	Yes
Traffic and Transportation	Impacts mitigated	Yes
Transmission Line Safety	No	Yes
Transmission System Engineering	No	Yes
Visible Plumes	No	
Visual Resources	Impacts mitigated	Yes
Waste Management	No	Yes
Water and Soil Resources	Inconclusive	Inconclusive
Worker Safety	No	Yes

Summarized below are staff's conclusions regarding Air Quality, which has been difficult to resolve. Staff will address the impact significance and compliance with LORS for Biological Resources and Water and Soil Resources in future staff filings.

Air Quality

The CPP as proposed has the potential to create significant impacts to local and regional air quality unless additional mitigation is provided. Staff found that the project's emissions have the potential to cause significant impacts relative to the state 24-hour PM_{10} (particulate matter less than 10 microns in diameter) air quality standard. In addition, the project would also contribute to existing violations of the recently promulgated federal 8-hour ozone and 24-hour $PM_{2.5}$ standards. Therefore, in addition to the mitigation measures contained in the Final Determination of Compliance from the air district to mitigate the project's PM_{10} and $PM_{2.5}$ emissions, staff proposes that the SMUD implement a wood stove replacement program.

Additionally, SMUD and the District have proposed that ammonia (NH_3) slip emissions be maintained at 10 ppm. However, due to ammonia's contribution to the formation of $PM_{2.5}$, staff believes that the project can and should be designed to maintain 5 ppm; which has been required by the South Coast Air Quality Management District and recommended by U.S. Environmental Protection Agency and CARB for other projects.

ENVIRONMENTAL JUSTICE

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or a socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies. Meaningful involvement means that: (1) potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health; (2) the public's contribution can influence the regulatory agency's decision; (3) the concerns of all participants involved will be considered in the decision making process; and (4) the decision makers seek out and facilitate the involvement of those potentially affected.

Staff's environmental justice approach includes providing notice (in appropriate languages) of the proposed project and opportunities for participation in public workshops to people of color and/or low-income communities, and providing information on staff's environmental justice approach to persons who attend staff's public workshops. The table below lists the public outreach conducted to date.

Meeting or Event	Date
4,700 Bilingual Project Description Flyers sent to Galt Joint Union Elementary School District for Distribution	October, 2001
AFC, Project Description Posters, and 25 Project Description Flyers sent to the Galt Neighborhood Library	October 18, 2001
AFC, Project Description Posters, and 25 Project Description Flyers sent to the Elk Grove Library	October 18, 2001
5,500 Project Description Flyers sent to Galt Chamber of Commerce for Distribution	October 21, 2001
16,000 Project Description Flyers sent to Galt Herald Newspaper for Distribution with Newspapers	December 6, 2001
Public Informational Hearing and Site Visit in Herald	December 19, 2001
Site Visit and Data Response Workshop in Herald	January 23, 2002
Hearing on Project Status in Sacramento	May 14, 2002
Issue Resolution Workshop in Sacramento	May 15, 2002
Data Response and Issue Resolution Workshop at Rancho Seco	June 11-12, 18, and 25, 2002
Preliminary Staff Assessment Workshop in Herald and Sacramento	August 26, 28 and September 5, 6, and 24, 2002

Energy Commission staff performs a demographic screening analysis in each energy facility siting process to determine whether a low-income and/or people of color population exists within the potentially affected area of the proposed project (a 6-mile radius of the proposed project). For the CPP, based on Census 2000 data, staff found that the population of people of color within the potential affected area is 16.5 percent. However, there are pockets of this population within the area that are greater than 50 percent people of color. Therefore, staff has conducted a focused environmental justice review for this project. (Refer to the **Socioeconomics** section of this FSA to review staff's demographics screening analysis.)

When people of color and/or low-income populations are identified, staff in eleven technical areas (i.e., Air Quality, Hazardous Materials, Land Use, Public Health, Noise and Vibration, Socioeconomics, Traffic & Transportation, Transmission Line Safety and Nuisance, Visual Resources, Waste Management, and Water and Soil Resources) consider possible impacts on these populations as part of their analysis. In addition, when staff determines that pockets or clusters of people of color population are present within the 6-mile radius, staff considers possible impacts on those populations.

Staff has evaluated the potential for unmitigated or disproportionate adverse impacts on Environmental Justice populations in the vicinity of the proposed CPP, and found none.

CONCLUSIONS AND RECOMMENDATIONS

Excluding the technical areas of Biological Resources and Water and Soil Resources, staff has determined that, with the recommended mitigation, the construction and operation of the CPP would not create a significant impact to the environment, public health and safety, or the electric transmission grid.

However, without the complete analysis of Biological Resources and Water and Soil Resources, staff cannot make a definitive recommendation on the project at this time. Staff will make its final recommendation on the entire CPP project once the analyses of Biological Resources and Water and Soil Resources are complete.

As discussed above, to the extent possible, staff has analyzed both phases of the project to the fullest extent allowed by the information that is currently available. Additional detail regarding Phase 2 will be needed, at a minimum, in the areas of Air Quality, Transmission System Engineering, and Water and Soil Resources. Staff's proposed conditions of certification for all other technical areas appear sufficient at this time for Phase 2, however, there may be changes to the project, changed circumstances, or new information that would require staff to undertake additional analyses in the other technical areas. Therefore, should Phase 1 of the project be approved, staff recommends that the Energy Commission make the following finding in its final decision:

> "Provided that the project owner submits an application within 3 years of the effective date of a Commission decision to approve Phase 1 of the project, the Commission's review of the application shall be limited to Air Quality, Soil and Water Resources, and Transmission System Engineering, unless any of the circumstances identified in Title 14, California Code of Regulations, section 15162(a)(1) - (3) have occurred (changes to the environment, laws and regulations, and the project). The Commission shall issue its findings and render a final decision on Phase 2 within 12 months after the supplemental application is deemed complete or, if the provisions of Title 20, California Code of Regulations, section 2021 et seq. are met, within 6 months after the application is deemed complete. If an application is not filed within 3 years, a new AFC will be required for Phase 2."

COSUMNES POWER PLANT (01-AFC-19)
FINAL STAFF ASSESSMENT (PART 1)

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INTRODUCTION

PURPOSE OF THIS REPORT

The Final Staff Assessment (FSA) presents the California Energy Commission (Energy Commission) staff's independent analysis of the Sacramento Municipal Utility District's (SMUD or "applicant") Application for Certification (AFC) for the Cosumnes Power Plant (CPP) project. The FSA is a staff document. It is neither a Committee document (the Committee is comprised of two commissioners who have been assigned to the project to oversee the progress of the case), nor a draft Energy Commission decision. The FSA describes the following:

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

The analyses contained in this FSA are based upon information from: 1) the AFC; 2) subsequent submittals; 3) responses to data requests; 4) supplementary information from local and state agencies and interested individuals; 5) existing documents and publications; and 6) independent field studies and research. The FSA presents a description of the project, environmental setting, analyses, conclusions, recommendations, and proposed conditions of certification that apply to the design, construction, operation, and closure of the proposed facility.

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

ORGANIZATION OF THE STAFF ASSESSMENT

The FSA contains an Executive Summary, Introduction, Project Description, Staff's Environmental and Engineering Assessments, and Project Alternatives. The environmental, engineering, and public health and safety analysis of the proposed project is contained in a discussion of 19 technical areas. Each technical area is addressed in a separate chapter. They include the following: air quality, public health, worker safety and fire protection, transmission line safety, hazardous material

management, waste management, land use, traffic and transportation, noise, visual resources, cultural resources, socioeconomics, biological resources, soil and water resources, geological and paleontological resources, facility design, power plant reliability, power plant efficiency, and transmission system engineering. These chapters are followed by a discussion of facility closure, project construction and operation compliance monitoring plans, and a list of staff that assisted in preparing this report.

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

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

ENERGY COMMISSION SITING PROCESS

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

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

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

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

The staff typically prepares both a preliminary and final staff assessment (PSA and FSA). The FSA presents the staff's preliminary analysis, conclusions, and recommendations for the applicant, intervenors, agencies, other interested parties and members of the public. Staff uses the PSA to resolve issues between the parties and to narrow the scope of adjudicated issues in the evidentiary hearings. During the period between publishing the PSA and the FSA, staff conducts one or more workshops in Sacramento County to discuss their findings, proposed mitigation, and proposed compliance monitoring requirements. Based on the workshops and written comments, staff refines the analysis, corrects errors, and finalizes conditions of certification. Responses to written comments on the PSA are incorporated into the FSA. The FSA serves as staff's testimony on the applicant's proposal.

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

Following the hearings, the Committee's recommendation to the full Energy Commission on whether or not to approve the proposed project will be contained in a document entitled the Presiding Members' Proposed Decision (PMPD). Following publication, the PMPD is circulated for a minimum of 30 days in order to receive written public comments. At the conclusion of the comment period, the Committee may prepare a revised PMPD. A revised PMPD is required to undergo a 15-day comment period. At the close of the comment period for the revised PMPD, the PMPD is submitted to the full Energy Commission for a decision. Within 30 days of the Energy Commission decision, any party may appeal the decision to the Energy Commission. A Compliance Monitoring Plan and General Conditions will be assembled from conditions contained in the FSA and other evidence presented at the hearings. The Compliance Monitoring Plan and General Conditions will be presented in the PMPD. The Energy Commission staff's implementation of the plan ensures that a certified facility is constructed, operated, and closed in compliance with the conditions adopted by the Energy Commission. Staff's proposed Compliance Monitoring Plan and General Conditions are included at the end of the FSA.

PUBLIC AND AGENCY COORDINATION

In preparing the FSA, Energy Commission staff conducted several publicly noticed workshops. These workshops served not only to allow discussion between staff and the applicant, but also to hear from intervenors, interested agencies, and members of the public.

Staff also coordinated with relevant local, state and federal agencies, such as the Sacramento Metropolitan Air Quality Management District, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, California Department of Fish and Game, Department of Toxic Substances Control, Central Valley Regional Water Quality Control Board, Native American Heritage Commission, Sacramento County, Yolo County, City of Elk Grove, and the Ione Band of Miwok Indians.

Written comments received from members of the public, and letters from agencies that require some form of response, have been included in this FSA. The **Response to Comments** section (Section 3.2) of this FSA contains an index of all comments received and a listing of where these comments are addressed.

PROJECT DESCRIPTION

INTRODUCTION

On September 13, 2001 the Sacramento Municipal Utility District (SMUD or "applicant") filed an Application for Certification (AFC) with the California Energy Commission for the construction and operation of the Cosumnes Power Plant (CPP), a proposed nominal 1,000-megawatt (MW) natural gas-fired, combined-cycle electric generating facility.

The proposed CPP site would be located approximately 25 miles southeast of the City of Sacramento, in Sacramento County, four miles north of the San Joaquin County line and five miles west of the Amador County line (see **Project Description Figure 1**). The project would be located on approximately 30-acres of an overall 2,480-acre area owned by SMUD. The project site is generally bound by the Rancho Seco Nuclear Plant (currently being decommissioned) to the north, Rancho Seco Reservoir to the east, State Route 104 (also known as Twin Cities Road) to the west, and Clay East Road to the south (see **Project Description Figure 2**).

Land immediately surrounding the CPP site is owned by SMUD. The nearest residence is located approximately 800 feet southwest of the site.

SMUD is proposing to build the project in two 500 MW phases, with the first phase commencing construction in 2003 and commercial operation in 2005. SMUD will decide in 2003 whether to proceed with Phase 2 or to defer seeking approval for and the construction of Phase 2 to a future date. Although both phases will be examined in this proceeding, only the first 500 MW will actually be considered for licensing. Please see the **Executive Summary** section of this Final Staff Assessment (FSA) for further discussion of the licensing process and review that would be required for Phase 2 of the CPP.

SMUD customers would be the first in line to receive electricity produced from the CPP and additional supply would be made available for purchase by the state-operated California Power Authority, which would pay market rate for the surplus energy (SMUD 2001i). SMUD has stated that the CPP would have an availability factor of 92 to 98 percent. (SMUD 2001a, § 2.2.16.)

PROPOSED PROJECT

The following are the major components of both phases of the power plant (see **Project Description Figure 3**):

- Four General Electric 7FA combustion turbine generators (CTGs) equipped with dry, low oxides of nitrogen (NOx) combustors;
- Four heat recovery steam generators (HRSGs) (without duct burners);
- Two condensing steam turbine generators (STGs);
- Deaerating surface condensers;

- Two 9-cell mechanical-draft evaporative cooling towers; and
- A zero-liquid discharge system.

Each phase would have two combustion turbines, two HRSG, and one condensing steam turbine, and would utilize mechanical–draft cooling towers and a zero-liquid discharge system.

FUEL

Natural gas for the first 500 MW (Phase 1) of the project would be supplied to the project site by extending a natural gas pipeline 26 miles that would originate at the Carson Ice-Gen cogeneration Facility, in Sacramento County. In general, from SMUD's existing pipeline near the Carson Ice Generation Facility, the natural gas pipeline alignment follows the Union Pacific Railroad right-of-way south to Core Road. Then the alignment travels eastward along Core Road, continuing east and southeast through agricultural land to Eschinger Road. The pipeline would then cross the Cosumnes River and State Route 99 to Arno Road. The alignment would continue east along Arno Road to Valensin Road, Twin Cities Road (State Route 104), and Clay East Road to the CPP site (see **Project Description Figure 4**).

On November 1, 2002, the applicant proposed a revised natural gas pipeline alignment for a 1-mile portion of alignment in order to avoid impacts to sensitive habitat within the Laguna Stone Lake Wetland Preserve (SMUD 2002ax). At the intersection of the Union Pacific Railroad right-of-way and Elk Grove Boulevard, the proposed revised alignment would then continue east, south of Elk Grove Boulevard for about ¼-mile to the east side of Franklin Boulevard. The alignment would then continue southwest on the east side of Franklin Boulevard for about one mile and then rejoin the original alignment near the Union Pacific Railroad (see **Project Description Figure 5**).

Gas pipeline installation methods include trenching (e.g., open-cut or soil excavation), boring (e.g., a boring machine with an auger or ramming device to "jack" the pipe into place), and horizontal direction drilling (HDD) (e.g., a pilot hole is drilled and the pipe is pulled through the hole). AFC Figure 6.1-2 shows locations of the proposed construction method for the 26-mile alignment (SMUD 2001a, §6.4). Construction would be limited to a designated construction corridor, generally 75 feet in width or less (SMUD 2001a, §8.2.5.2).

Two new natural gas compressor stations would be required to fuel Phase 2 of the project. One compressor station would be located at the existing connection of SMUD's pipeline to Pacific Gas & Electric's backbone pipeline 400/401 on County Road 29 near County Road 88 in Yolo County (see **Project Description Figure 6**). The 4,152 horse power, electric-driven, natural gas compressor station is anticipated to be skid mounted, approximately 10 feet x 20 feet x 8 feet high, surrounded on four sides by an acoustical wall or in an acoustical enclosure for noise attenuation (SMUD 2002p, §1.1.1.1).

The other compressor station would be located near SMUD's existing Valve 190 station in Elk Grove, within the buffer area of the Sacramento Regional Wastewater Treatment Plant (see **Project Description Figure 7**). This station is anticipated to be a 2,191 horse power, skid mounted, electric-driven compressor, approximately 10 feet x 20 feet

x 8 feet high, within a slatted fence enclosure or surrounded by acoustical walls or within an acoustical enclosure (SMUD 2002p, §1.1.1.2)

One new natural gas pipeline interconnection station and three new gas pipeline valve stations are also required for the CPP project (see **Project Description Figure 4**). All mainline valves would be below ground at these stations. The only items anticipated to be above ground would be the high head extensions for the valves (about 3.5 feet above the ground surface), a blow off stack (about 8 feet above the ground surface and 10 inches in diameter), and a remote terminal unit (to send and receive information regarding natural gas flow rates, pressures, temperatures, valve positions, station entry, etc.). Each remote terminal unit would be enclosed in a 5-foot x 8-foot x 8-foot high structure. A slatted 6-foot cyclone fence topped with barbed wire would enclose each valve station. (SMUD 2002p, §1.1.2.)

The natural gas pipeline interconnection station would connect the new pipeline to SMUD's existing pipeline. It would be located across the street from Carson Ice Generation Facility and would be approximately 75 feet x 75 feet in size. The two valve stations that are proposed to be located near Core Road/Bruceville Road and Arno Road/Valensin Road would each be approximately 50 feet x 50 feet in size. However, the valve station proposed near Valensin Road/Alta Mesa Road would be approximately 100 feet x 100 feet in size. (SMUD 2002p; §1.1.2.)

WATER

SMUD proposes to use approximately 5,300 acre-feet (af) of water per year to meet both phases of the project's cooling and process water requirements (SMUD 2002ae, §8.14.4). SMUD has an existing water service contract with the U.S. Bureau of Reclamation that expires in 2012 for delivery of a maximum of 75,000 af per year via the Folsom-South Canal (which originates at Lake Natoma, which is located approximately 25 miles north of the CPP site on the American River). Of this amount, 15,000 af is water that was originally assigned to SMUD by the city of Sacramento and the remaining 60,000 af is Central Valley Project (CVP) water.

The point of delivery of the CVP water is through an existing turnout located approximately 700 feet upstream from the Laguna Creek siphon, on the Folsom-South Canal . Water from the turnout is pumped east through a 66-inch diameter pipeline to the Rancho Seco Plant. Water for the CPP would be diverted through an approximate 0.5-mile long, 12-inch diameter water pipeline to be located between the existing booster pump station (that pumps water to Rancho Seco Reservoir) and the CPP site (see **Project Description Figure 8**). The reservoir pipeline can also use gravity flow to provide water from the reservoir to the CPP if the water supply pump station at Folsom-South Canal is not operational. (SMUD 2001a; §7.1.)

An onsite water treatment system would treat and condition the incoming raw water for use in the cooling towers, potable domestic water, plant service water, and to produce demineralized water for HRSG makeup water (SMUD 2001a; §7.1).

WATER DISCHARGE

SMUD has proposed the use of a zero-liquid discharge (ZLD) system to process all plant cooling water, resulting in no cooling water discharge (SMUD 2002ae, §3.14). The circulating water system blowdown, including water from the Folsom-South Canal, various process waste streams, and residues of anti-scalants and anti-biofouling chemicals would be processed by a brine concentrator and crystallizer to produce a dry salt cake product (SMUD 2002ae, §8.14.4.1). The salt cake would be hauled offsite to an appropriate landfill facility (SMUD 2002ae, §3.13).

Sanitary waste water from sinks, toilets, showers, and other sanitary facilities would be collected and discharged to a package sanitary waste treatment system and leach field, eventually percolating into the groundwater (SMUD 2001a; §2.2.9.1 and SMUD 2002ae, Figure 2.2-1R2).

Stormwater runoff from the CPP would discharge into Clay Creek (SMUD 2002ae, §8.14.5.1)

ELECTRICITY DISTRIBUTION

Output from the CPP generators would be connected to the existing Rancho Seco Plant switchyard by means of three overhead 230-kV circuits, extending approximately 0.5 mile north from the facility to the Rancho Seco Plant switchyard (see **Project Description Figure 8**). Two circuits would be carried on one set of double circuit steel pole structures and one circuit would be carried on a single-circuit single pole structure, resulting in a total of two sets of transmission line towers (six towers in all). All three lines would be constructed as part of Phase 1 (SMUD 2002p, §1.3).

CONSTRUCTION ROAD

SMUD has proposed the development of a construction access road along the east side of the Rancho Seco Plant (see **Project Description Figure 8**). Construction workers and equipment would be brought to the CPP site by traveling east along Twin Cities Road, then turning south into the joint entrance of the Rancho Seco Plant and Racho Seco Park. Vehicles would then follow the road to Rancho Seco Park for a short distance. Once past the park's entrance gate, vehicles would then turn south and follow a road that would be constructed from the gatehouse due south to Clay East Road. The new construction road would be two lanes, 24 feet wide (12 feet per lane), composed of asphaltic concrete on a raised gravel base, with several drainages to accommodate the naturally occurring seasonal flows. The road would be designed to accommodate heavy loads needed for construction of the plant (SMUD 2002p, §1.2.). Vehicles would then travel west on Clay East Road to the CPP site.

CONSTRUCTION LAYDOWN AND PARKING AREAS

An approximate 20-acre construction laydown and parking, located south of the proposed CPP site, south of Clay East Road is proposed by SMUD (see **Project Description Figure 8**). SMUD proposes to revegetate the laydown area after construction is complete (SMUD 2003d).

CONSTRUCTION SCHEDULE

The first 500 MW (Phase 1) is expected to be on-line by spring 2005 (SMUD 2001a, §2.2.15). During 2003, SMUD would determine whether to build the second 500 MW (Phase 2) or to defer construction (SMUD 2001h). Construction of Phase 1 is anticipated to take 24 months to complete and Phase 2 to take 18 months. Commercial operation of Phase 2 is expected to begin spring 2008 if construction is not deferred by SMUD (SMUD 2001a, §1.2). Please see the **Executive Summary** section of the FSA for further discussion of the licensing process and review that would be required for Phase 2 of the CPP.

REFERENCES

SMUD (Sacramento Municipal Utility District) 2001a. Application for Certification, Volumes 1 and 2 (01-AFC-19). Submitted to the California Energy Commission on September 13, 2001. Docket date September 13, 2001.

SMUD (Sacramento Municipal Utility District) 2001h. SMUD Cosumnes Power Plant project website – project overview. http://www.smud.org/cpp/project.htm. 2001. Site accessed May 7, 2002.

SMUD (Sacramento Municipal Utility District) 2001i. SMUD Cosumnes Power Plant project website – Q&A. http://www.smud.org/cpp/info/info_qa.htm. Site accessed May 7, 2002.

SMUD (Sacramento Municipal Utility District) 2002p. AFC Supplement B. April 15, 2002. Docket date April 15, 2002.

SMUD (Sacramento Municipal Utility District) 2002ae. AFC Supplement C – Zero Liquid Discharge Arrangement. July 18, 2002. Docket date July 19, 2002.

SMUD (Sacramento Municipal Utility District) 2002ax. AFC Supplement D – Pipeline Alignment and Construction Laydown Modifications. November 1, 2002. Docket date November 1, 2002.

SMUD (Sacramento Municipal Utility District) 2003d. Revised Informal Data Response, Set 13 – Revised Drainage Plan. January 24, 2003. Docket date January 24, 2003.

RESPONSE TO PUBLIC AND AGENCY COMMENTS

Below is an index of comments received from interested members of the public and governmental agencies that contained questions on staff's Preliminary Staff Assessment of the Cosumnes Power Plant (CPP) or other comments that require some form of response. A few of the questions or comments are answered in this section, but most are addressed in the applicable technical section referenced below. Responses appearing in separate technical sections are included under the heading, "Response to Public and Agency Comments." Following the index is a copy of each comment.

AGENCY COMMENTS ON THE PSA

CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS) - LETTER DATED SEPTEMBER 17, 2002

This letter contained comments and recommended conditions regarding the natural gas pipeline crossings underneath State rights-of-way. These comments are addressed in the **Traffic and Transportation** section of the FSA.

CALIFORNIA REGIONAL STATE WATER QUALITY CONTROL BOARD – LETTER DATED SEPTEMBER 20, 2002

The Regional Board had comments regarding the project's proposed secondary treatment system and concerns about degradation to groundwater. These comments are addressed in the **Water and Soil Resources** section of the FSA.

DEPARTMENT OF TOXIC SUBSTANCES CONTROL (DTSC) – LETTER DATED OCTOBER 17, 2002

DTSC concurs with the staff's conclusion that the proposed CPP will comply with applicable LORS governing the management of hazardous substances during facility construction, operation, and closure.

CITY OF ELK GROVE COMMUNITY DEVELOPMENT DEPARTMENT – LETTER DATED SEPTEMBER 27, 2002

The City of Elk Grove Community Development Department had comments regarding Air Quality, Biological Resources, Cultural Resources, Hazardous Materials, Land Use, Traffic and Transportation, and Visual Resources. These comments are addressed in the respective sections of the FSA.

YOLO COUNTY PLANNING AND PUBLIC WORKS DEPARTMENT – LETTER DATED NOVEMBER 12, 2002

The Yolo County Planning and Public Works Department recommended conditions regarding the natural gas compressor station proposed to be located near County Road 88 in Yolo County (required for Phase 2). These comments are addressed in the Land Use section of the FSA.

PUBLIC COMMENTS (NON-INTERVENORS) ON THE PSA

KAREN FRENCH

KF-1 Believes there are significant impacts regarding visual resources, visible plumes, biological resources, and alternative sites that must be mitigated.

Response: Please refer to the respective sections of the FSA for staff's proposed mitigation measures and conditions of certification to reduce aesthetic and biologic resource impacts from the project.

KF-2 The AFC downplays any significant impact in the areas of biological resources, visual resources, and visible plumes. The conclusions reached in the PSA are not supported by adequate research and analysis. Staff's analysis dismisses proposed site alternatives with no supporting data. Rushing to approve yet another fossil fuel plant without careful analysis and mitigation is short sighted.

Response: Staff's conclusions and recommendations presented in the FSA are based on staff's technical expertise, research, independent analysis, and professional judgment. Staff is recommending numerous mitigation measures and conditions of certification to reduce impacts to less than significant levels.

KF-3 Disagrees with the PSA assessment of the visual quality of the area as low to moderate range and that the Rancho Seco Plant and electrical towers are the prominent features of the landscape from all KOPs. The panoramic views from Mt. Diablo to the Sierra Nevada is vastly more prominent than any manmade structure. The proposed project and staff's recommended landscaping of fast growing trees will block a significant portion of view of the panorama. Staff's proposed mitigation will not protect commentor's view. (Please see **Visual Resources** section of FSA.)

KF-4 Land adjacent to the Rancho Seco site is rare blue oak grassland which is a scenic treasure and directly conflicts with staff's conclusion that the area is "low to moderate in visual quality." (Please see Visual Resources section of FSA.)

KF-5 One of the measures of importance of visual impact appears to be the number of people who will see the plumes, structure, light, etc. The very lack of people is the reason most of us have chosen to live in the greater Cosumnes basin. (Please see **Visual Resources** and **Visible Plumes** sections of the FSA.)

KF-6 Staff's proposed mitigation of providing a fence around the pipeline construction area will do nothing for the commentor's view of the construction of the pipeline along Twin Cities Road due to the difference in elevation between the road and the commentor's residence. (Please see **Visual Resources** section of FSA.)

KF-7 The commentor grazes horse, sheep, and cattle in the pasture across the road from the proposed pipeline. Pipeline construction could impact them.

Response: SMUD proposes the use of trenching as the construction method to install the pipeline along Twin Cities Road. SMUD anticipates installing 100 feet to 500 feet of pipeline per day. Construction in the vicinity of the grazing livestock would likely be accomplished in a day or two. In addition, staff is recommending mitigation requiring SMUD to keep soil moist during construction to reduce dust.

KF-8 Disagrees with staff's assessment of the vicinity of the project site as being low to moderate in visual quality. The early morning hours when the project's dominant plumes will be visible is the exact same time period when commentor and neighbors are outside performing farm chores or driving on the highway. It is the time of day the Sierra Nevada is most visible and magnificent. I cannot comprehend staff's conclusion that the plumes "would not cause significant and adverse direct or cumulative visual impacts." The plumes would be visible to area travelers and residents within a 10-mile radius of Rancho Seco, including most of Wilton. The staff analysis fails to note that the existing plant creates a cumulative impact when combined with the plume. (Please see **Visible Plumes** section of the FSA.)

KF-9 Current lighting at the Rancho Seco Plant has increased recently and is visible from commentor's house all night. Commentor is concerned that increased lighting from CPP will further obscure the night sky. An unobscured night sky is important to the commentor. The PSA fails to note the cumulative impact of lighting or to address SMUD's increased lighting at the site. To reduce glare and improve the night sky, conditions of certification should require SMUD to mitigate the lighting at Rancho Seco Plant. (Please see **Visual Resources** section of FSA.)

KF-10 Burrowing owls are on her land within 100 feet of the proposed gas line. A pair of nesting Swainson's hawks are located in trees along Clay Station Road. The birds forage on her land and are vulnerable to construction equipment. SMUD's proposed activities may jeopardize their existence. SMUD's and staff's analysis are completely inadequate. Until adequate information is available and has been analyzed, no final staff assessment can be completed or should be filed. (Please **see Biological Resources** section of the FSA.)

KF-11 Visual and biological impacts have not been adequately mitigated, therefore a more in-depth discussion of alternative sites must take place. The Staff Assessment is incomplete and subject to legal challenge in the absence of such analysis and discussion. Staff's analysis of alternatives is based on the generation of 1000 MW. Staff rejects the Proctor & Gamble and Campbell Soup sites because there is insufficient land to support a 1000 MW facility. The analysis should be based on a 500 MW facility. No analytical data supports the rejection of these sites. These sites would not have the impacts associated with a 26-mile pipeline (bio & visual). Urges a more careful review of alternatives to site the plant closer to the population center which places the demand for electricity and to ensure that significant impacts of the project are mitigated. (Please see **Alternatives** section of the FSA.)

KF-12 Believes the construction of this project will result in adverse effects on this rural environment. Staff should carefully assess alternatives, in light of the inadequate information on rare and endangered species. The destruction of wildlife habitat cannot be mitigated adequately. The Energy Commission should require real mitigation, e.g.,

installation of plume abatement technology; remove/recycle some of the fencing, lighting, reactor, rail line, cooling towers, etc.; and restore land at RSP before being allowed to destroy additional habitat and build more industrial structures.

Response: Please see the **Biological Resources** section of the FSA for a response regarding sensitive habitat. Please see the **Visible Plumes** section of the FSA for a response to plume abatement technology mitigation.

The Rancho Seco Plant is under the jurisdiction of the federal Nuclear Regulatory Commission (NRC) and was not licensed by the Energy Commission. The Energy Commission only has the authority and ability to require mitigation and conditions to avoid and minimize impacts resulting from SMUD's proposed CPP project. SMUD is in the process of decommissioning the Rancho Seco Plant and they are removing structures from the site. However, the NRC and SMUD would determine the extent of removal, clean up, and restoration.

RK-1 Is concerned about the visible plumes conclusions. 1,172 hours of plumes during clear, daytime weather conditions and 10th percentile plumes of 380 feet high and 272 feet long are significant since the view of the Sierra Nevada mountains would be obscured. (Please see **Visible Plumes** section of the FSA.)

RK-2 What would the plume length at the 5th percentile level? How often would the plume exceed 1 km in length? (Please see **Visible Plumes** section of the FSA.)

RK-3 Believes that visible plumes that may exceed 1,000 meters in length is a substantial impact. (Please see **Visible Plumes** section of the FSA.)

RK-4 Suggests that the applicant be required to mitigate the visible plume impacts to the maximum degree possible. (Please see **Visible Plumes** section of the FSA.)

SK-1 Is worried about air pollution and visual pollution from future smoke stacks and cooling towers. Take every effort to minimize pollution and vapor plumes from the plant. (Please see **Air Quality** and **Visible Plumes** sections of the FSA.)

MC-1 RSP's huge plume was out of character to the rural area of rolling hills, oaks, farmhouses, crops, and rangeland. Based on the visual simulations, the CPP will introduce large steam plumes to the skyline. The plumes will create a significant impact. Does not want to see the plumes in the spring and winter months. The analysis states the plumes would be higher than the existing RSP towers and spew for 50 minutes in the morning on clear days between November through April. Believes that this is a significant impact to their views. (Please see **Visible Plumes** section of the FSA.)

MC-2 How are the grading terms (low, moderate, moderate-high, and high) derived? Is there a mathematical equation to determine moderate or moderate-high expectation? How are the various scales determined? The methodology used is confusing and not understandable to the public. (Please see **Visible Plumes** section of the FSA.)

MC-3 There is no discussion of the combined visual impacts of the existing RSP, the new power plant, and the plumes from the CPP. It is all treated separately. Why are plumes and structures analyzed separately if they are all part of the same project? (Please see **Visible Plumes** section of the FSA.)

MC-4 Does not agree that the visual impacts of the project are insignificant. Large industrial plumes are out of character for the area. RSP was built before the environmental review process and is an eyesore. Because an eyesore is there now doesn't justify adding to the eyesore. Why not require technology to reduce the plumes? (Please see **Visible Plumes** section of the FSA.)

AIR QUALITY

Testimony of Tuan Ngo, P.E.

INTRODUCTION

This analysis addresses the potential air quality impacts resulting from criteria air pollutant emissions created by the construction and operation of Phase 1 of the Cosumnes Power Plant (CPP). Criteria air pollutants are those for which a state or federal standard has been established. They include nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3) and its precursors: oxides of nitrogen (NO_x) and volatile organic compounds (VOC), particulate matter less than 2.5 microns ($PM_{2.5}$) and less than 10 microns in diameter (PM_{10}) and their precursors (NO_x, VOC, SO_2), and lead (Pb). Non-criteria air pollutants are addressed in the **Public Health** section of this Final Staff Assessment (FSA).

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

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

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

FEDERAL

The federal Clean Air Act requires the proponent of any new major stationary sources of air pollution and any major modifications to major stationary sources to obtain a construction permit before commencing construction. This process is known as New Source Review (NSR). NSR requirements differ depending on the attainment status of the area where the major source would be located. Prevention of Significant Deterioration (PSD) requirements apply in areas that are in attainment of the national ambient air quality standards. The NSR requirements apply to areas that have not demonstrated compliance with national ambient air quality standards. The entire program, including both PSD and NSR permit reviews, is referred to as the federal NSR program.

Title V of the federal Clean Air Act requires states to implement and administer an operating permit program. Large sources are required to operate in compliance with the

Title V requirements promulgated in Title 40, Code of Federal Regulations, Section 70. A Title V permit contains all of the requirements specified in different air quality regulations, which affect an individual project.

The U.S. Environmental Protection Agency (EPA) has reviewed and approved the District's regulations and has delegated to the District the implementation of the federal PSD, NSR, and Title V programs. The District implements these programs through its own rules and regulations, which are, at a minimum, as stringent as the federal regulations.

The CPP's gas turbines are also subject to the federal New Source Performance Standards (NSPS). These standards include a NO_x emissions concentration of no more than 75 parts per million (ppm) at 15 percent excess oxygen (ppm@15%O_2), and a SO_x emissions concentration of no more than 150 ppm@15%O_2.

STATE

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

LOCAL

As part of the Energy Commission's licensing process, in lieu of issuing a construction permit to the applicant for the CPP, the District prepares and presents to the Energy Commission a Determination of Compliance (DOC). The DOC evaluates whether and under what conditions the proposed project would comply with the District's applicable rules and regulations, as described below. The District has provided staff with a Final DOC (FDOC) and recommended conditions to ensure compliance with the District rules and regulations. Staff has incorporated the District findings and all necessary conditions into this FSA.

The project is subject to the specific District rules and regulations that are briefly described below:

Rule 102 Makes it unlawful for a person to circumvent any applicable section of rules and regulations.

Rule 201 Provides an administrative procedure for the review of new sources of air pollution and of the modification and operation of existing sources through the issuance of permits.

Rule 202 Requires that a source be subject to a New Source Review (NSR) process if it is a new or modified stationary source. The NSR process includes an evaluation of Best Available Control Technology (BACT), an air quality impact analysis, and emission offsets.

- Section 304: States that inter-pollutant offsets are discouraged and may only be allowed between precursor contaminants. It further states that the Air Pollution

Control Officer may approve the inter-pollutant offsets on a case-by-case basis, provided that the applicant demonstrates through the use of air quality modeling that the new emissions will not cause a new violation or contribute to an existing violation of the ambient air quality standard. In addition, it requires that inter-pollutant offsets used at a major stationary source must be approved, in writing, from the federal EPA.

- Sections 414, 415, 417 and 418: Require that calculations of emissions offset triggers and required for NO_x, VOC, PM_{10}, and SO_2 should be based on the potential to emit (maximum capacity) of the polluting units.

Rule 401 Limits the discharge of air contaminants into the atmosphere through visible emissions and opacity.

Rule 402 Protects the public's health and welfare from the emission of air contaminants, which constitute a nuisance.

Rule 403 Regulates operations, which periodically may cause fugitive dust emissions into the atmosphere.

Rule 404 Limits the discharge of particulate matter in the atmosphere through the establishment of an emission concentration limit of 0.1 grains per dry standard cubic foot.

Rule 405 Limits the discharge of dust and condensed fumes into the atmosphere by establishing rates based on process weight.

Rule 406 Limits the emissions of sulfur compounds to no greater than 0.2 percent calculated as SO_2 and combustion contaminants to no greater than 0.1 grains per dry standard cubic foot (gr/dscf).

Rule 801 Establishes requirements for general definitions, monitoring, records, and administrative requirements applicable to the federal New Source Performance Standard (NSPS).

Rule 805 Establishes limits for NO_2 and SO_2 from new or modified stationary gas turbines with a designed heat rate input of 10 MMBtu/hr or more. The proposed turbines NO_x concentrations shall not exceed 75 ppm dry at 15% oxygen, and SO_2 concentrations shall not exceed 150 ppm dry at 15% oxygen.

Rule 901 Establishes the general definitions, monitoring and administrative requirements applicable to the federal National Emission Standards for Hazardous Air Pollutants (NESHAP).

SETTING

METEOROLOGY AND CLIMATE

The project site is located 0.5 mile south of the Rancho Seco Facility, 25 miles southeast of the City of Sacramento, in southeastern Sacramento County. The area is characterized by relatively hot and dry summers, cold and moist winters, and cool and

breezy springs and falls. The daily average temperature ranges from 47°F in winter to 77°F in summer. During late fall and winter, cold air from the surrounding mountains, low dispersion and stable atmospheric conditions produce fog in the valley, which normally burns off by mid-day.

The annual precipitation of the area is approximately 17.1 inches, with most of the rainfall occurring during the months of November through March. The area averages 58 rainy days per year.

The wind data collected at the Executive Airport (SMUD 2001a, Appendix A), located approximately 22 miles northwest of the project site, shows that the wind direction and intensity vary significantly by season, although the predominant wind direction is from the south and southwest.

Mixing heights in the area have been estimated to range from approximately 350 meters in the morning to 1,600 meters in the afternoon (Holzworth 1972). High mixing heights, normally associated with unstable conditions, can lead to greater dispersion of air pollutants.

EXISTING AMBIENT AIR QUALITY

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

In general, an area is designated as attainment if the concentration of a particular air contaminant does not exceed the standard. Likewise, an area is designated as non-attainment for an air contaminant if that contaminant standard is violated. Where not enough ambient data are available to support designation as either attainment or non-attainment, the area can be designated as unclassified. The unclassified area is normally treated the same as an attainment area for regulatory purposes. An area could be attainment for one air contaminant while non-attainment for another, or attainment for the federal standard and non-attainment for the state standard for the same air contaminant. The entire area within the boundaries of an air district is usually evaluated to determine the district's attainment status.

The proposed project area is designated as non-attainment for the federal PM_{10} and ozone standards, and attainment for the federal SO_2, CO, and NO_2 standards.

The project area is designated as non-attainment for the state ozone and PM_{10} standards, and attainment for the NO_2, SO_2, CO, lead, H_2S, and sulfate standards.

Air Quality Table 1
Ambient Air Quality Standards

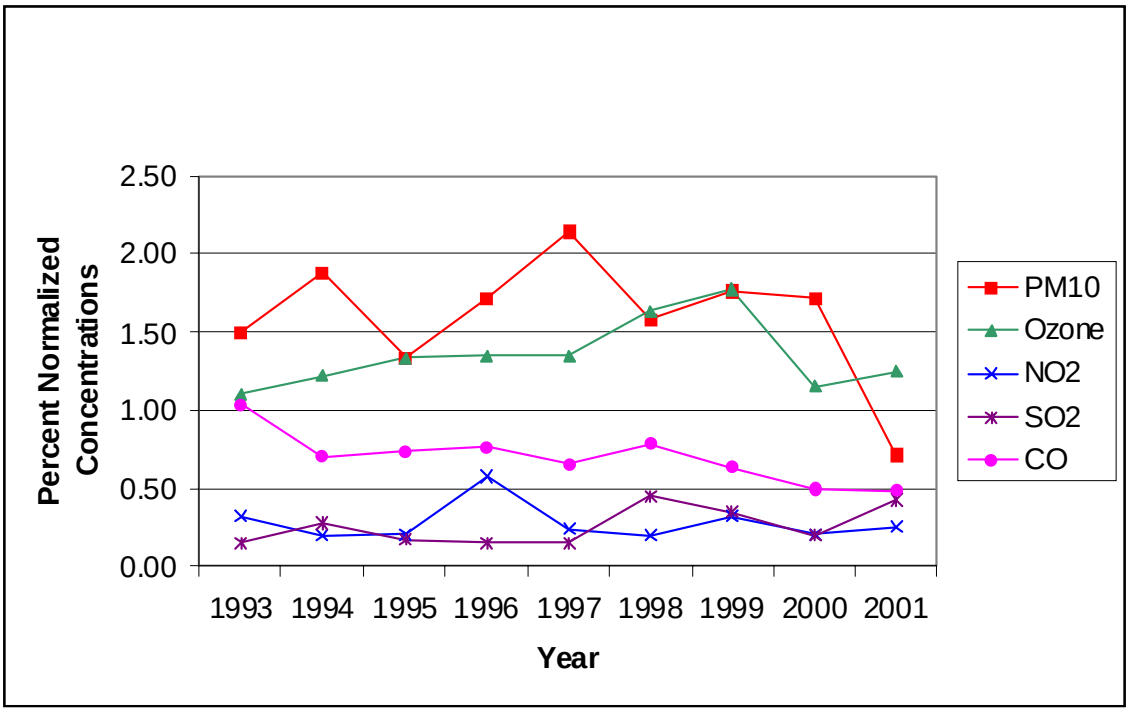
Pollutant	Averaging Time	California Standards	Federal Standards	
			Primary	Secondary
Ozone(O_3)	1-hour	0.09 ppm (180 $\mu g/m^3$)	0.12 ppm (235 $\mu g/m^3$)	Same as primary
Particulate Matter (PM_{10})	Ann.Geo. Mean	30 $\mu g/m^3$	---	Same as primary
	24-hour	50 $\mu g/m^3$	150 $\mu g/m^3$	
	Ann.Arit. Mean	---	50 $\mu g/m^3$	
Fine Particulate Matter ($PM_{2.5}$)	24-hour	No separate standard	65 $\mu g/m^3$	Same as primary
	Ann.Arit. Mean		15 $\mu g/m^3$	Same as primary
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	None
	8-hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	
Nitrogen Dioxide (NO_2)	1-hour	0.25 ppm (470 $\mu g/m^3$)	---	Same as primary
	Ann.AritMean	---	0.053 ppm (100 $\mu g/m^3$)	
Lead(Pb)	30-day	1.5 $\mu g/m^3$	---	Same as primary
	Cal. Quarter	---	1.5 $\mu g/m^3$	
Sulfur Dioxide (SO_2)	Ann.Arit. Mean	---	0.03 ppm (80 $\mu g/m^3$)	---
	24-hour	0.04 ppm (105 $\mu g/m^3$)	0.147 ppm (365 $\mu g/m^3$)	---
	3-hour	---	---	0.5 ppm (1300 $\mu g/m^3$)
	1-hour	0.25 ppm (655 $\mu g/m^3$)	---	---
Sulfates	24-hour	25 $\mu g/m^3$	No federal standard	
H_2S	1-hour	0.03 ppm (42 $\mu g/m^3$)	No federal standard	

Source: California Air Resources Board

Air Quality Figure 1 summarizes the historical air quality data for the project location for PM_{10}, CO, SO_2, ozone (O_3), and NO_2. In **Air Quality Figure 1**, the normalized concentrations represent the ratio of the highest measured concentrations in a given year to the most stringent applicable national or state ambient air quality standard. [In **Air Quality Figure 1**, the most stringent standards are the state ambient air quality standards.] Therefore, normalized concentrations lower than one indicate that the highest measured concentrations were lower than the most stringent ambient air quality standards. Based on the ambient concentration data collected, the area is consistently maintained below the most stringent ambient air quality standards for all criteria

pollutants except for PM_{10} and ozone. Below is an in-depth discussion of ambient air quality conditions in the area for ozone, NO_2, CO, and PM_{10}.

Air Quality Figure 1
Normalized Maximum Short-Term Historical Air Contaminant Concentrations: 1993-2001



Notes: PM_{10} data are measured from Stockton Boulevard station.
Ozone, NO_2 data are measured from Elk Grove station.
CO data are measured from T Street station.
SO_2 data are measured from Del Paso station.
Source: Air Resources Board.

Ozone

Ozone is not directly emitted from stationary or mobile sources, but is formed as the result of chemical reactions between nitrogen oxides, volatile organic compounds, and to a lesser extent CO, in the presence of sunlight.

The peak ambient ozone concentrations, recorded between 1993 and 2001, have ranged from 10 (in 1993) to 16 (in 1999) parts per hundred million (pphm). The area experienced between 3 (in 1993) to 21 (in 1996) violation days a year of the state's 1-hour ozone air quality standard. Based on these recorded data, the area has experienced a slightly increased trend in both ozone concentrations and the number of violation days.

Nitrogen Dioxide (NO_2)

As shown in **Air Quality Figure 1,** the highest NO_2 levels in the area, measured in 1996, are about half of the most stringent NO_2 ambient air quality standards. In other years, 1993 to 1995, and 1997 to 2001, the measured NO_2 levels are no more than 30

percent of the most stringent standard. Approximately 90 percent of the NO_x emitted from combustion sources is NO, while the balance is NO_2. NO is oxidized in the atmosphere to NO_2, but some level of photochemical activity is needed for this conversion. The highest concentrations of NO_2 typically occur during the fall when atmospheric conditions favor the trapping of ground level releases but lack significant photochemical activity (less sunlight). In the summer, the conversion rates of NO to NO_2 are high but the relatively high temperatures and windy conditions (atmospheric unstable conditions) disperse pollutants, preventing the accumulation of NO_2 at levels approaching the 1-hour ambient air quality standard.

Carbon Monoxide (CO)

The highest CO concentration levels measured in the area in 1993 through 2001 show a steady declining trend (see **Air Quality Figure 1**). The highest concentrations of CO occur when low wind speeds and a stable atmosphere trap the pollution emitted at or near ground level in what is known as the stable boundary layer. These conditions occur frequently in the wintertime, late in the afternoon, persist during the night, and may extend one or two hours after sunrise.

Particulate Matter (PM_{10})

As shown in **Air Quality Figure 1**, PM_{10} concentrations measured in the local area have persistently exceeded the state 24-hour PM_{10} standard over the last 10 years. The highest PM_{10} concentrations are normally measured in the winter, especially during evening and night hours. During wintertime high PM_{10} episodes, the main sources of PM_{10} contributions are wood smoke, and combustion of fossil fuels. During each winter from the period 1993 to 2000, the area has experienced from two to seven violations of the state 24-hour PM_{10} air quality standard. The area did not experience a violation of either the state or the federal PM_{10} standards in 2001.

Fine Particulate Matter ($PM_{2.5}$)

Fine particulate matter is derived mainly from either the combustion of materials, or from precursor gases (SO_x, NO_x, and VOC) through complex reactions in the atmosphere. $PM_{2.5}$ consists mostly of sulfates, nitrates, ammonium, elemental carbon, organic compounds, and a variety of other compounds.

The EPA has promulgated a 65 $\mu g/m^3$ 24-hour $PM_{2.5}$ standard, and a 15 $\mu g/m^3$ annual $PM_{2.5}$ standard. However, they have not determined the attainment status of any district.

The ARB recently adopted a new annual $PM_{2.5}$ standard of 12 μg/m3, but has not determined the attainment status of any district. The ARB also considered adopting a new 24-hour $PM_{2.5}$, but deferred the adoption of such standard until a later date. Given the debate on the proposed 24-hour standard of 25 $\mu g/m^3$, it is difficult to predict where a California 24-hour PM2.5 standard might fall other than between 25 and 65 $\mu g/m^3$.

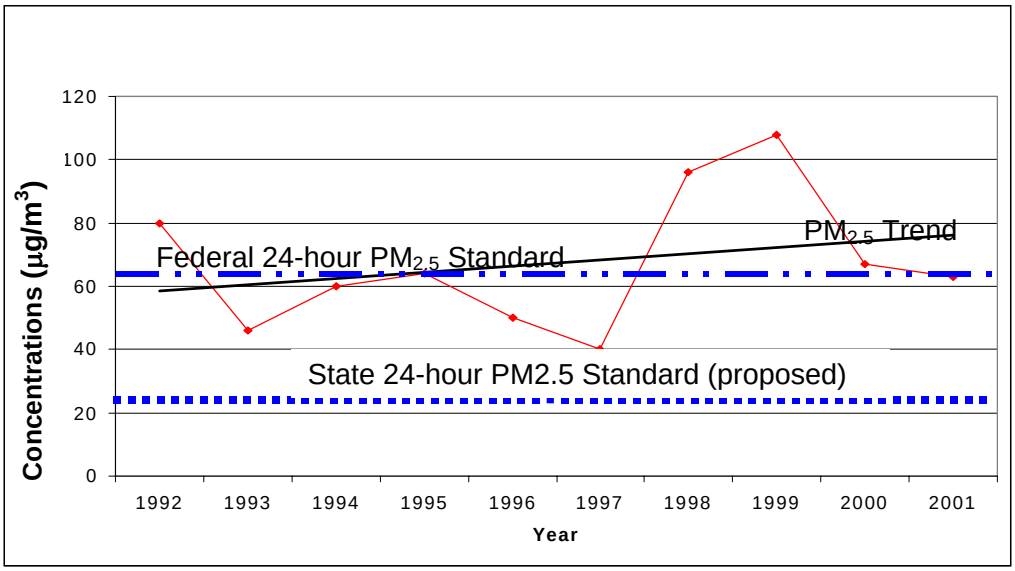
Presented in **Air Quality Figure 2** are $PM_{2.5}$ data collected at the Sacramento T Street monitoring station from 1991 to 2001. These data indicate that the highest $PM_{2.5}$ concentration normally occurs during November to January. These $PM_{2.5}$ data show that the highest $PM_{2.5}$ concentrations range from 40 $\mu g/m^3$ in 1997 to 108 $\mu g/m^3$ in 1999. The data in **Air Quality Figure 2** show a steadily increasing trend in the 24-hour $PM_{2.5}$

concentrations since 1991. Based on these data, the area would likely be designated as non-attainment for the federal 24-hour $PM_{2.5}$ and the proposed state 24-hour $PM_{2.5}$ standard.

In a study by Nehzat Motallebi (Motallebi, 1998), the following observations are drawn from the application of Chemical Mass Balance analysis of the Sacramento PM_{10} and $PM_{2.5}$ measured data.

- Primary vehicle exhaust and wood smoke are significant sources of both PM_{10} and $PM_{2.5}$ in winter.
- Nitrates, a secondary formed fine particulate matter from the complex reaction of NO_x and ammonia in the atmosphere, are the major cause of high $PM_{2.5}$ and PM_{10} level during the winter months.
- Sulfates, a secondary formed fine particulate matter from the reaction of SO_x and ammonia in the atmosphere, are also a major contributor to high $PM_{2.5}$ level during the winter months.
- Fugitive dust is not a major contributor to the peak PM_{10} and $PM_{2.5}$ levels in Sacramento.

Air Quality Figure 2
PM2.5 Levels in Sacramento Area



Source: Air Resources Board.

PROJECT EMISSIONS

CONSTRUCTION ACTIVITIES

The proposed project construction consists of two separate phases. Each phase involves the installation of two gas turbine/heat recovery steam generator (HRSG) power trains, one cooling tower, and auxiliary equipment to produce approximately 500 MW of electricity. The first construction phase would last approximately 24 months, and

the second phase would last approximately 18 months. This analysis contains an assessment of the first phase (500 MW) of the project for the following reasons:

- The applicant has not provided any definite information about the mitigation measures for the second phase of the project. Without this information, staff is not able to determine whether the impacts from the second phase of the project are effectively mitigated.
- Because of the rapid advance of emission control technology, a determination that today's control systems would satisfy future BACT requirements is shortsighted.
- The attainment status of the area can be subject to change, which may affect the determination of BACT and may prompt different offset requirements.

Construction generally consists of three major activities: site preparation, construction, and installation of major equipment and structures. All of these activities would result in fugitive dust emissions and construction equipment exhaust. A small amount of hydrocarbon emissions may also occur as a result of the temporary storage of petroleum fuel at the site. The applicant provided estimated peak daily and annual construction equipment exhaust and fugitive dust emissions (SMUD 2001a). These estimated construction emissions are identified in **Air Quality Table 2**. Staff reviewed the applicant's estimated construction emissions and believes that they are accurate.

Air Quality Table 2
Construction Emissions

Construction Emission Sources	NO_x	SO_2	VOC	CO	PM_{10}
Daily (lbs/day)	306	6	127	1470	50
Annual (tons/yr)	24.3	0.5	9.4	107.5	1.1
Fugitive Dust (tons/yr)					3.3

Source: SMUD 2001a.

PROJECT OPERATION

The first phase of the project would be built with the following major components:

- Two natural gas fired, General Electric (GE) model 7241FA combustion turbines,
- Two unfired heat recovery steam generators (HRSG),
- One steam turbine,
- One nine-cell cooling tower.

The turbines would be operating in combined cycle mode to produce approximately 500 MW of electricity. The facility is expected to be available between 92 to 98 percent of the time, and could operate up to 8,760 hours per year (SMUD 2001a, pp. 8.1-30). The applicant proposes to equip each combustion turbine with dry low NO_x combustors and a selective catalytic reduction (SCR) system in the HSRG, which together limit the NO_x emissions to 2 ppm@15% O_2 to comply with the District's BACT requirement. The applicant proposes to provide space in the HRSG for a high-temperature oxidation catalyst system if the project cannot meet the proposed CO emissions of 6 ppm (SMUD 2001a, pp. 2-3).

The applicant is requesting that the project be analyzed with the assumption of 180 hours of start-up and shutdowns for each turbine each year (SMUD 2001a, pp. 8.1-30).

The facility's hourly, daily, and annual emissions were estimated based on information on the GE 7FA turbine and the following assumptions (SMUD 2001a, pp. 8.1-30):

- The facility maximum hourly emissions are estimated using one gas turbine in cold start and one turbine in full load operation.
- The maximum daily emissions are estimated using 3 hours of start up and 21 hours of full load operation for each turbine.
- The maximum annual emissions are estimated using 180 hours of start up and shut down, and full load at the remaining 8580 hours for each turbine.

The facility maximum hourly, daily, and annual emissions are presented in **Air Quality Table 3**.

INITIAL COMMISSIONING

Initial commissioning refers to a period of approximately 60 days prior to beginning commercial operation when the combustion turbines will undergo initial test firing. During this commissioning phase, the project may operate at a low-load for a long period of time for fine-tuning. The District typically requires that each activity of the commissioning period be planned carefully, and that all NO_x and CO emissions and the time of commissioning be minimized. It should also be noted that the NO_x and CO emissions during the commissioning period are not higher than emissions during normal start up of the facility; therefore, staff expects no new impacts from emissions during the commissioning period. All emissions from the commissioning period would be counted toward the annual emission limits; thus there is an incentive for the applicant to limit the commissioning period to the shortest time possible.

CLOSURE

Eventually the facility would close, either at the end of its useful life, or through some unexpected situation, such as a natural disaster or catastrophic facility breakdown. When the facility closes, all sources of air emissions cease and all impacts

Air Quality Table 3
Project Maximum Hourly, Daily, and Annual Emissions
(First Phase)

	NO_x	SO_x[3]	CO	VOC	PM_{10}
Maximum Hourly Emissions (lbs/hr)					
Gas Turbines, Start up[1]	93.5	2.9	926.7	19.3	18.0
Gas Turbines, Steady State	27.0	2.9	49.4	6.6	18.0
Cooling Tower					0.2
Total	93.5	2.9	926.7	19.3	18.2
Maximum Daily Emissions (lbs/day)					
Gas Turbines[2]	1,047	66	6,103	235	432
Cooling Tower					3.6
Total	1,047	66	6,103	235	436
Maximum Annual Emissions (ton/year)					
Gas Turbines	125.60	12.28	298	30	78.9
Cooling Tower					0.6
Total	125.60	12.28	365.4	30	79.5

Source: SMUD 2001a, Table 8.1-23 and SMAQMD, 2002b.

1 Assume one turbine at start-up and the other is in steady state operation.
2 Assume 3 hours of start up followed by 21 hours of steady state operation.
3 Assume an annual average sulfur content of 0.28 gr./100 standard cubic feet (scf) natural gas.

associated with those emissions will no longer occur. The only other expected emissions will be fugitive particulate emissions from the dismantling activities. These activities are short term and will create fugitive dust emissions levels much lower than those created during the construction of the project. Nevertheless, staff recommends that a facility closure plan be submitted to the Energy Commission Compliance Project Manager (CPM) to demonstrate compliance with applicable District Rules and Regulations during closure activities.

AMMONIA EMISSIONS

Due to the large combustion turbines proposed to be used in this project and the need to control NO_x emissions, significant amounts of ammonia will be injected into the flue gas stream as part of the SCR system. Not all of this ammonia will mix with the flue gases to reduce NO_x; a portion of the ammonia will pass through the SCR and would be emitted unaltered, out the stacks. These ammonia emissions are known as ammonia slip. The applicant has committed to an ammonia slip no greater than 10 ppm (SMUD 2001a, Table 8.1B-7). A 10 ppm slip is equivalent to approximately 600 pounds of ammonia emitted into the atmosphere per day (SMUD 2001a, Appendix 8.1B, Table 1B-7).

IMPACTS

Air dispersion models provide a means of predicting the location and ground level magnitude of the impacts of a new emissions source. These models consist of several complex series of mathematical equations, which are repeatedly calculated by a computer for many ambient conditions. The model results are often described as a unit of mass per volume of air, such as micrograms per cubic meter ($\mu g/m^3$).

The applicant has used an EPA-approved ISCST3 model to estimate the impacts of the project's NO_x, PM_{10}, CO, and SO_x emissions resulting from project construction and operation. A description of the modeling analyses and results are provided in Section 8.1.5.2.2 (SMUD 2001a) and Tables 8.1-26R and 8.1-28R (SMUD 2002j). Staff added the applicant's modeled impacts to the available highest ambient background concentrations recorded during the previous three years from nearby monitoring stations. Staff then compared the results with the ambient air quality standards for each respective air contaminant to determine whether the project's emission impacts would cause a new violation of the ambient air quality standards or would contribute to an existing violation.

Inputs for the modeling include stack information (exhaust flow rate, temperature, and stack dimensions), specific turbine emission data and meteorological data, such as wind speed, atmospheric conditions, and site elevation. For this project, the meteorological data used as inputs to the model included hourly wind speeds and directions measured at the project site.

CONSTRUCTION IMPACTS

The results of the project construction impacts analyses are presented in **Air Quality Table 4**. The modeling analyses included both the fugitive dust and vehicle exhaust emissions, which include PM_{10}, NO_x, and CO. In **Air Quality Table 4**, the first and second columns list the air contaminant, i.e., NO_2, PM_{10}, and CO, and the averaging time for each air contaminant analyzed. The third column presents the project emission impacts, and the fourth column presents the highest measured concentration of the criteria air contaminants in the ambient air (background). The fifth column presents the total impact, i.e., the sum of project emission impact and background measured concentration.

The applicant submitted a modeling analysis showing that the project construction activities would cause a new violation of the state 1-hour NO_2 standard, and further exacerbate existing violations of the state 24-hour PM_{10} standard. Staff reviewed the modeling and finds that:

- To calculate the project construction NO_2 impact, the applicant used the maximum-modeled output value for NO_x (403.7 $\mu g/m^3$), and maximum background measured ozone concentration to correct NO_x to NO_2. Because this type of analysis would overestimate the expected NO_2 impact, the applicant's modeling analysis shows that the construction of the project would cause a new violation of the 1-hour NO_2 standard. If the correction of NOx to NO_2 is performed using the actual ozone concentration measured at the time when the maximum impact would occur, a project construction impact of 189 $\mu g/m^3$ would result. This value, when added to

the background NO_2 concentration, would result in a maximum impact of 341 $\mu g/m^3$, or about 70% of the applicable standard. Thus, the project construction 1-hour NO_2 impact would not cause a new violation of the standard.

- Construction of the facility would result in unavoidable short-term PM_{10} impacts. Because the area is non-attainment for PM_{10}, additional impacts during construction of the project can be viewed as significant. However, it is doubtful that the general public would be exposed to the maximum construction impacts associated with the project. Staff reviewed the modeling files and believes that the likely PM_{10} construction impacts during the day would be in the range of 20 to 30 $\mu g/m^3$. Nevertheless, because the area PM_{10} standard is already violated, additional emissions beyond the fence line from construction of the project would exacerbate the existing violation. Therefore, the project's construction PM_{10} emission impact is significant.

Staff believes that the PM_{10} impacts from the construction of the project can be reduced with the implementation of the staff recommended construction mitigation measures, as discussed in the **Mitigation** section.

Air Quality Table 4
Maximum Project Construction Impacts

Pollutants	Avg. Period	Impacts ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	State Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr.	189[1]	152	341	470	73%
CO	8-hr.	256.1	8,165	8,421	10,000	84%
PM_{10}	24-hr.	30[1]	88	118	50	240%

Source: SMUD 2001a. Appendix 8.1A, Table 8.1A-5.
[1] Staff estimated impacts

OPERATION IMPACTS

Staff performed a modeling analysis using the EPA-approved ISCST3 model to estimate the impacts of the project's NO_x, PM_{10}, CO, and SO_x emissions resulting from project operation. Inputs for the modeling include stack information (exhaust flow rate, temperature, and stack dimensions), specific turbine emission data (SMUD 2001a, 2002j) and meteorological data, such as wind speed, atmospheric conditions, and site elevation. For this project, the meteorological data used as inputs included the 1989 hourly wind speeds and directions measured at the project site.

Staff added the modeled impacts to the available highest ambient background concentrations recorded during the previous three years from nearby monitoring stations. Staff then compared the results with the ambient air quality standards for each respective air contaminant to determine whether the project's emission impacts would cause a new violation of the ambient air quality standards or would contribute to an existing violation.

Air Quality Table 5 presents the results of the modeling analysis for two turbines and one cooling tower (Phase 1), including steady state and start-up events. **Air Quality Table 5** shows that the project does not cause any new violations of any applicable air

quality standard even with worst case ambient concentrations recorded. As for PM_{10}, staff believes that the project itself would contribute to existing violations of the state 24-hour PM_{10} air quality standard.

Air Quality Table 5
Project Phase 1 Operation Emission Impacts

Pollutants	Avg. Period	Impacts ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impacts ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hour (start up)	131	152.3	283	470[1]	60%
	1-hour (steady state)	7.55	152.3	160	470[1]	34%
	Annual	0.13	20.7	20.8	100[2]	21%
SO_2	1-hour	0.58	78.6	79.2	655[1]	12%
	24-hour	0.22	47.2	47.4	105[1]	45%
CO	1-hour (start up)	480	9,200	9,680	23,000[1]	42%
	8-hour	133	8,165	8,298	10,000[1]	83%
PM_{10}	24-hour	1.73	88	89.7	50[1]	180%
	Annual	0.09	21.3	21.4	30[1]	71%
$PM_{2.5}$	24-hour[3]	1.73	108	109.7	65[2]	170%
	Annual	0.09	N/A	N/A	15[2]	N/A

[1] State standards
[2] Federal standards
[3] Staff estimated
Source: SMUD 2002j. AFC Supplement A.

In addition, because most PM_{10} emissions from the turbines are in the form of $PM_{2.5}$, and the area's $PM_{2.5}$ concentrations show an increasing trend, the project's $PM_{2.5}$ emission impacts would contribute to the area's violations of the new federal 24-hour ambient $PM_{2.5}$ standards. Staff considers this a significant impact.

CUMULATIVE IMPACTS

Staff's cumulative impact assessment is comprised of two types of analyses. The first is an analysis of the project's directly emitted pollutants along with similar emissions from other foreseeable future projects that are currently under construction, or are currently under District review. The second is a discussion of the project's potential contribution to the formation of secondary pollutants, namely ozone and PM_{10}.

Directly Emitted Pollutant Impacts

To evaluate the direct emission impacts of the project along with other probable future projects, staff needs specific information that is included when project applicants file an application with the District for a permit. Projects located up to six miles from the proposed facility usually need to be included in the analysis. Staff assumes that impacts from projects beyond six miles would not affect the modeling analysis on a cumulative basis. The District has stated that there are no sources currently planned, being built, or are expected to be built within six miles radius of the project. Therefore, a cumulative impact analysis of directly emitted pollutants is not necessary.

Secondary Pollutant Impacts

Ozone impacts

The proposed project's gaseous emissions, primarily NO_x and VOC, can contribute to the formation of ozone. There are air dispersion models that can be used to quantify ozone impacts, but they are only appropriate for use in regional air quality planning efforts where numerous sources are input into the model to determine the regional ozone impacts. There are no regulatory agency models approved for assessing single source ozone impacts. However, because of the known relationship of NO_x and VOC emissions to ozone formation, staff believes that the emissions of NO_x and VOC from the project do have the potential to contribute to higher ozone levels if not mitigated. The applicant has proposed to mitigate the project's contribution to the area's ozone violations with a combination of NO_x and VOC emission reduction credits from Sacramento, Placer, and Yolo counties.

Secondary $PM_{2.5}$ impacts

The project's NO_x, VOC, NH_3, and SO_x emissions can contribute to the formation of secondary fine particulate matter, namely organic condensable, nitrate, and sulfate particulate matter.

Organic Condensable $PM_{2.5}$

Not all volatile organic compounds can form secondary $PM_{2.5}$. VOC with six or less carbon atoms in the chain will not participate in the formation of the carbon based $PM_{2.5}$. The project's VOC emissions would be in the form of unburned natural gas, which is mostly methane and ethane, which contain only one to two carbon atoms. Thus, the turbine exhaust is not expected to emit any significant amounts of VOC that can participate in the formation of secondary $PM_{2.5}$.

Ammonia, Nitrate and Sulfate $PM_{2.5}$

Staff believes that the project's ammonia, SO_x and NO_x emissions have a potential to contribute to ammonium sulfate and ammonium nitrate formations, which may worsen the violations of the state 24-hour PM_{10} and $PM_{2.5}$ standards. Available research (Spicer, 1982) indicates that the conversion of NO_x to nitrate is approximately between 10 to 30 percent per hour in a polluted urban area where ozone and ammonia are present in sufficient amounts to participate in the reaction.

Other research (ARB, 2002) also shows that secondary ammonium nitrate (formed by NO_x and ammonia) can account for over half of the wintertime $PM_{2.5}$ mass during the winter at most of the urban sites in California.

Staff believes that ammonia has a potential to significantly contribute to nitrate and sulfate particulate formation. Research (Watson, 1998) has shown that in an ammonia rich area, a reduction of 50 percent ammonia will reduce 15 percent of fine particulate matter, equivalent to a 30 percent conversion rate for ammonia. Thus, if CPP maintains an emission rate of 600 lbs/day of ammonia (based on the applicant's proposed 10 ppm ammonia slip level) the equivalent secondary $PM_{2.5}$ (nitrates and sulfates) could be in the range of 800 to 1,400 lbs/day. Assuming a linear extrapolation of the project's $PM_{2.5}$

modeling results, staff estimates that the project's SO_x, NO_x and ammonia emissions can potentially add 2 to 3 $\mu g/m^3$ of particulate sulfates and nitrates to the ambient air on a 24-hour basis. This amount of secondary $PM_{2.5}$ is approximately twice as large as the project's proposed particulate matter emissions.

Information from the SCR manufacturer indicates that a 5 ppm ammonia slip can be designed and achieved by the proposed system, and that the primary benefit in allowing a 10 ppm ammonia slip level would be that the project owner could keep the catalyst 3 to 5 years longer. Both the ARB and the EPA have recommended that ammonia slip levels be maintained at 5 ppm. Additionally, the South Coast Air Quality Management District requires ammonia levels of 5 ppm. The Blackstone Energy facility in Massachusetts has been operated for over 5,000 hours with less than 2 ppm NOx and ammonia level at less than 0.1 ppm (MDEP, 2003).

Because the area is non-attainment for the state 24-hr PM_{10} standard and the federal 24-hour $PM_{2.5}$ standard, the ammonium nitrate and sulfate (from NO_x, SO_x and ammonia) contribution should be mitigated by minimizing the ammonia emissions by restricting the ammonia slip level to 5 ppm. It should be noted that staff would normally recommends mitigation, in the form of emission reduction credits, be provided to mitigate the PM2.5 impacts from ammonia; However, because of the uncertainty in the actual conversion of ammonia, staff only go as far as recommending to minimize ammonia emissions.

In addition, staff still recommends that SO_x offsets, in the form of emission reductions, be provided to lessen the project's contribution of SO_x to PM_{10} violations.

VISIBILITY IMPACTS

The applicant has provided, as part of their PSD application to the District, a visibility impact analysis, which shows that the project is not expected to exceed any significant visibility impairment increment inside any nearby (Desolation Wilderness and Mokelumne Wilderness) PSD Class I areas (SMUD 2001a, § 8.1.5.2.4). Class I areas are areas of special national or regional value from a natural, scenic, recreational, or historic perspective.

APPLICANT'S PROPOSED MITIGATION

CONSTRUCTION PHASE

The applicant proposes to implement Best Available Control Measures (BACM) during construction of the project (SMUD, 2001a, Appendix 8.1A). These measures are listed below:

- Frequent watering of unpaved roads and disturbed areas.
- Limit speed of vehicles within the construction areas.
- Employ tire washing and gravel ramps prior to entering a public roadway to limit accumulated mud and dirt deposited on the roads.

- Treat the entrance roadways to the construction site with soil stabilization compounds.
- Place sandbags adjacent to roadways to prevent run-off to public roadways.
- Install windbreaks at the windward sides of construction areas prior to the soil being disturbed. The windbreaks shall remain in place until the soil is stabilized or permanently covered.
- Employ dust sweeping vehicles to sweep the public roadways that are used by construction and worker vehicles.
- Limit equipment idle times and perform regular preventive maintenance on construction equipment.
- Employ electric motors for construction equipment when feasible.
- Apply covers or dust suppressants to soil storage piles and disturbed areas that remain inactive over two weeks.
- Wet the soil to be excavated during construction.
- Use ultra-low sulfur diesel fuel for construction engines that use diesel fuel.

In addition, the applicant would maintain the construction equipment and vehicle emissions to a maximum 20 percent opacity during any three-minute span. Because the construction emissions are short-term, the applicant has not proposed any emission reduction credits (ERCs) to offset the construction emissions.

OPERATION PHASE

The applicant proposes to mitigate the emission increases from the proposed facility using a combination of clean fuel, emission control devices, and emission reduction credits. The applicant proposes to use a combination of dry low-NO_x combustion design and Selective Catalytic Reduction (SCR) for each of the combined cycle turbine trains to minimize NO_x emissions. SMUD proposes to design and operate the SCR to maintain the turbines' NO_x emissions at 2.5 ppm on an hourly basis (SMUD 2001a). The applicant proposes that each of the combined cycle gas turbine power trains will maintain emission limits of 6 ppm for CO, 2 ppm for VOC, and 10 ppm for ammonia slip (from unreacted ammonia in the SCR). Natural gas would be the only fuel used, which would minimize the project's PM_{10}, $PM_{2.5}$ and SO_x emissions. Below is a brief description of the emission control technologies that SMUD would employ.

Dry Low- NO_x Combustors

Over the last 20 years, combustion turbine manufacturers have focused their attention on limiting the NO_x formed during combustion. Because of the expense and efficiency losses due to the use of steam or water injection in the combustor cans to reduce combustion temperatures and the formation of NO_x, CTG manufacturers are presently choosing to limit NO_x formation through the use of dry low- NO_x technologies. In this process, firing temperatures remain somewhat low, thus minimizing NO_x formation, while thermal efficiencies remain high.

Selective Catalytic Reduction

To further reduce the emissions from the combustion turbines before they are exhausted into the atmosphere, flue gas controls, primarily catalyst systems, would be installed in the HRSG. The applicant is proposing SCR to reduce NO_x emissions.

SCR refers to a process that chemically reduces NO_x by injecting ammonia into the flue gas stream, over a catalyst, in the presence of oxygen. The process is termed selective because the ammonia reducing agent preferentially reacts with NO_x rather than oxygen, producing inert nitrogen and water vapor. The performance and effectiveness of SCR systems are related to operating temperatures, which may vary with catalyst designs.

Flue gas temperatures from a combustion turbine typically range from 950 to 1100°F. Catalysts generally operate between 600 to 750°F, and are normally placed inside the HRSG where the flue gas temperature has cooled. At temperatures lower than 600°F, the ammonia reaction rate may start to decline, resulting in increasing ammonia emissions, called ammonia slip. At temperatures above about 800°F, depending on the type of material used in the catalyst, damage to some catalysts can occur. The catalyst material most commonly used is titanium dioxide, but materials such as vanadium pentoxide, zeolite, or a noble metal are also used. These newer catalysts (versus the older alumina-based catalysts) are resistant to fuel sulfur fouling at temperatures below 770°F (EPRI 1990).

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

The District requires, and the applicant agreed to, the use of a combination of a dry low-NO_x combustor and an SCR system to maintain a NO_x concentration exiting the HRSG stack of 2 ppm, corrected to 15 percent excess oxygen, averaged over a 1-hour period.

OFFSETS

The proposed facility is required by the District to provide offsets on a quarterly basis (pounds per quarter (ppq)) for NO_x, VOC, and PM_{10}. The applicant has purchased emission reduction credits, in the form of District issued banking certificates, from sources of offsets located in Sacramento, Placer, and Yolo counties to mitigate the project's emission impacts. The project quarterly emissions and emission reduction credits for NO_x, VOC, SO_x and PM_{10} are presented in **Air Quality Tables 6, 7, 8** and **9**. The next to last row of each table specifies whether the project needs additional offsets or has a surplus. The last row of each table indicates whether the proposed offsets are adequate.

Ozone Precursors

Since the applicant proposes to surrender VOC emission reduction credits to offset facility NO_x emission increases, this section discusses the relationship among NO_x, ozone, and VOC in the project area. Because both VOC and NO_x are precursors to ozone, reductions of one air contaminant can offset the increase of the other. This concept is called inter-pollutant trading. Staff believes that the use of such a trade must satisfy two requirements:

- the trade should compensate for the specific impacts caused by the facility, and
- the trade must not interfere with the progress toward attainment.

Air Quality Table 6
Project VOC Emissions and Offsets (Pounds)

	Certificate Number	Location (County)	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Project Emissions			14,807	14,958	15,110	15,110
Formica (ERC)	PCAPCD/22000-0007, 2001-17	Placer	87,132	49,434	78,930	60,639
Swansons (ERC)	SMAQMD/ 653	Sacramento	10,657	13,631	7,762	16,389
Procter & Gamble (ERC)	SMAQMD/ 755	Sacramento	16,667	16,667	16,667	16,667
Donner Furniture (ERC)	SMAQMD/ 750	Sacramento	263	505	439	523
Burns Phillip Food (ERC)	YSAQMD/ EC-0121	Yolo	0	3	13	6
Holly Sugar (ERC)	YSAQMD/ EC-174-178	Yolo	47	798	820	843
Blue Diamond (ERC)	SMAQMD/ 836	Sacramento	1,060	1,030	1,067	1,037
Ag Containers (ERC)	SMAQMD/ 776, 852	Sacramento	1,329	2,447	3,070	1,003
American River Asphalt	SMAQMD/ 851	Sacramento	167	421	792	675
Rancho Seco (ERC)	SMAQMD/ 471, 473, 477, 479	Sacramento	355	188	100	115
Total ERC			117,678	85,115	109,676	97,978
Surplus ERC			102,871	70,157	94,566	82,868
Offsets Adequate?			Yes	Yes	Yes	Yes

Notes: All emission reduction credits have been adjusted with the appropriate distance factor (between 1.3 to 1.5) as required by the District NSR Rule (Rule 202) (SMAQMD, 2002b).
All surplus VOC emission reduction credits would be used to inter-pollutant offset new NO_x emissions (see Air Quality Table 7).
Sources: SMAQMD 2002b.

To demonstrate that the inter-pollutant trading, i.e., VOC for NO_x, would compensate for project impacts on the ambient ozone air quality concentration, the District has provided a number of different analyses. The District has determined that an inter-pollutant trade-off ratio of 3.9 pounds of VOC for every pound of NO_x emissions (3.9:1) would ensure that the project's emissions would not cause or contribute to an ozone violation. The analysis, which includes Urban Airshed Modeling, is presented in the FDOC (SAQMD, 2002b).

The project VOC emissions and emission reduction credits are presented in **Air Quality Table 6**. The applicant has VOC excess emission reduction credits of 117,678 lbs in quarter one, 85,115 lbs in quarter two, 109,676 lbs in quarter three, and 97,978 lbs in quarter four. The excess VOC credits, or surplus, would be used as inter-pollutant trade

for the project's shortfall in meeting NO_x offsets requirements. The use of VOC emission reductions to offset the NO_x emission increases is possible because:

a. Both VOC and NO_x are precursors to ozone and particulate matter,
b. The applicant has not been able to find sufficient NO_x emission reduction credits in the area,
c. The project NO_x emissions are not expected to cause a new violation or make worse any existing violation of the NO_2 air quality standards.
d. The District has required the applicant to consider several modeling to determine the appropriate inter-pollutant trading ratio. Ultimately, only the Urban Airshed Model (UAM) method was used.

As a result of the modeling analysis, the District is requiring 2.6 pounds of VOC emission reduction credits for each pound of NO_x emission increase. It should be noted that because the District NSR Rule already requires that a distance ratio of 1.5:1 be applied to the available emission reduction credits, the actual trading ratio is 3.9:1. Other methods initially considered by the District calculated a range of inter-pollutant trading ratios. Staff's own analysis of measured VOC, ozone, and NO_x levels from the Elk Grove monitoring station indicated a VOC to NO_x ratio as high as 6:1, and a default, or theoretical, ratio of approximately 6:1. Ultimately, staff accepted the District's ratio in this case because it is in the range of ratios calculated by the various methods. However, ratios will vary by project site and air basin, and the next project proposing inter-pollutant trading would be required to use a range of methods, or a least the UAM, to determine the appropriate inter-pollutant trading ratio for that specific site.

All surplus VOC emission reduction credits in **Air Quality Table 6** have been converted to the equivalent NO_x quantity using the District recommended inter-pollutant trading ratio of 2.6 to 1. In addition, because there are deficits of NO_x emission reduction credits in quarters 1 and 2, the surplus credits from quarters 3 and 4 have been used to offset the deficits in quarters 1 and 2. As presented in **Air Quality Tables 6** and **7**, all VOC and NO_x emission reduction credits satisfy the District requirements.

SO_x

The project SO_x emissions and emission reduction credits are presented in **Air Quality Table 8**. It should be noted that the project SO_x emissions estimated by staff are different from those estimated by the applicant and the District. The applicant and the District estimated the project SO_x emissions using a natural gas fuel that has a sulfur content of 0.25 gr/100scf. This estimate shows that the project SO_2 emissions are below the District requirement for emission offsets. Therefore, SMUD has not proposed to mitigate any SO_2 emissions from the project. SMUD proposed to use all the SO_x emission reduction credits to inter-pollutant trade for the project's particulate matter emissions.

Air Quality Table 7
Project NO_x Emissions and Offsets (Pounds)

	Certificate Number	Location (County)	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Project Emissions			62,021	62,643	63,265	63,265
Burns Philip Food (ERC)	YSAQMD/ EC-0121	Yolo	0	195	801	333
General Mills (ERC)	YSAQMD/ EC-0123	Yolo	510	501	716	671
Holly Sugar (ERC)	YSAQMD/ EC-174-178	Yolo	1,059	19,706	20,743	21,000
Blue Diamond (ERC)	SMAQMD/ 849	Sacramento	3,795	3,946	4,106	3,659
Procter &Gamble (ERC)	SMAQMD/ 777, 823, 826, 827	Sacramento	5,565	5,565	5,565	5,565
American River Asphalt	SMAQMD/ 851	Sacramento	215	540	1,019	869
Campbell Soup Company	SMAQMD/ 737, 838	Sacramento	1,190	2,545	6,887	0
VOC Surplus as NO_x [2]			49,687	29,645	24,293	31,168
Total ERC			62,021	62,643	64,130	63,265
Offsets Adequate?			Yes	Yes	Yes	Yes

Notes: [1]All emission reduction credits have been adjusted with the appropriate distance factor (between 1.3 to 1.5) as required by the District NSR Rule 202.
[2] After applying the interpollutant offset ratio of 2.6 VOC for NOx, and including swap of VOC emission reduction credits from quarter 3 to 2, and quarters 3 and 4 to 1 (SMAQMD, 2002b. App. B, p. 19).
Sources: SMAQMD, 2002b.

The applicant has a summary of the hourly sulfur content measurements for an entire year (most recently as 2000), which indicates that the annual average sulfur content of natural gas is approximately 0.28 gr/100scf, and the sulfur can be as high as 0.49 gr/100scf. These data indicate that the applicant and the District estimates of project SO_x emissions using the 0.25 gr./100 scf sulfur content are underestimated. Staff has provided an estimated project SO_x emissions in **Air Quality Table 8** using the annual average sulfur content of 0.28 gr./100 scf of natural gas.

Staff has serious concerns that the project SO_x emissions, which are precursors to $PM_{2.5}$ and PM_{10}, would contribute to the existing violations of the state 24-hour PM_{10} and the proposed state and federal $PM_{2.5}$ standards if not mitigated. However, as demonstrated in **Air Quality Table 8**, the project SO_x emissions (presented in row one), are adequately mitigated with the excess SO_x emission reduction credits. Surplus SOx ERCs are used to interpollutant offset project PM10 emissions.

Particulate Matter

The applicant has provided emission reduction credits of 32.4 tons per year (TPY) of PM_{10} to partially offset the emissions (79.5 TPY) from the project.

Because of the shortfall of emission reduction credits to directly offset the project PM_{10} and $PM_{2.5}$ emissions, the applicant has proposed to use the surplus SO_x emission reduction credits for inter-pollutant trading. The use of SO_x emission reductions to offset the project particulate matter emission increases is possible because:

a. SO_x are precursors to particulate matter,
b. The applicant has not been able to secure any additional PM_{10} or $PM_{2.5}$ emission reduction credits in the area, and
c. The District has performed an analysis to determine the appropriate inter-pollutant trading ratio.

Air Quality Table 8
Project SO_x Emissions and Offsets (Pounds)

	Certificate Number	Location	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Project Emissions[1]			6054	6121	6188	6188
Grace Industries	SMAQMD/ 388, 390	Sacramento	1319	1316	1310	1286
Campbell Soup	SMAQMD/ 737	Sacramento	94	75	197	101
Poppy Ridge Partners	SMAQMD/ 726, 727	Sacramento	47	62	62	48
Rancho Seco	SMAQMD/ 471, 473, 475,477, 479	Sacramento	60,869	22,739	5,967	24,363
American River Asphalt	SMAQMD/ 851	Sacramento	173	435	821	700
Total ERC[2]			62,502	24,627	8,357	26,498
Surplus ERC[3]			56,448	18,506	2,169	20,310

Notes: 1. Project SO_x emissions were estimated with an annual average sulfur content of 0.28 gr/100 scf natural gas.
2. All ERC have been adjusted with the District NSR offset factor of 1.2 to 1.5.
3. Surplus SO_x ERCs, after mitigation of SOx emission as shown in table, would be used to inter-pollutant offset the project particulate matter emissions.

As a result of the analysis, the District requires 2.8, 1.7, 1.7, and 3.3 pounds of SO_x emission reduction credits, for quarter 1, 2, 3, and 4, respectively, for each pound of new particulate matter emission increase. (It should be noted that because the District NSR Rule already requires that a distance ratio of 1.5 be applied to the available emission reduction credits, the effective inter-pollutant trading ratios are higher than the value mentioned above.) Staff converted the surplus SO_x emission reduction credits from the last row of **Air Quality Table 8** to the effective particulate emission reductions using the inter-pollutant trading ratios above. These ratios are presented in **Air Quality Table 9**.

In addition to mitigating the project PM emissions with direct PM emission reduction credits and SO_x, the applicant has proposed to use 42.4 TPY of emission reduction credits created by paving various unpaved roadways in the area. These roads are Beskeen Road, Laguna Boulevard, Angrave Road, Angle Road, Magos Road, Loll Road, and Kiefer Boulevard. The nearest of these roads is located approximately 2.5 miles from the project site. A total of 5.76 miles of roadway are proposed to be paved by SMUD (SMAQMD 2002b, pgs. 79-84)

Air Quality Table 9
Project PM_{10} and $PM_{2.5}$ Emissions and Offsets (Pounds)

	Certificate Numbers	Location (County)	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Project Emissions			39,204	39,640	40,075	40,075
Campbell Soup (ERC)	SMAQMD/ 737	Sacramento	382	224	1,239	438
Poppy Ridge (ERC)	SMAQMD/ 726, 727	Sacramento	685	663	493	659
Blue Diamond (ERC)	SMAQMD/ 849	Sacramento	2,320	2,214	2,289	2,138
Procter & Gamble (ERC)	SMAQMD/	Sacramento	7,513	7,513	7,513	7,513
Grace Ind. (ERC)	SMAQMD/ 833-835	Sacramento	2,394	2,393	2,383	2,343
Concrete Inc (ERC)	SMAQMD/ 758	Sacramento	850	1,004	1,043	965
Rancho Seco (ERC)	SMAQMD/ 471,473,475, 477, 479	Sacramento	1,722	821	424	859
American River Asphalt	SMAQMD/ 851	Sacramento	343	819	1,429	1,131
Road Paving (ERC)[1]	SMAQMD/ 768, 769, 772-776	Sacramento	2,223	3,067	4,245	3,173
Total PM ERC			18,432	18,718	21,058	19,219
Surplus SO_x ERC as PM [2]			20,160	10,886	1,276	6,155
Deficit or (surplus)			612	10,036	17,741	14,701
Offsets Adequate?			No	No	No	No

Note: All emission reduction credits have been adjusted with the appropriate distance factor (between 1.0 to 1.5) as required by the District NSR Rule 202. (SMAQMD, 2002b, App. B).
1 After taking adjustment (of 15 percent) for $PM_{2.5}$ portion (SMAQMD, 2002b, App. B pp. 34).
2 After applying inter-pollutant trading ratio of 2.8, 1.7, 1.7, and 3.3 SOx for PM for the first, second, third and fourth quarter, respectively.

Staff believes that the emission reduction credits can be used effectively to mitigate the project's PM_{10} emissions. However, staff has serious reservations about the use of the road dust emission reduction credits to mitigate the project's combustion generated fine particulate matter impacts. Staff concerns are:

- PM_{10} emissions generated from a combustion source, such as the project gas turbines, are mostly, if not all, in the form of fine particulate matter with an average aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$). These particles can reach deep into the lung and stay trapped; thus, the health effects are significant.
- The road dust particles are mostly in the coarse range, and of those that have an average aerodynamic diameter of 10 microns or less, only 3 to 15 percent are in the range of 2.5 microns or less [EPA AP-42, Section 13.2.2, and ARB Emission Inventory].
- Most of the road dust particles are likely to settle within 100 yards of the sources, although a portion of these road dust particles, most likely fine particles ($PM_{2.5}$), can stay suspended in the atmosphere [Central Regional Particulate Air Quality Study, December 20, 1998]. The portion of these fine particles ($PM_{2.5}$) can be used to mitigate the project's PM_{10} and $PM_{2.5}$ contributions to the violations in the area.

The ARB has also expressed serious concerns about the use of road dust emission reductions to offset the PM_{10} emissions from combustion sources (June 19, 2000 ARB Memorandum to the California Air Pollution Control Officer Association). ARB recommends that emission reduction credits generated from road dust should only be used for permitting of new sources that generate particulate matter from similar activities.

Staff recommends that the emission reduction credits from road paving be adjusted for the $PM_{2.5}$ portion prior to their use as offsets. Using an assumption that 15 percent of road dust PM_{10} is $PM_{2.5}$, the emission reduction credits from road paving should be adjusted to 6.4 TPY (from 42.4 TPY), which can be used to mitigate part of the project's PM_{10} and $PM_{2.5}$ emission impacts.

As presented in **Air Quality Table 9**, the applicant proposed emission reduction credit package, which includes particulates, SO_x and road paving emission reduction credits, is not sufficient to offset the project's particulate matter emissions. The deficits amount to 612 pounds in the first quarter, 10,036 pounds in the second quarter, 17,741 pounds in the third quarter, and 14,701 pounds in the fourth quarter.

It should be noted that the PM_{10} and $PM_{2.5}$ problems normally occur during the three months of November, December, and January. The project's PM_{10} and $PM_{2.5}$ offset deficits only occur in the two months (9,800 lbs), November and December, in the fourth quarter (October to December); and in January (204 lbs) in the first quarter (January to March). Because of this, staff recommends that additional particulate matter emission reductions, preferably $PM_{2.5}$, equal to 10,004 pounds (9,800 + 204 lbs) must be acquired to mitigate the project contribution to the area's PM_{10} and $PM_{2.5}$ problem.

To mitigate the project's remaining PM emissions, staff recommends that the applicant develop a plan to provide financial incentives to willing participants in the Sacramento area to replace their current conventional wood stoves with newer, cleaner units. Under this program, each participant would receive a cash rebate of $1,250 to replace his or her current wood stove with a newer, EPA certified unit. [This program is currently being offered in another project licensed by the Energy Commission (Three Mountain Power Plant) and is very successful]. Staff estimates that the program should provide

enough funds (approximately $396,250) to subsidize 317 units. This program targets both the combustion particulate emissions and the time of year (winter) when the measure PM_{10} / $PM_{2.5}$ levels peak and violations occur. Staff estimates that this program would generate the additional needed PM emission reductions to mitigate the remaining PM emission liability for the project (see Appendix A for detailed calculations).

ENVIRONMENTAL JUSTICE

Staff has reviewed Census 2000 information that shows the non-white population is less than fifty percent within a six-mile radius of the proposed Cosumnes Power facility, and Census 2000 information that shows the low-income population is less than fifty percent within the same radius. However, there are two census blocks in the south and southeast, and one census block in the northwest of the project site, which contain more than fifty percent non-white members. Since all project impacts would be mitigated to less than significant levels if staff's recommended mitigation measures are implemented, there is no environmental justice issue.

RESPONSES TO PUBLIC AND AGENCY COMMENTS

SK-1 Please make sure that every effort is made to minimize pollution from this plant. Please ensure that the plant will use the best modern technology to reduce pollution and vapor plumes.

> Response: The Sacramento Metropolitan Air Quality Management District and staff recommend that the emissions from the facility would be minimized by the application of state of the art control technology (BACT). In addition, as presented in the Staff Recommended Additional Mitigation section, staff has made recommendations that additional mitigation measures be implemented to generate actual emission reductions in the local area. Staff believes that these emission reductions would mitigate the project's impacts to the air quality in the area.

ELK-1 Staff has not adequately discussed the local area impact potential from any ground level releases of air pollutants and possible local impacts to the citizens of Elk Grove.

> Response: The Impacts Section is an analysis of the project's potential impacts on the local area. Staff has actually relied on ambient concentration data collected in Elk Grove as a basis to analyze whether the project and its proposed mitigation would cause a significant impact in the area.

ELK-2 The recommended PM_{10} offsets include paving of roads. This offset only reduces large diameter and generally inert materials. The project generates a substantial amount of $PM_{2.5}$, which are considered to have greater human health effects and implications. Therefore, offsets should directly mitigate $PM_{2.5}$ related impacts.

> Response: Staff agrees that the project $PM_{2.5}$ emission impacts should be mitigated; Therefore, staff has recommended additional mitigation measures, such as minimizing ammonia emissions and retrofitting/replacing wood stoves, be implemented to directly mitigate the project $PM_{2.5}$ impacts on the local area.

COMPLIANCE WITH LORS

FEDERAL

The applicant has submitted to the District an application for the federal PSD permit. The District has issued a Final Determination of Compliance (FDOC) on October 21, 2002. Staff has incorporated the District recommended conditions specified in the FDOC into the Final Staff Assessment.

The applicant is also required to submit an application to the District for a Major Facility Review Permit (Title V) prior to commencing operation. The applicant is also restricted from commencing operation unless a Title IV Permit has been issued, or 24 months after submitting an acid rain application (Title IV) to the District, whichever is earlier. Compliance with both of these federal titles is expected, and would be determined at a later date by the District.

STATE

Staff believes that the operation of the project, after the implementation of staff recommended mitigation measures, and the District recommended conditions (**AQ-1** to **43**), would comply with all applicable state laws.

LOCAL

The District issued an FDOC (October 21, 2002), which states that the proposed project is expected to comply with all applicable District rules and regulations, and that offsets will be provided prior to the issuance of the project Authority to Construct permit.

CONCLUSIONS

The project emissions would be fully offset, and the project would incorporate BACT in accordance with the District NSR requirements.

The project would not cause new violations of any NO_2, SO_2, or CO ambient air quality standards, and therefore, its NO_x, SO_x and CO emission impacts are not significant.

The project NO_x and VOC emissions can contribute to the existing violations of the state and the federal 1-hour ozone air quality standards. However, staff has determined that the required mitigation (in the form of emission reduction credits) would mitigate the project's impact to a less than significant level.

Staff recommends the addition of four additional restrictions on construction activities, which are described in Conditions of Certification **AQ-SC1** to **AQ-SC-4**. Staff believes that with this addition, the project's construction impacts from PM_{10} and $PM_{2.5}$ emissions will be mitigated to a less than significant level.

The project's PM_{10} and $PM_{2.5}$ emissions can, if left unmitigated, contribute to violations of the state 24-hour PM_{10} and the federal 24-hour $PM_{2.5}$ standards, especially during the winter season. However, if offsets and additional local emissions mitigation measures

[in the form wood stove replacement and the reduction of ammonia slip emissions to 5 ppm] are implemented, the potential for direct and secondary particulate matter emission impacts would be reduced to a level that is less than significant.

RECOMMENDATIONS

- Limit the ammonia slip from the SCR system to no more than 5 ppm to lessen the potential impacts of the project on the area PM_{10} and $PM_{2.5}$ ambient air quality levels. Staff recommends the inclusion of this limit in Condition **AQ-23**.
- Include the District recommended Conditions of Certification **AQ-1** through **AQ-43**.
- Include staff Conditions of Certification **AQ-SC1** through **AQ-SC4** to address the construction-related impacts.
- Require the applicant to design and implement a program to rebate $1,250 to each participant (317 participants) who volunteers to replace his or her existing wood stove with a new EPA certified unit (Condition of Certification **AQ-SC5)**.

CONDITIONS OF CERTIFICATION

AQ-SC1. The project owner shall fund all expenses for an on-site air quality construction mitigation manager (AQCMM) who shall be responsible for maintaining compliance with conditions AQ-SC2 through AQ-SC4 for the entire project site and linear facilities construction. The on-site AQCMM shall have full access to areas of construction of the project site and linear facilities, and shall have the authority to appeal to the CPM to have the CPM stop any or all construction activities as warranted by applicable construction mitigation conditions. The on-site AQCMM shall have a current certification by the California Air Resources Board for Visible Emission Evaluation prior to the commencement of ground disturbance. Employment of the on-site AQCMM shall not be terminated without written consent of the CPM.

Verification: At least sixty (60) days prior to the start of ground disturbance, the project owner shall submit to the CPM, for approval, the name, current ARB Visible Emission Evaluation certificate, and contact information for the on-site AQCMM.

AQ-SC2. The project owner shall provide a construction mitigation plan, for approval, which shows the steps that will be taken, and reporting requirements, to ensure compliance with conditions AQ-SC3 and AQ-SC4.

Verification: At least sixty (60) days prior to start any ground disturbance, the project owner shall submit to the CPM, for approval, the construction mitigation plan. The CPM will notify the project owner of any necessary modifications to the plan within 30 days from the date of receipt. Otherwise, the plan shall be deemed approved.

AQ-SC3. The on-site AQCMM shall submit to the CPM, in the monthly compliance report, a construction mitigation report that demonstrates compliance with the following mitigation measures:

a) All unpaved roads and disturbed areas in the project and linear construction sites shall be watered until sufficiently wet for every four hours of construction activity. The frequency of watering can be reduced or eliminated during periods of precipitation.

b) No vehicle shall exceed 10 miles per hour within the construction site.

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

d) All vehicle tires shall be washed or cleaned free of dirt prior to entering paved roadways.

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

f) All entrances to the construction site or laydown area shall be graveled.

g) No construction vehicles can enter the construction site unless through the treated entrance roadways.

h) Construction areas adjacent to any paved roadway shall be provided with sandbags to prevent run-off to the roadway.

i) All paved roads within the construction site shall be swept twice daily.

j) At least the first 500 feet of any public roadway exiting from the construction site shall be swept twice daily.

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

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

m) All construction areas that may be disturbed shall be equipped with windbreaks at the windward sides prior to any ground disturbance. The windbreaks shall remain in place until the soil is stabilized or permanently covered with vegetation.

n) Any construction activities that can cause fugitive dust in excess of the visible emission limits specified in Condition **AQ-SC4** shall cease when the wind exceeds 15 miles per hour.

o) All diesel-fueled engines used in the construction of the facility shall be fueled only with ultra-low sulfur diesel, which contains no more than 15 ppm sulfur.

p) All large construction diesel engines, which have a rating of 100 hp or more, shall meet, at a minimum, the 1996 ARB or EPA certified standards for off-road equipment.

q) All large construction diesel engines, which have a rating of 100 hp or more, shall be equipped with catalyzed diesel particulate filters (soot filters), unless certified by engine manufacturers or the on-site AQCMM that the use of such devices is not practical for specific engine types.

r) All diesel-fueled engines used in the construction of the facility shall have clearly visible tags issued by the on-site AQCMM that shows the engine meets the conditions **AQ-SC3**(p) and **AQ-SC3**(q) above.

Verification: In the monthly compliance report (MCR), the project owner shall provide the CPM a copy of the construction mitigation report and any diesel fuel purchased records, which clearly demonstrates compliance with condition AQ-SC3.

AQ-SC4. No construction activities are allowed to cause visible emissions at or beyond the project site fenced property boundary. No construction activities are allowed to cause visible plumes that exceed 20 percent opacity at any location on the construction site. No construction activities are allowed to cause any visible plume in excess of 200 feet beyond the centerline of the construction of linear facilities.

Verification: The on-site AQCMM shall conduct a visible emission evaluation at the construction site fence line, or 200 feet from the center of construction activities at the linear facilities, each time he/she sees excessive fugitive dust from the construction or linear facility site. The records of the visible emission evaluations shall be maintained at the construction site and shall be provided to the CPM in the monthly compliance reports.

AQ-SC5 The project owner shall submit a plan for a fireplace retrofit/woodstove replacement program to the CPM for review and approval. The plan shall provide the following elements:

a) Provisions for a replacement fund to be made available on a first-come, first-serve basis to finance a five-year voluntary woodstove replacement/fireplace retrofit program which shall provide a minimum $PM_{2.5}$ emission reductions of 5 tons for the three months November through January. The replacement fund shall pay for the retrofit/ replacement costs of at least 317 current non-EPA certified fireplaces and woodstoves (up to a maximum of $1,250 for each retrofit/replacement) with an EPA-certified solid fuel heating device. The fund shall be capable of being drawn upon in any year of the five year program and as allowed by conditions of certification until the fund is depleted.

b) A procedure whereby the CPM would establish a list of approved retailers and professional, licensed installers. Each resident participating in the retrofit/replacement program would only do business with listed retailers or installers. Payments shall only be made to vendors or contractors who agree to participate in the program and who submit certification that the retrofit/replacement is permanent (by permanent removal of the wood stove doors and proper recycling of the old stove) and conforms to program requirements.

c) Submission to the CPM of quarterly status reports on the program, the status of reimbursements, and remaining funds available.

d) A description of eligibility requirements, including that, for the first three years of the program, homes and businesses located within a 15-mile radius of the proposed facility and within Sacramento County would be eligible to participate in the program. Homes and businesses within a 25-mile radius of the CPP facility

and located within Sacramento County would be eligible to participate in the fourth and fifth years if there are remaining funds.

If the program fails to achieve the necessary $PM_{2.5}$ emission reduction specified above, the project owner can:

- purchase and provide emission reduction credits, or
- initiate other programs approved by the CPM to benefit the air quality in the area, as long as the emission reductions are equivalent to 5 tons of $PM_{2.5}$ for the three months November through January.

Verification: No later than 30 days prior to commencement of construction, the project owner shall provide the CPM, for approval, a copy of the fireplace retrofit/wood stove replacement program.

AQ-SC6 The project owner shall submit to the CPM for review and approval any modification proposed by either the project owner or issuing agency to any project air permit.

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

DISTRICT'S CONDITIONS OF CERTIFICATION

AQ-1. The equipment shall be properly maintained.

Verification: The project owner shall provide the District and the CPM quarterly and annual reports as required in condition AQ-34.

AQ-2. The Air Pollution Control Officer and/or authorized representatives, upon the presentation of credentials, shall be permitted:

A. To enter upon the premises where the source is located or in which any records are required to be kept under the terms and conditions of this permit to operate, and

B. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit to operate, and

C. To inspect any equipment, operation, or method required in this permit to operate, and

D. To sample emissions from the source or require samples to be taken.

Verification: Not necessary.

AQ-3. This permit does not authorize the emission of air contaminants in excess of those allowed by Division 26, Part 4, Chapter 3, of the California Health and Safety Code or the rules and regulations of the Air Quality Management District.

Verification: The project owner shall provide the District and the CPM quarterly and annual reports as required in condition **AQ-34**.

AQ-4. A legible copy of this permit shall be maintained on the premises with the equipment.

Verification: Not necessary.

AQ-5. Malfunction - the Air Pollution Control Officer shall be notified of any breakdown of the emissions monitoring equipment, any equipment, or any process which results in an increase in emissions above the allowable emissions limits stated as a condition of this permit or any applicable state or federal regulation or which affects the ability for the emissions to be accurately determined. Such breakdowns shall be reported to the District in accordance with the procedures and reporting times specified in Rule 602 - Breakdown Conditions; Emergency Variance.

Verification: The project owner shall provide the District and the CPM quarterly and annual reports as required in condition **AQ-34**.

AQ-6. Severability – if any provision, clause, sentence, paragraph, section, or part of these conditions for any reason is judged to be unconstitutional or invalid, such judgement shall not affect or invalidate the remainder of these conditions.

Verification: The project owner shall provide the District and the CPM quarterly and annual reports as required in condition **AQ-34**.

COMMISSIONING ACTIVITIES

Conditions AQ-7 though 15 shall only apply during the commissioning period. The commissioning period is defined as, "The Period shall commence when all mechanical, electrical, and control systems are installed and individual start-up has been completed, or when a gas turbine is first fired, whichever occurs first. The Period shall terminate when the plant has successfully completed both performance and compliance testing."

AQ-7. The owner/operator of the CPP combustion gas turbines #1 and #2 (CTG's #1 & #2) shall minimize emissions of carbon monoxide and nitrogen oxides to the maximum extent possible during the commissioning period.

Verification: The project owner shall submit in the monthly compliance report to the CPM a discussion about how this condition is being complied with.

AQ-8. At the earliest feasible opportunity in accordance with the recommendations of the equipment manufacturers and the construction contractor, the gas turbine combustors of CTG's #1 & #2 shall be tuned to minimize the emissions of carbon monoxide and nitrogen oxides.

Verification: The project owner shall submit in the monthly compliance report to the CPM a discussion about how this condition is being complied with.

AQ-9. At the earliest feasible opportunity in accordance with the recommendations of the equipment manufacturers and the construction contractor, the Selective Catalytic Reduction (SCR) systems #1 & #2 shall be installed, adjusted, and operated to minimize the emissions of nitrogen oxides from CTG's #1 & #2.

Verification: The project owner shall submit in the monthly compliance report to the CPM a discussion about how this condition is being complied with.

AQ-10. The owner/operator of the CPP shall submit a plan to the District and the CPM that describes the procedures to be followed during the commissioning of the gas turbines and HRSGs. The plan shall include a description of each commissioning activity, the anticipated duration of each activity in hours, and the purpose of the activity. The activities described shall include, but is not limited to, the tuning of the dry-low-NOx combustors, the installation and operation of the SCR systems, the installation, calibration, and testing of the NOx, CO and O_2 continuous emission monitors, and any activities requiring the firing of the CTG's #1 & #2 without abatement by their respective SCR systems.

Verification: The project owner shall submit a commissioning plan to the District and CPM for review at least four weeks prior to the first firing of CTG's 1 and 2.

AQ-11. During the commissioning period, the owner/operator of CTG's #1 & #2 shall demonstrate compliance with conditions AQ-13 through 16 through the use of properly operated and maintained continuous emission monitors and data recorders for the following parameters:

a. Firing hours for each CTG,
b. Fuel flow rates to each CTG,
c. Stack gas nitrogen oxide emission concentrations of each CTG,
d. Stack gas carbon monoxide emission concentrations of each CTG, and
e. Stack gas oxygen concentrations of each CTG.

The monitored parameters shall be recorded at least once every 15 minutes (excluding normal calibration periods or when the monitored source is not in operation) for the CTG's #1 & #2. The owner/operator shall use District approved methods to calculate heat input rates, NOx, CO, ROC, SO_x and PM_{10} mass emission rates, and NOx and CO emission concentrations, summarized for each clock hour and each calendar day.

Verification: The project owner shall submit in the monthly compliance report to the CPM a discussion about how this condition is being complied with. All records shall be retained on site for at least 5 years from the date of entry and made available to District personnel and CPM upon request.

AQ-12. The District approved continuous emission monitors specified in condition 11 shall be installed, calibrated, and operational prior to first firing of the CTG's #1 & #2. After first firing of the turbines, the detection range of these continuous emission monitors shall be adjusted as necessary to accurately measure the resulting range of NOx and CO emission concentrations. The type, specifications, and location of these monitors shall be subject to District review and approval.

Verification: The project owner shall submit in the monthly compliance report to the CPM a discussion about how this condition is being complied with. In addition, the project owner shall provide evidence of the District's approval of the emission monitoring system to the CPM prior to first firing of the gas turbines.

AQ-13. The total number of firing hours of each CTG without abatement of nitrogen oxide emissions by SCR systems #1 & #2 shall not exceed 400 hours during the commissioning period. Such operation of CTG's #1 & #2 shall be limited to discrete commissioning activities that can only be properly executed without the SCR systems fully operational. Upon completion of these activities, the owner/operator shall provide written notice to the District and the unused balance of the 400 firing hours without abatement shall expire.

Verification: The project owner shall submit in the monthly compliance report to the CPM a discussion about how this condition is being complied with.

AQ-14. The total mass emissions of nitrogen oxides, carbon monoxide, reactive organic compounds, sulfur oxides, and PM_{10} that are emitted by the CTG's #1 & #2 during the commissioning period shall accrue towards the quarterly emission limitations specified in condition **AQ-19.**

Verification: The project owner shall submit in the monthly compliance report to the CPM a discussion about how this condition is being complied with.

AQ-15. Combined pollutant mass emissions from CTG's #1 & #2 shall not exceed the following limits during the commissioning period.

Maximum Allowable Emissions During the Commissioning Period, Including Start-ups and Shutdowns.		
Pollutant	Lbs./hr	Lbs./day
NOx	142	2,095
CO	918.46	7,844
ROC	--	159
SO_x	--	48
PM_{10}	--	324

Note: Hourly limits for NOx and CO will be monitored using CEMS. For those pollutants that are not directly monitored (ROC, SO_x, and PM_{10}), the mass emissions shall be calculated based on District approved emission factors contained in footnotes to condition **AQ-17**.

Verification: The project owner shall submit in the monthly compliance report to the CPM a discussion about how this condition is being complied with.

EMISSION LIMITS

AQ-16. The equipment shall not discharge into the atmosphere any visible air contaminant other than uncombined water vapor, for a period or periods aggregating more than three minutes in any one hour, which is Ringelmann No. 1 or greater.

Verification: As part of the quarterly and annual compliance reports, the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-17. Emissions from the following equipment shall not exceed the following limits, not including periods containing start-ups and short-term excursions as defined in condition AQ-26.

Pollutant	Maximum Allowable Emissions	
	CTG #1 (lbs./hr)	CTG #2 (lbs./hr)
NO_x	13.51 (a)	13.51 (a)
CO	16.46 (b)	16.46 (b)
ROC	3.30 (c)	3.30 (c)
SO_x	1.31 (d)	1.31 (d)
PM_{10}	9.00 (e)	9.00 (e)

(a) Based on data submitted in the application and is monitored by the turbine's NOx CEM system (1 hour average).

(b) Based on data submitted in the application and is monitored by the turbine's CO CEM system (3 hour average)

(c) Based on a turbine ROC emission factor of 0.00177 lb/mmbtu and firing at full capacity.

(d) Based on a turbine SO_x emission factor of 0.00071 lb/mmbtu and firing at full capacity.

(e) Based on a turbine PM_{10} emission factor of 0.00483 lb/mmbtu and firing at full capacity.

Verification: As part of the quarterly and annual compliance reports, the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-18. Emissions of NOx, CO, ROC, SO_x, and PM_{10} from Phase 1 of the CPP facility including start-ups and shut-downs shall not exceed the following limits.

Pollutant	Maximum Allowable Emissions (lbs./day)			
	CTG #1	CTG #2	Cooling Tower	Total
NO_x	523.7	523.7	NA	1,047.4
CO	3,051.7	3,051.7	NA	6,103.3
ROC	117.3	117.3	NA	234.6
SO_x	31.4	31.4	NA	62.9
PM_{10}	216.0	216.0	3.6	435.6

Verification: As part of the quarterly and annual compliance reports, the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-19. Emissions of NOx, CO, ROC, SO_x, and PM_{10} from Phase 1 of the CPP facility including start-ups and shut-downs shall not exceed the following limits.

Pollutant	Maximum allowable emissions				
	Qtr 1 (lbs./quarter)	Qtr 2 (lbs./quarter)	Qtr 3 (lbs./quarter)	Qtr 4 (lbs./quarter)	Total (lbs./year)
NO_x	62,021	62,643	63,265	63,265	251,194
CO	147,929	148,687	149,444	149,444	595,505504
ROC	14,807	14,958	15,110	15,110	59,986
SO_x	5,405	5,465	5,525	5,525	21,922
PM_{10}	39,204	39,640	40,075	40,075	158,994

Verification: As part of the quarterly and annual compliance reports, the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-20. Each combined cycle combustion turbine shall not emit more than 2.0 ppmvd NOx at 15% O_2, averaged over any one hour period, excluding periods containing start-ups/shut-downs and short term excursions as defined in condition **AQ-26**.

Verification: As part of the quarterly and annual compliance reports, the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-21. Each combined cycle combustion turbine shall not emit more than 4.0 ppmvd CO at 15% O_2, averaged over any consecutive three hour period, excluding periods containing start-ups/shut-downs as defined in condition **AQ-26**.

Verification: As part of the quarterly and annual compliance reports, the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-22. Each combined cycle combustion turbine shall not emit more than 1.4 ppmvd ROC at 15% O_2, averaged over any consecutive three hour period, excluding periods containing start-ups/shut-downs as defined in condition **AQ-26**.

Verification: As part of the quarterly and annual compliance reports, the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-23. Each combined cycle combustion turbine shall not emit more than 5 ppmvd ammonia at 15% O_2, measured as NH_3, averaged over any consecutive three hour period, excluding start-ups/shut-downs as defined in condition **AQ-26**.

Verification: As part of the quarterly and annual compliance reports, the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-24. The total dissolved solids content of the circulating cooling water shall not exceed 470 ppmw, averaged over any consecutive three-hour period.

Verification: The project owner shall sample and test the cooling tower water at least once per day to verify compliance with this TDS limit. In addition, the project owner shall include information on the date, time, and duration of any violation of this permit condition in the quarterly and annual reports.

EQUIPMENT OPERATION

AQ-25. Each combined cycle turbine shall not be operated without a functioning selective catalytic reduction air pollution control system, excluding periods of start-ups and shut-downs.

Verification: As part of the quarterly and annual compliance reports, the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-26. The duration of each combined cycle turbine's start-up period shall not exceed 180 minutes. Start-ups are defined as time periods commencing with the introduction of fuel to the gas turbine, and ending at the time that 15-minute average NOx and CO concentrations do not exceed 2.0 ppmvd and 4.0 ppmvd respectively, but in no case exceeding 180 consecutive minutes.
The duration of each combined cycle turbine's shut-down period shall not exceed 30 minutes. Shut-downs are defined as the 30-minute period immediately prior to the termination of fuel flow to the gas turbine.

Compliance with the concentration and hourly NOx emission limitations specified in conditions AQ-17 and AQ-20 shall not be required during short-term excursions limited to a cumulative total of 10 hours per combustion turbine per calendar year. Short-term excursions are defined as 15-minute periods designated by the owner/operator that are the direct result of transient load conditions, not to exceed four consecutive 15-minute periods, when the 15-minute average NOx concentration exceeds 2.0 ppmvd @ 15% O_2. Examples of transient load conditions include, but are not limited to the following:

a) Initiation/shutdown of combustion turbine inlet air cooling and
b) Rapid combustion turbine load changes

The maximum 1-hour average NOx concentration for periods that include short-term excursions shall not exceed 30 ppmvd @ 15% O_2.

All emissions during start-ups/shut-downs and short-term excursions shall be included in all calculations of daily, quarterly, and annual mass emissions required by this permit.

Verification: As part of the quarterly and annual compliance reports, the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-27. The cooling towers shall not use any chromium-containing water treatment chemicals.

Verification: The project owner shall sample and test the cooling tower water at least once per day to verify compliance with this TDS limit. In addition, the project owner shall include information on the date, time and duration of any violation of this permit condition in the quarterly and annual reports.

AQ-28. The cooling tower drift rate shall not exceed 0.0005%. The project owner shall provide a written vendor statement, prior to installation, declaring that the cooling towers mist eliminators used meet the drift criteria stated above.

Verification: Sixty (60) days prior to installation, the project owner shall provide a manufacturer design specification of the cooling tower mist eliminator, which demonstrates compliance with the drift limit.

NEW SOURCE PERFORMANCE STANDARDS COMPLIANCE

AQ-29. The project owner shall provide written notification to the Air Pollution Control Officer for the following:

A. The date construction is commenced postmarked no later than 30 days after such date.
B. The anticipated date of initial start-up of the plant not more than 60 days or less than 30 days prior to such date.
C. The actual date of initial start-up of the plant within 15 days after such date.
D. A notification of any physical or operational change to the facility which may increase the emission rate to which a standard applies except exempted modifications as defined in 40 CFR 60.14(e), postmarked 60 days or as soon as practicable before the change is commenced.
E. The date upon which the demonstration of the continuous monitoring system performance commences postmarked not less than 30 days prior to such date.

Verification: The project owner shall provide a copy of each required written notification, in the same time frame of Condition AQ-29 to the CPM.

AQ-30. The following tests, reports and conditions shall be met:

A. Within 60 days of achieving the maximum production rate but no later than 180 days after initial start-up the owner or operator shall conduct performance test(s) as per Condition AQ-35 and furnish the Air Pollution Control Officer a written report of the results of such performance test(s).
B. The owner or operator shall provide the Air Pollution Control Officer 30 days prior notice of the performance test(s).

Verification: Approval of the source test protocols, as required in condition AQ-35, and the source test reports shall be deemed as verification for this condition. The project owner shall notify the District and the CPM within seven (7) working days before the execution of the source tests required in this condition. Source test results shall be submitted to the District and to the CPM within 60 days of the date of the tests.

MONITORING SYSTEMS

AQ-31. The CPP shall operate a continuous emission monitoring system that has been approved by the Air Pollution Control Officer for each combined cycle turbine's emissions.

A. The continuous emission monitoring (CEM) system shall monitor and record nitrogen oxides, carbon monoxide, and oxygen.

B. The CEM system shall comply with the EPA performance specifications (title 40, Code of Federal Regulations, Part 60, Appendix B, Performance Specifications 2, 3, and 4).

Verification: At least sixty (60) days prior to the start of ground disturbance, the project owner shall submit to the District and the CPM, for approval, a copy of the manufacturer specifications for the continuous emission monitoring system, which demonstrates compliance with the EPA performance specifications.

AQ-32. The CPP shall operate a continuous monitoring system that has been approved by the Air Pollution Control Officer that either measures or calculates and records the following.

Parameter to be monitored	Units
Fuel consumption of each combined cycle turbine.	Mmbtu/hr of natural gas
Exhaust gas flow rate of turbine and duct burner.	Kscfh or lb/hr
Total dissolved solids content of the circulating water in the cooling towers.	PPMW

Verification: At least sixty (60) days prior to the start of ground disturbance, the project owner shall submit to the District and the CPM, for approval, a copy of the manufacturer specifications for the continuous emission monitoring system, which demonstrates compliance with the EPA performance specifications.

RECORD KEEPING

AQ-33. The following record shall be continuously maintained on site for the most recent five-year period and shall be made available to the Air Pollution Control Officer upon request. Quarterly and yearly records shall be made available for inspection within 30 days of the end of the previous quarter or year respectively.

Frequency	Information to be recorded
General	A. Record of the occurrence and duration of any start-up, short-term excursion, or shut-down. B. Malfunction in operation of each turbine. C. Measurements from the continuous monitoring system. D. Monitoring device and performance testing measurements. E. All continuous monitoring system performance evaluations.

	F. All continuous monitoring system or monitoring device calibration checks. G. All continuous monitoring system adjustments and maintenance.
Hourly	A. Each combined cycle turbine's natural gas fuel consumption (mmbtu/hr). B. Indicate when each combined cycle turbine start-up/shut-down occurred. C. Each combined cycle turbine's NOx, CO, ROC, SO_x, and PM_{10} hourly mass emissions. For those pollutants directly monitored (NOx and CO), the hourly mass emissions shall be calculated based on concentration measurements from the CEM system required pursuant to condition AQ-31. For those pollutants that are not directly monitored (ROC, SO_x, and PM_{10}), the hourly mass emissions shall be calculated based on District approved emission factors contained in footnotes to condition AQ-17. D. Each combined cycle turbine's NOx and CO concentration measured in ppmvd at 15% O_2. E. Total dissolved solids content of the circulating water in the cooling towers in ppmw. F. Cooling tower hourly PM_{10} mass emission rate. The hourly emissions shall be calculated based on the cooling water circulation rate multiplied by the cooling tower drift rate, density of water, and the measured TDS level.
Daily	Total facility NOx, CO, ROC, SO_x, and PM_{10} daily mass emissions.
Quarterly	Total facility NOx, CO, ROC, SO_x, and PM_{10} quarterly mass emissions.

Verification: All quarterly and annual reports shall be maintained on site for a minimum of five (5) years and shall be provided to the CPM or District personnel upon request.

REPORTING

AQ-34. For each calendar quarter submit to the Air Pollution Control Officer a written report which contains the following. Each quarterly report is due by the 30th day following the end of the calendar quarter.

Frequency	Information to be submitted
Whenever the continuous emissions monitoring system is inoperative except for zero and span checks.	A. Date and time of non operation of the continuous emission monitoring system B. Nature of the continuous emission monitoring system repairs or adjustments.
Whenever an emission occurs as measured by the required continuous monitoring equipment that is in excess of any emission	A. Magnitude of the emission which has been determined to be in excess. B. Date and time of the commencement and completion of each period of excess emissions C. Periods of excess emissions due to start-up, shut-

limitation	down, short-term excursion, and malfunction shall be specifically identified. D. The nature and cause of any malfunction (if known). E. The corrective action taken or preventive measures adopted.
If there were no excess emissions for a quarter	A report shall be submitted indicating that there were no excess emissions

Verification: The project owner shall submit to the District and CPM, quarterly reports for the proceeding calendar quarter within 30 days from the end of the quarter. The report for the fourth quarter can be an annual compliance summary for the preceding year. The quarterly and annual compliance summary reports shall contain the following information.

(a) Operating parameters of emission control equipment, including but not limited to ammonia injection rate, NO_x emission rate, and ammonia slip.

(b) Total plant operation time (hours), number of startups, hours in cold startup, hours in warm startup, hours in hot startup, and hours in shutdown.

(c) Date and time of the beginning and end of each startup and shutdown period.

(d) Average plant operation schedule (hours per day, days per week, weeks per year).

(e) All continuous emissions data reduced and reported in accordance with the District approved CEMS protocol.

(f) Maximum hourly, maximum daily, total quarterly, and total calendar year emissions of NO_x, CO, PM_{10}, VOC, and SO_x (including calculation protocol).

(g) Fuel sulfur content (monthly laboratory analyses, monthly natural gas sulfur content reports from the natural gas supplier(s), or the results of a custom fuel monitoring schedule approved by the District).

(h) A log of all excess emissions, including the information regarding malfunctions/breakdowns.

(i) A log of excess visible emissions, including the information regarding malfunctions/breakdowns.

(j) Any permanent changes made in the plant process or production, which would affect air pollutant emissions, and indicate when changes were made.

(k) Any maintenance to any air pollutant control system (recorded on an as-performed basis).

In addition, this information shall be maintained on site for a minimum of five (5) years and shall be provided to the CPM or District personnel upon request.

COMPLIANCE TESTING REQUIREMENTS

AQ-35. A NOx, ROC, CO, SO_x, PM_{10}, ammonia, and CEM accuracy source test of each combined cycle turbine shall be performed during the time frame pursuant to Condition AQ-30.

A. The project owner shall submit a test plan to the Air Pollution Control Officer for approval at least 30 days before the source test is to be performed.

B. The Air Pollution Control Officer shall be notified at least 7 days prior to the emission testing date.

C. During the test(s), each turbine is to be operated at its maximum firing capacity defined as $\geq$ 90% of rated heat input capacity and taking into account ambient conditions.

D. The source test results shall be submitted to the Air Pollution Control Officer within 60 days from the completion of the source test(s).

Verification: No later than thirty (30) working days before the commencement of the source tests, the project owner shall submit to the District and the CPM a detailed source test plan designed to satisfy the requirements of this condition. The District and the CPM will notify the project owner of any necessary modifications to the plan within 20 working days of receipt of the plan; otherwise, the plan shall be deemed approved. The project owner shall incorporate the District and the CPM comments into the test plan. The project owner shall notify the District and the CPM within 7 working days prior to the planned source testing date. The source test results shall be submitted to the District and the CPM within 60 days from the completion of the source test.

AQ-36. A NOx, ROC, CO, SO_x, PM_{10}, ammonia, and CEM accuracy source test of each combined cycle turbine shall be performed once each calendar year.

A. The project owner shall submit a test plan to the Air Pollution Control Officer for approval at least 30 days before the source test is to be performed.

B. The Air Pollution Control Officer shall be notified at least 7 days prior to the emission testing date.

C. During the test(s), each turbine is to be operated at its maximum firing capacity defined as $\geq$ 90% of rated heat input capacity and taking into account ambient conditions.

D. The source test results shall be submitted to the Air Pollution Control Officer within 60 days from the completion of the source test(s).

Verification: The project owner shall notify the District and the CPM within 7 working days prior to the planned source testing date. The source test results shall be submitted to the District and the CPM within 60 days from the completion of the source test.

EMISSION REDUCTION CREDITS

AQ-37. The project owner shall provide the District emission reduction credit certificates in sufficient quantity to show compliance with the quarterly emission limits by the use of the following calculation procedure.

For NOx or ROC

$$QTR_q = \frac{P_{q\leq 15}}{1.3} + \frac{P_{q>15}}{1.5}$$

For PM_{10}

$$QTR_q = \frac{P_{q\leq 15}}{1.2} + \frac{P_{q>15}}{1.5}$$

Pq	=	Emission offset credit for pollutant in lb/quarter
q	=	Quarter (1, 2, 3, or 4)
QTR	=	This is the quarterly limit specified in Condition 19
<=15	=	Those emission reduction credit certificates whose point of origin was within 15 miles of the CPP project
>15	=	Those emission reduction credit certificates whose point of origin was greater than 15 miles but less than 50 from the CPP Project.

Verification: At least thirty (30) working days prior to start any ground disturbance for construction, the project owner shall provide valid emission reduction credits specified in AQ-38 to 40 to the District and the CPM for approval.

AQ-38. Except as provided in condition AQ-41, the following list of emission reduction credits shall be surrendered to the APCO prior to commencement of actual on-site construction. The values in the tables below represent the value of the credit after the appropriate distance ratio has been applied.

	District/ Certificate #	Quarter 1	Quarter 2	Quarter 3	Quarter 4
ROC					
Formica	PCAPCD/ 2000-0007	45,333	46,667	46,667	41,333
Formica	PCAPCD/ 2001-17	41,799	2,767	32,263	19,306
Swansons Cleaners	SMAQMD/ 653	10,657	13,631	7,762	16,389
Procter & Gamble	SMAQMD/ 755	16,667	16,667	16,667	16,667
Donner Furniture	SMAQMD/ 750	263	505	439	523
Burns Philp Food	YSAQMD/ EC-0121	0	3	13	6
Holly Sugar	YSAQMD/ EC-0174 – EC 0178	48	798	820	843
Blue Diamond Growers	SMAQMD/ 836	1,060	1,030	1,067	1,037

Ag Containers	SMAQMD/ 776	453	827	1,040	347
Ag Containers	SMAQMD/ 852	876	1,610	2,030	656
American River Asphalt	SMAQMD/ 851	167	421	792	675
Rancho Seco	SMAQMD/ 471,473,477, 479	355	189	116	196

	District/ Certificate #	Quarter 1	Quarter 2	Quarter 3	Quarter 4
NOx					
Burns Philp Food	YSAQMD/ EC-0121	0	195	801	333
General Mills	YSAQMD/ EC-0123	510	501	716	671
Holly Sugar	YSAQMD/ EC-0174 – EC 0178	1059	19,706	20,743	21,000
Blue Diamond Growers	SMAQMD/ 00849	3,795	3,946	4,106	3,659
Procter & Gamble	SMAQMD/ 777, 823, 826, 827	5,565	5,565	5,565	5,565
American River Asphalt	SMAQMD/ 851	215	540	1,019	869
Campbell Soup Company	SMAQMD/ 737,838	1,190	2,545	6,887	0

	District/ Certificate #	Quarter 1	Quarter 2	Quarter 3	Quarter 4
PM_{10}					
Campbell Soup	SMAQMD/ 737	382	224	1,239	438
Poppy Ridge Partners	SMAQMD/ 726,727	685	663	493	659
Blue Diamond Growers	SMAQMD/ 849	2,320	2,214	2,289	2,138
Procter & Gamble	SMAQMD/ Various	7,513	7,513	7,513	7,513
Grace Industries	SMAQMD/ 833-835	2,394	2,393	2,383	2,343
Elk Grove Ready Mix	SMAQMD/ 758	850	1,004	1,043	965
Rancho Seco	SMAQMD/ 471,473,475,477, 479	1,722	821	424	859
Road Paving	SMAQMD/ 768,769,772-776	14,823	20,448	28,300	21,156

American River Asphalt	SMAQMD/ 851	343	819	1,429	1,131

	District/ Certificate #	Quarter 1	Quarter 2	Quarter 3	Quarter 4
SO_x					
Grace Industries	SMAQMD/ 388, 390	471	775	770	390
Campbell Soup	SMAQMD/ 737	34	44	116	31
Poppy Ridge Partners	SMAQMD/ 726,727	17	36	36	15
Rancho Seco	SMAQMD/ 471,473,475,477, 479	21,741	13,377	3,511	7,383
American River Asphalt	SMAQMD/ 851	62	256	483	212

The specific allocation of ERC's to satisfy the offset requirement for those pollutants where SMUD possess an excess amount of ERC's shall be determined at the time of the surrender of the credits.

Verification: Thirty (30) days prior to start any ground disturbance for construction, the project owner shall provide the necessary emission reduction credit certificates and detailed calculations showing that the offsets are fully satisfied.

AQ-39. ROC emission reduction credits may be traded for NOx emission reduction credits at a ratio of 2.6 lb ROC for 1 lb NOx.

Verification: Thirty (30) days prior to start any ground disturbance for construction, the project owner shall provide the necessary emission reduction credit certificates and detailed calculations showing that the offsets are fully satisfied.

AQ-40. SO_x emission reduction credits may be traded for PM_{10} emission reduction credits at the following ratios

a) 2.8 lb SO_x for 1 lb PM_{10} for Calendar Quarter 1
b) 1.7 lb SO_x for 1 lb PM_{10} for Calendar Quarter 2 and 3
c) 3.3 lb SO_x for 1 lb PM_{10} for Calendar Quarter 4.

Verification: Thirty (30) days prior to start any ground disturbance for construction, the project owner shall provide the necessary emission reduction credit certificates and detailed calculations showing that the offsets are fully satisfied.

AQ-41. Those credits that that are being generated contemporaneous with the construction of the CPP (i.e. road paving ERC applications 00768, 00769, & 00772-00776) will only be required to be submitted prior to operation.

Verification: Thirty (30) days after the issuance of the District emission reduction credit certificates, the project owner shall surrender the necessary certificates and detailed calculations showing that the offsets are fully satisfied.

AQ-42. SMUD shall pave the roadways described in SMAQMD ERC applications 00768, 00769, 00772-00776.

Verification: Thirty (30) days prior to issuance of the District emission reduction credit certificates, the project owner shall provide the District and the CPM the work order completion and pictures of the roadways before and after paving performed.

AQ-43. SMUD shall ensure that the paved roads described in SMAQMD ERC applications 00768, 00769, 00772-00776 are properly maintained and repaired for the life of the Cosumnes Power Plant.

Verification: The project owner shall include pictures of the roadways after being paved for credits in the annual compliance report as required in condition AQ-34.

AIR QUALITY APPENDIX A
STAFF PROPOSED $PM_{2.5}$ MITIGATION FOR THE COSUMNES POWER PLANT

THE PROJECT

The Cosumnes Power Plant (CPP) is a nominal 500 megawatt natural gas-fired, combined-cycle power plant comprised of two combustion turbines, one steam turbine, and supporting equipment. CPP is expected to emit 80 tons per year of PM_{10}, almost all of it as fine particulate matter ($PM_{2.5}$), which could create significant adverse impacts. Staff is investigating all feasible means of reducing the impacts to a level that is less than significant.

THE PROBLEM

Fine particulate matter is derived directly from the combustion of materials, or from secondary formation from precursor gases (SO_x, NOx, and VOC) through complex reaction in the atmosphere. $PM_{2.5}$ consists of sulfates, nitrates, ammonium, elemental carbon, organic compounds, and a variety of other compounds.

The EPA has promulgated a 65 $\mu g/m^3$ 24-hour $PM_{2.5}$ standard, and a 15 $\mu g/m^3$ annual $PM_{2.5}$ standard. However, they have not determined the attainment status of any district.

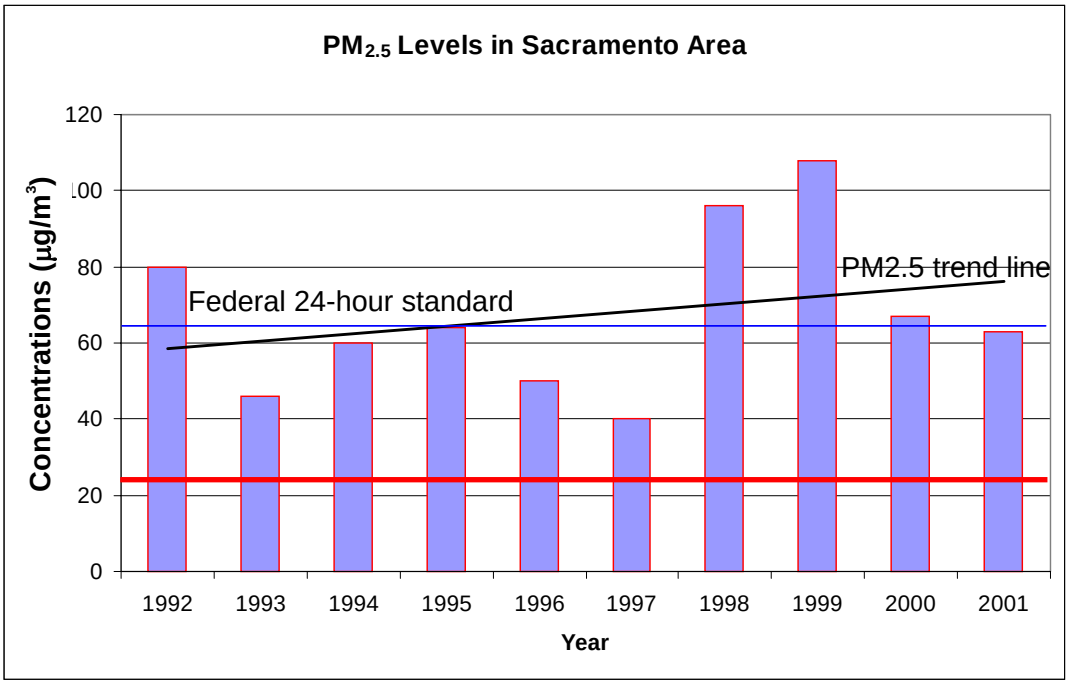
The ARB has recently adopted a new annual $PM_{2.5}$ standard of 12 μg/m3, but has not determined the attainment status of any district. The ARB also considered adopting a new 24-hour $PM_{2.5}$ standard at 25 $\mu g/m^3$.

Presented in **Figure 1** are $PM_{2.5}$ data collected at the Sacramento T Street monitoring station from 1991 to 2001. These data indicate that the highest $PM_{2.5}$ concentration normally occurs during November to January. These $PM_{2.5}$ data show that the highest $PM_{2.5}$ concentrations range from 40 in 1997 to 108 mg/m^3 in 1999. The data in **Figure 1** show an increasing trend in the 24-hour $PM_{2.5}$ concentrations since 1991. Based on these data, the area would likely be designated as non-attainment for the federal 24-hour $PM_{2.5}$ and the proposed state 24-hour $PM_{2.5}$ standard.

An ARB staff report (ARB 2002) was provided at the adoption hearing for the state ambient air quality standards for particulate matter and sulfates. The report states that secondary ammonium nitrate (formed by NOx and ammonia) can account for over half of the wintertime $PM_{2.5}$ mass during the winter at most of the urban sites in California. The highest $PM_{2.5}$ concentrations normally occurred in the three months November to January.

From a study by Nehzat Motallebi (Motallebi 1998) the following observations can be drawn from the application of Chemical Mass Balance analysis of the PM_{10} and $PM_{2.5}$ measurement data in Sacramento.

Figure 1



Source: Air Resources Board

- Primary vehicle exhaust and wood smoke are significant sources of both PM_{10} and $PM_{2.5}$ in winter.
- Nitrates, a secondary formed fine particulate matter from the complex reaction of NOx and ammonia in the atmosphere, are the major cause of high $PM_{2.5}$ and PM_{10} levels during the winter months.
- Sulfates, secondary formed fine particulate matter from the reaction of SO_x and ammonia in the atmosphere, are also a major contributor to high $PM_{2.5}$ levels during the winter months.
- Fugitive dust is not a major contributor to the peak PM_{10} and $PM_{2.5}$ levels in Sacramento in the winter months.

SOLUTION

To mitigate the project's fine particulate matter emission impacts, staff recommends that the applicant reduce emissions of $PM_{2.5}$ and its precursors, specifically in the PM season (November, December, and January) by:

- Permitting the turbine exhaust ammonia slip emissions at 5 ppm or less, and
- Implementing a program to replace residential and business wood burning devices used in the Sacramento area.

PROGRAM CONCEPT

Basically, the existing wood stoves are replaced with new wood stoves. The new stoves, called "EPA Phase II Certified", burn much more cleanly and efficiently than older non-certified units. Thus, replacing the older units with the new units would result in both lower emissions and a reduction in the amount of wood being burned. These emission reductions of the local PM_{10} and $PM_{2.5}$ emissions would mitigate the project's fine particulate matter contribution to the area's PM_{10} and $PM_{2.5}$ problems.

THE PROGRAM:

Staff suggests that the applicant design and market a program to achieve the following goals:

- The program will last for five years or until the available funds ($396,250.00) are exhausted, or 317 units have been installed, whichever comes first.
- The program is strictly on a voluntary basis to willing residents and businesses of Sacramento County.
- Each resident or business participating in the program will be eligible to receive an EPA Phase II Certified wood stove unit installed, free of charge, or up to a total of $1,250.00 toward a more expensive model, whichever is less.
- Priority will be given to retailers and licensed installers who have businesses in the Sacramento area to sell and install the new wood stoves and remove and destroy the old wood stoves.
- Each participant in the program would only do business with the retailer and the professional, licensed installer to ensure up-to-code installation of the new unit.
- Each dealer participated in the program must agree to provide a detailed instructions for the proper operation and the use of proper type of wood for the new unit to each residential or business participates in the program.
- The retailer must certify that he or she has rendered all old wood stoves replaced non-operative by permanent removal of the stove doors.
- The retailers are required to keep records of old wood stove units being removed and installation of the new units, and submit those records to CPP on a monthly basis for reimbursement.

HOW STAFF ARRIVED AT THE NECESSARY WOODSTOVES

Criteria:

To achieve a total of 10,005 pounds of fine particulate matter for the three months November to January.

Known data (reference EPA AP-42, Table 1.10-1):

- conventional wood stove PM emission rate= 30.6 lbs/ton of wood
- burns 1.28 cords/year each (cord = 1400 kg) [ARB, Residential Wood Combustion Suggested Control Measure, 1991]

Calculations:

- Convert from cord to tonnage of wood:

$$\frac{1.28 cords}{yr} * \frac{1400 kg}{cord} * \frac{2.205 lb}{kg} * \frac{ton}{2000 lb} = 1.97 \frac{tons}{yr}$$

- Emissions reduction per wood stove conversion:

$$\Delta \dot{E} = (\frac{30.6 lbPM}{ton} - \frac{14.6 lbPM}{ton}) * \frac{1.97 ton}{yr} = \frac{31.5 lbPM}{unit * yr}$$

- Numbers of unit needed:

$$\frac{10{,}005 lbs}{yr} * \frac{unit}{31.5 lbPM} = 317 units$$

- Cost:

@ $1,250/unit = $396,250

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CULTURAL RESOURCES

Testimony of
Judy McKeehan and Dorothy Torres

INTRODUCTION

The cultural resources section identifies potential impacts of the proposed Cosumnes Power Plant (both Phase 1 and Phase 2) to cultural resources. Staff defines the term "cultural resources" to refer to anything created or affected by human beings. The term "cultural resources", as defined in law, includes buildings, sites, structures, objects, and historic districts. The primary purpose of the cultural resources analysis is to ensure that all potential impacts are identified, and that conditions of certification are set forth that ensure impacts are mitigated below a level of significance under the California Environmental Quality Act (CEQA).

Staff provides a cultural resources overview of the project, as well as an analysis based on CEQA criteria that assesses potential project related impacts. If cultural resources are identified, staff determines whether they may be affected by the project and whether the resources are eligible for the California Register of Historic Resources (CRHR) or the National Register of Historic Places (NRHP). If eligible, staff recommends mitigation that ensures no significant impacts would occur. In addition, a project may impact a previously unidentified resource or impact an identified historical resource in an unanticipated manner. Staff therefore recommends procedures in the conditions of certification that mitigate these potential impacts.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

FEDERAL

- Code of Federal Regulations, 36 C.F.R. Part 61. Federal Guidelines for Historic Preservation Projects: The U.S. Secretary of the Interior has published a set of Standards and Guidelines for Archaeology and Historic Preservation. These are considered to be the appropriate professional methods and techniques for the preservation of archaeological and historic properties. The Secretary's standards and guidelines are used by federal agencies, such as the U.S. Forest Service, the Bureau of Land Management, and the National Park Service. The State Historic Preservation Office refers to these standards in its requirements for mitigation of impacts to cultural resources on public lands in California.
- National Historic Preservation Act, 16 U.S.C. § 470, commonly referred to as Section 106, requires federal agencies to take into account the effects of their undertakings on historic properties through consultations beginning at the early stages of project planning or if there are unanticipated discoveries of cultural resources during activities conducted under a federal permit. Implementing regulations revised in 1997 (36 CFR Part 800 et. seq.) set forth procedures to be followed for determining eligibility of cultural resources, determining the effect of the undertaking on the historic properties, and how the effect will be taken into

account. The eligibility criteria and the process are used by federal agencies. Very similar criteria and procedures are used by the State in identifying cultural resources eligible for listing in the California Register of Historical Resources.

STATE

- California Code of Regulations, Title 14, section 4852 defines the term "cultural resource" to include buildings, sites, structures, objects, and historic districts.
- Public Resources Code, Section 5000 establishes a California Register of Historic Places; determines significance of and defines eligible resources. It identifies any unauthorized removal or destruction of historic resources on sites located on public land as a misdemeanor. It also prohibits obtaining or possessing Native American artifacts or human remains taken from a grave or cairn and establishes the penalty for possession of such artifacts with intent to sell or vandalize them as a felony. This section defines procedures for the notification of discovery of Native American artifacts or remains, and; states that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated.
- The California Environmental Quality Act (CEQA) (Public Resources Code, section 21000 et seq.; Title 14, California Code of Regulations, section 15000 et seq.) requires analysis of potential environmental impacts of proposed projects and requires application of feasible mitigation measures.
- Public Resources Code section 21083.2 states that the lead agency determines whether a project may have a significant effect on “unique” archaeological resources; if so, an EIR shall address these resources. If a potential for damage to unique archaeological resources can be demonstrated, the lead agency may require reasonable steps to preserve the resource in place. Otherwise, mitigation measures shall be required as prescribed in this section. The section discusses excavation as mitigation; limits the Applicant’s cost of mitigation; sets time frames for excavation; defines “unique and non-unique archaeological resources;” and provides for mitigation of unexpected resources.
- Public Resources Code section 21084.1 indicates that a project may have a significant effect on the environment if it causes a substantial adverse change in the significance of a historic resource; the section further defines a “historic resource” and describes what constitutes a “significant” historic resource.
- CEQA Guidelines, Title 14, California Code of Regulations, section 15126.4(b), prescribes the manner of maintenance, repair, stabilization, restoration, conservation, or reconstruction as mitigation of a project’s impact on a historical resource; discusses documentation as a mitigation measure; and discusses mitigation through avoidance of damaging effects on any historical resource of an archaeological nature, preferably by preservation in place, or by data recovery through excavation if avoidance or preservation in place is not feasible. Data recovery must be conducted in accordance with an adopted data recovery plan.
- CEQA Guidelines, section 15064.5 defines the term “historical resources,” explains when a project may have a significant effect on historic resources, describes CEQA’s applicability to archaeological sites, and specifies the relationship between “historical resources” and “unique archaeological resources.”

- Penal Code, section 622 1/2 states that anyone who willfully damages an object or thing of archaeological or historic interest is guilty of a misdemeanor.
- California Health and Safety Code, section 7050.5 states that if human remains are discovered during construction, the project owner is required to contact the county coroner.

LOCAL

County Of Sacramento

The Sacramento County General Plan Conservation Element (December 15, 1993) contains goals, objectives, and policies for the preservation and protection of historical and cultural resources throughout the County. Its goal is to promote the inventory and to protect and interpret the cultural heritage of Sacramento County, including historical and archaeological settings, sites, landings, features, artifacts, and/or areas of ethnic, historical, religious, or socio-economic importance. Section VI describes policies and programs under six objectives to accomplish this goal. A summary of the objectives follows:

- Attention and care that ensure that cultural resource sites are protected with sensitivity to Native American values.
- Structures with architectural or historical importance preserved to maintain exterior design elements.
- Protection of known archaeological sites.
- Knowledge of cultural resource site locations.
- Properly store and classify artifacts for ongoing study.
- Public awareness and appreciation of visible and intangible historic and cultural resources. (County of Sacramento 1993).

City of Elk Grove

The East Franklin Specific Plan is applicable to the project because a portion of the CPP natural gas pipeline route is Franklin Boulevard. One mile of the natural gas pipeline would be installed is in the utility corridor along Franklin Boulevard, which is within the East Franklin Specific Plan Planning area of the City of Elk Grove (City of Elk Grove 2002a). The Plan covers an area of approximately 2,470 acres about two miles west of the center of the City of Elk Grove. The Sacramento County Board of Supervisors originally approved it in 2000 when the area was unincorporated. The City of Elk Grove was incorporated in July 2001 and has subsequently adopted the Plan. Its purpose is to provide direct and comprehensive correlation between land use, public facilities, and services necessary for support of land use. (County of Sacramento 2000).

One of the Planning Principles of the Specific Plan is to “recognize the unique, historical character of the Town of Franklin and develop a plan which is sensitive to its preservation and provides compatible land uses.” The Plan area contains approximately eight historic homestead sites: three are active dairies; two are abandoned dairies; and three are homestead sites that appear farming-related. The East Franklin Specific Plan provides for the protection of the integrity of the Grant,

Rusmore, and Benedict homesites and for the preservation of the Jungkeit Dairy residence. (City of Elk Grove 2000.)

Yolo County

The Yolo County Code, Article 2, sections 8-8.201 and 8-8.202 provide standards for designation of historic landmarks and historic districts. It also provides procedures recommending historic landmarks and historic districts to the Historic Preservation Commission (Yolo County 2002, p. 257).

ENVIRONMENTAL SETTING

The project area is located within the Central Valley of California, a huge alluvial basin 400 miles long and 50 miles wide that is characterized by broad alluvial plains dominated by annual grasslands and fresh emergent wetland habitats. The project lies within Sacramento County, about 25 miles southeast of the City of Sacramento, south of the Rancho Seco Nuclear Plant site.

The proposed power plant and associated fuel, water, and electrical transmission lines, would be located on SMUD's 2,480-acre property which is located in Section 29, Township 6N, Range 8E, Mount Diablo Base and Meridian. Clay East Road borders the project site to the south and Twin Cities Road (State Route 104) is the closest major road to the north and west.

The proposed natural gas line would extend approximately 26 miles from the network tap point at the Carson Ice-Gen facility in Elk Grove to the CPP site. A compressor station, (necessary for Phase 2) is also planned to be located on County Road 29 near Winters, California, in Yolo County. The Winters compressor station would be installed within the existing fenced PG&E/SMUD inter-tie station. An additional compressor station (necessary for Phase 2) would be installed at the existing compressor station within the Sacramento Regional Wastewater Treatment Plant buffer lands within the existing fenced valve station. Additionally, three valve stations would also be located in three areas along the proposed gas line route as part of the CPP project (SMUD 2002p, p. 1-1 and 1-2).

The proposed electric transmission line corridor would be 50 feet wide and about 0.5-mile in length. It would extend from the proposed CPP switchyard to the existing Rancho Seco switchyard. There would be a total of six transmission line poles. Pole foundations would be 6 feet in diameter and 20 feet deep (SMUD 2002p, p.1-3).

An approximately 0.4 mile long water pipeline would extend from the existing Rancho Seco Plant to the CPP.

Refer to the **Project Description** section of this Staff Assessment for additional information and figures of the project development region and the project area.

PREHISTORIC SETTING

The project area and the greater Sacramento Valley have been occupied for about 12,000 years, although only a few archaeological sites have been found that date earlier

than 5,000 years ago. The probable reason for this is that much of the evidence for human occupation is buried beneath the alluvial sediments that accumulated quickly (as much as 30 feet) during that period.

Three general patterns of prehistoric resource exploitation have been identified for the area. During the time period between 2500 B.C. to A.D. 1500, the Windmiller Pattern was a seasonal hunting/gathering economy characterized archaeologically by projectile points, fishing hooks and spears, groundstone, and the remains of a wide variety of fauna and fish. Over a period of 1,000 years, that pattern evolved into a more specialized adaptive pattern called the Berkeley Pattern that demonstrates a shift to a greater reliance on acorns and shellfish as demonstrated by the use of mortars and pestles and the presence of shell mounds. The Augustine Pattern reflects development of social organization and stratification demonstrated by mortuary ritual, sedentism, population growth, and beads as monetary exchange after A.D. 500 (SMUD 2001a, p. 8.3-9 to 8.3-12).

ETHNOGRAPHIC BACKGROUND

The project area was inhabited by the Eastern Miwok, a subfamily of the Utian family, Penutian stock. The Eastern Miwok once contained seven language divisions and five separate groups. The project area falls into the Plains Miwok subdivision that occupied the lower Mokelumne and Cosumnes rivers and the Sacramento River from Rio Vista to Freeport. As known mostly from Spanish mission records, diaries, and journals, the Plains Miwok relied on the resources of the Delta and surrounding areas for food and material needs. Acorns were the primary food staple, supplemented by large game, waterfowl, fish, and shellfish. Trade with coastal groups and mountain tribes is indicated by obsidian, steatite, and shell. Social structure centered around tribelets associated with central permanent settlements on high ridges or knolls, or on Delta islands (SMUD 2001a, p. 8.3-12, 8.3-13).

HISTORIC SETTING

The first documented European presence in the Sacramento Valley was by the Spanish explorer Pedro Fages in 1772. Spanish Colonel Juan Bautista De Anza and a party of Spanish settlers, soldiers, and Franciscan Fray were sent to Monterey to establish a mission. They traveled through the Bay Area in 1776. Spanish explorer Lieutenant Gabriel Moraga's caravan crossed the Mokelumne, Cosumnes, and American rivers and explored the Feather River in 1808 while looking for suitable mission locations and capturing runaway Mission Indians. The first river-based expedition took place along the San Joaquin and Sacramento rivers by Spanish explorers in 1811. The last, and most substantial Spanish exploration in the area occurred in 1817 when Luis Arguello, then commander of the San Franciso Presidio, traveled up the Sacramento River and on to the Feather River.

The Mexican revolt of 1822 brought an end to colonization through coastal mission building and began an emphasis on establishment of extensive land grants that included interior California. American trapper and explorer, Jedediah Smith explored the western Sierra Nevada and foothills starting in 1826, trapping in and around the Sacramento Valley in 1827. Large Mexican land grants were issued to John Sutter who founded New Helvetia in 1838. During the mid-1840s ranchos were granted around

Sloughhouse, the Cosumnes River, modern Elk Grove, and the existing Rancho Seco Plant. Jackson Road was established as the main route between the Cosumnes River and Sacramento in 1848. The European population in the Sacramento Valley boomed in the early 1849 with the discovery of gold, just subsequent to the decimation of the indigenous population by epidemics of disease. California became a state in 1850, following the end of the Mexican war in 1848 and the Treaty of Guadelupe Hidalgo that ceded the territory of California to the United States.

A stage line that followed Laguna Creek to Stockton Road served as the main transportation route in the local area in the 1860s and 1870s. The Central Pacific Railroad completed a line to transport coal mined in adjacent Amador County in 1877 and used surrounding land grant property to graze cattle. Farming was started to supply stock feed and grew to include fruit orchards, hops production, and vineyards during the early 20th century. Agriculture has dominated the project area since that time. In 1966 SMUD began construction of the Rancho Seco Plant and operations began in 1972. The power plant was closed by a vote of Sacramento County residents in 1989, after a controversial history of operation (SMUD 2001a, p. 8.3-13, -15).

RESOURCES INVENTORY

Literature and Records Search

Prior to preparation of the AFC, the applicant conducted literature searches and cultural resources inventories within ½-mile of the project site and related facilities (e.g. natural gas pipeline, construction access road, electric transmission line, water line, valve stations, compressor stations), through the Archaeological Information Center of the California Historic Resources Information System (CHRIS). The record searches identified three previously known/recorded prehistoric sites, fourteen historic archaeological resources, and one site with historic and prehistoric components within ½-mile of the proposed project. No Native American traditional cultural properties were identified.

Only one potential archaeological resource was identified within the vicinity of the proposed project site. This potential site was previously the subject of controversy. Expert opinions differed, however the final opinion was that the location was probably not a site. The potential cultural resource was recorded with the CHRIS as ARS-85-15-1 (SMUD 2001a, Confidential Filing, p.12). Several previously recorded historic cultural resources were identified near the project footprint. They include CA-SAC-500H, a site composed of historic dredge tailings, possible placer mining features, and CA-SAC-504H, a site related to ranching.

Previously recorded sites, CA-SAC-93, CA-SAC-68, and the historic Hicksville Cemetery were identified near the gas line route. The locations of Elliot Ranch, former Arno townsite, and former Hicksville townsite are also in the vicinity of the proposed gas line.

An additional records search conducted at the CHRIS revealed the Union School that was constructed in 1912. The school has since been converted to a private residence. No other cultural resources were identified in the vicinity of the Winters gas compressor

station or in the vicinity of the Valve #190 compressor station in Elk Grove (SMUD 2002, pp. 1-2 and 2-4).

In July 2002, a member of the Ione Band of Miwok, Randy Yonemura, identified 13 additional locations of potential cultural resource sites for SMUD (SMUD 2002r). In October 2002 SMUD arranged to have remote sensing conducted at eight of the identified sites. SMUD contacted property owners, but could not gain access to the additional five areas (SMUD 2002bc). Remote sensing is defined as in Archaeology Theories Methods and Practice, as "The imaging of phenomena at a distance,…, 'Ground based remote sensing' links geophysical methods such as radar with remote sensing method applied at ground level, such as thermography" (Renfrew and Bahn 2000, p.571).

In November 2002, an additional records search was conducted to assess an area where a portion of a linear route had changed. The search confirmed that previously recorded CA-SAC-2 appeared to be located along the gas line route (SMUD 2002bg).

Field Surveys

The applicant carried out a cultural resources field reconnaissance survey of the proposed power plant site in March 2001 and of the previously unsurveyed sections of the gas line route in July 2001 (SMUD 2001a, p.17).

The March 2001 reconnaissance survey did not find any material at the previously recorded location of ARS-85-15-1. The surveyors did identify two potential historic period sites, a ranch related site recorded as CA-SAC-504H and historic period dredge tailings recorded as site CA-SAC-500H. It does not appear that the project would impact any of these potential cultural resources (SMUD 2001a, Confidential filing, p.12-15). The water line was included in the area surveyed in March 2001. The cultural resources survey conducted in January 2002 identified a circular feature believed to be a placer mining depression in the project site vicinity. No artifacts were associated with this depression (SMUD 2002f, Confidential filing, p. CR41-6). The project would also avoid this potential cultural resource.

One new potential archaeological site was identified along the proposed gas line route. This site was later recorded and assigned the trinomial CA-SAC-526/H by the CHRIS.

Between January 23 and January 26, 2002, the valve stations, compressor stations, construction access road and transmission corridor were surveyed. This survey included the proposed compressor station located in Yolo County, near Winters. No cultural resources were identified as a result of these surveys (SMUD 2002p).

The 3,200-feet proposed construction access road located from Clay East Road to an existing Rancho Seco Park road was surveyed in April 2002. No cultural resources were identified (SMUD 2002p, p. 3-3).

On June 25, 2002, SMUD surveyed an additional 11 miles of proposed gas pipeline route. The route had been previously surveyed in 1980. The survey began several hundred feet south of Dwight Road and ended at Eschinger Road. An additional segment of the survey began at Laguna Road and extended approximately 1.8 miles

along the pipeline route. For the most part, the survey extended 30 feet from the centerline of the proposed route. In one section, the survey extended 60 feet from the proposed centerline of the gas line route. This survey included the area of a route change that had not been previously surveyed. The route change encompassed a corridor from Core Road to Eschinger Road. No cultural resources were identified along the survey route (SMUD 2002r).

On November 1, 2002, the applicant proposed a route change for a one-mile portion of the 26-mile natural gas line. The one-mile portion of the revised route would be located parallel to Franklin Boulevard rather than the Union Pacific Railroad tracks. The Jungkeit Dairy appeared to be at risk of disturbance due to the route change. However on December 14, 2002, staff investigated the route and noted that new residential buildings had been constructed between the Jungkeit Dairy and the proposed gas line route. The presence of the gas line would not affect the Jungkeit Dairy building. The area of the new route was covered by the original record search conducted for the project. In addition, the applicant surveyed the route in October 2002. No cultural resources were identified during the survey (SMUD 2002ax, p.7).

Portions of proposed laydown areas were surveyed in March 2001 and additional areas were surveyed in January 2002 and October 2002 (SMUD 2002f p. CR41-4 to 5). Two features that appear to be placer mining holes were recorded during the first survey. Three additional features that appear to be a combination of mining activity and historic debris were identified in the vicinity during the second and third surveys. All the identified features would be part of “no construction-related activity” areas and would be avoided by the project (SMUD 2002f, p. CR41-7; SMUD 2002ax, p.13).

A survey of the area of previously recorded CA-SAC-02 (two previous locations were identified by the CHRIS) was conducted in October 2002. No evidence of a site was identified at either location (SMUD 2002bg, p.21).

In response to Data Request 37, SMUD provided Department of Parks and Recreation (DPR) form 523s for buildings and other resources within 100 feet of the proposed gas line. JRP Historical Consulting Services compared locations on historical maps to potential resources identified during a windshield survey. Caltrans bridge lists were also checked. Additional fieldwork included field recordation of potential cultural resources and photographs (SMUD 2002e).

Presence/Absence Testing

To avoid repetition, the discussion of presence/absence testing is included in the Impacts section.

Remote Sensing

Members of the Native American community expressed a great deal of concern regarding the potential for encountering human burials in the vicinity of the Hicksville Cemetery. SMUD decided to conduct remote sensing in the area of Hicksville Cemetery. SMUD could not obtain landowner permission to use this technique along the actual proposed gas pipeline route, which is south of the Arno Road right-of-way.

The remote sensing was accomplished by Billy A. Silva Sensing Systems using an EG+G Geometrics 858 cesium vapor magnetometer. The G858 magnetometer measures the rates of change of certain atomic structures in the presence of a superimposed magnetic field (SMUD 2002r, p. 2). Remote sensing was used at newly identified site CA-SAC-256/H and the vicinity of the Hicksville Cemetery to identify potential cultural resources. Anomalies were identified at both locations. The remote sensing operator recommends that augering or some other method of "ground truthing" be used to investigate the identified anomalies (SMUD 2002r).

Thirteen additional locations were identified as areas of potential cultural sensitivity by Randy Yonemura. On August 1, 2002, SMUD sent letters to landowners attempting to gain access to the 13 locations. SMUD either acquired property owner permission for access or conducted remote sensing where there was public access. SMUD was able to conduct remote sensing at eight of the locations.

Contractors, CH2M Hill, Tremaine and Associates and URS/Norcal conducted the remote sensing tests. SMUD instructed the contractors to use whatever method of remote sensing that the contractors thought applicable. Consequently, a variety of testing procedures were used. SMUD referred to each test site as a numbered location (Locations 1-9). (SMUD 2002bk, p. 6). Staff refers to the location numbers for this discussion in **Cultural Resources Table 1.**

In order to address potential impacts to previously recorded sites and locations identified a culturally sensitive, staff and SMUD are constructing a treatment plan that would ensure that any impacts to previously identified sites would be mitigated to below a level of significance. After permitting, SMUD would have access to property where cultural resources might be located and would be able to conduct presence/absence testing, evaluations, and data recovery (if needed) as required by proposed Condition of Certification **CUL-8**. Depending on the location of the other five areas (where access for remote sensing could not be obtained) identified as culturally sensitive, monitoring would occur at these areas based on procedures specified in the treatment plan.

At Location #8 an anomaly was identified during remote sensing that may be a historic site. Although anomalies were not identified, at several other locations, the terrain suggests a potential for previous habitation (SMUD 2002bk). The treatment plan would require backhoe testing at locations #2, #4, #7 and #8. If backhoe testing reveals cultural materials, then shovel testing may be required to determine the extent of the site and quantity and quality of material contained within the site. If it is not possible to avoid the site, after a determination that the sufficient material is present, the site would be evaluated for eligibility to the CRHR. If a site is recommended eligible to the CRHR, avoidance or data recovery, as detailed in the agreed upon treatment plan, would be conducted.

Cultural Resources Table 1
Remote Sensing Locations, Findings, and Recommendations

Remote Sensing Location, 2002	Method	Findings	Staff Recommendations
1. CH2M Hill	EM31 and EM61	Underground pipeline	Part-time monitoring per treatment plan
2. Tremaine & Assoc.	EM3	May be sensitive for human habitation	Backhoe testing Shovel test, if necessary
3. CH2M Hill	EM31 and EM61	Unidentified anomalies	Test area would not be impacted by project
4. Tremaine & Assoc.	EM3	May be sensitive for human habitation	Backhoe testing Shovel test, if necessary
5. URS/Norcal	VMG, TC, GPR, and MD	Modern metal fragments	Part-time monitoring per treatment plan
6. Tremaine & Assoc.	EM3	May be sensitive for human habitation	full-time monitoring
7. Tremaine & Assoc.	EM3	May be sensitive for human habitation	Backhoe testing Shovel test, if necessary
8. CH2M Hill	EM31 and EM61	Possible historic site	Backhoe testing Shovel test, if necessary
9. URS/Norcal	VMG, TC, GPR, and MD	Testing method would not have identified prehistoric site	Part-time monitoring per treatment plan
Source: SMUD 2002bk.			

Native American Contacts

Consultation with Native Americans is essential to identification of all the cultural resources within a project area. The applicant contacted the Native American Heritage Commission (NAHC) on March 22, 2001 to obtain a list of Native Americans that may have concerns about projects in the Sacramento County area (SMUD 2001a, p. 8.3-23). The applicant sent letters to those on the list on May 4, 2001 describing the project and asking their concerns. Two responses were received. The United Auburn Indian Community of the Auburn Rancheria (Miwok/Maidu) reported on May 21, 2001 that the Tribal Historic Preservation Committee had no information regarding sacred sites in the project area. The Ione Bank of Miwok Indians reported on June 20, 2001 that the Tribe was unaware of any information regarding existing sites in the area. SMUD representatives met with Native Americans who wanted to provide information regarding the project on November 8, 2001, January 15, 2002, and January 26, 2002. At the January 26th meeting, the Native Americans identified and walked potentially sensitive areas with SMUD representatives and the Energy Commission (SMUD 2002e, Attachment CR-53.)

In addition, a letter was received from the Ione Band of Miwok Indians (Ione Band of Miwok Indians 2002b). The letter outlined measures that the Ione Band would like to see implemented. In summary, the Band requested that a buffer area be created around the Hicksville Cemetery. The Band also requested that Native American

monitors be present during earthmoving activities in culturally sensitive areas. Members of the Band are willing to participate as Native American monitors. Moreover the Band would like to see that culturally sensitive areas are clearly marked and continually monitored during ground disturbing activity in these areas. The Band also suggested that a training plan be developed to educate construction personnel regarding the significance of the culturally sensitive areas and the importance of avoiding these areas. The Ione Band is available to participate in the training program. The Band also suggested that an agreement between the Band and SMUD that identifies the steps that should be taken if human remains or other cultural materials are found. The Band also wanted assurance from the applicant that sensitive cultural areas would be protected during project maintenance activities (Ione Band of Miwok Indians 2002b). Staff met with the Cultural Committee of the Ione Band of Miwok on November 25, 2002. The results of that meeting are discussed in the Impacts section.

Moreover, staff has received telephone calls from Billie Blue Elliston and Randy Yonemura, who are also members of the Ione Band. They both expressed concern regarding specific locations along project linears (CEC 2002c and CEC 2002f). Mr. Yonemura also provided comments in writing on June 21, 2002, regarding a site testing plan (SMUD 2002q) proposed by SMUD (Yonemura 2002a). Additional comments from Mr. Yonemura concerned curation, human remains, and grave goods.

CATEGORIZATION OF IDENTIFIED CULTURAL RESOURCES

As described previously, various laws apply to the treatment of cultural resources. These laws require the Energy Commission to categorize resources by determining whether they meet several sets of specified criteria. These categories then in turn influence the analysis of potential impacts to the cultural resources and the methods and consultation required to mitigate any such impacts.

The record and literature search and the pedestrian and windshield surveys of the proposed project area and linears were conducted in order to identify the presence of any cultural resource sites or materials. Remote sensing and presence/absence testing were conducted in specific areas to identify whether intact sites existed in those locations. Where resources were identified, additional cultural resource evaluation was conducted to determine whether the resources are already listed on, or are potentially eligible for listing on either the National Register of Historic Places (NRHP) or the CRHR. If a cultural resource is recommended eligible to the CRHR it is considered to be a historical resource and public agencies must treat that cultural resource as significant unless there is a preponderance of evidence to the contrary. The determination of eligibility is made in compliance with the criteria for the CRHR. The criteria include: (1) is associated with important historical or cultural events in California; (2) is associated with the lives of persons important in our past; (3) embodies 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; and (4) has yielded or may yield important information in history or prehistory (Cal. Code Regs., tit. 14, § 4852). SMUD was not able to complete presence/absence testing because they could not gain access to private property where previously identified sites were located. Since the presence or absence of some sites could not be confirmed, the sites could not be evaluated.

CEQA Guidelines explicitly require the lead agency (in this case, the Energy Commission) to make a determination of whether a proposed project would affect "historical resources." The guidelines provide a definition for historical resources and set forth a listing of criteria for making this determination. These criteria are the eligibility criteria for the CRHR and are essentially the same as the eligibility criteria for the NRHP. In addition, as with the NRHP, historical resources must also possess integrity of location, design, setting, materials, workmanship, feeling, and association. Resources eligible for the CRHR may have less integrity than the resources eligible for the NRHP. If the criteria are met and the resource is determined eligible for the CRHR, the Energy Commission must evaluate whether the project would cause a "substantial adverse change in the significance of the historical resource," which the regulation defines as a significant effect on the environment. If there is federal involvement in the project, the lead federal agency would ensure compliance with Section 106 of the National Historic Preservation Act, 16 U.S.C. § 470 (36 CFR Part 800 are the implementing regulations of Section 106). The lead federal agency would also determine the eligibility of applicable sites for the NRHP in consultation with the State Historic Preservation Officer (SHPO).

CEQA also contains a section addressing "unique" archeological resources and provides a definition of such resources (PRC, Section 21083.2). This section establishes limitations on analysis and prohibits imposition of mitigation measures for impacts to archeological resources that are not unique. However, the CEQA Guidelines state that the limitations in this section do not apply when an archeological resource has already met the definition of a historical resource ((Cal. Code Regs., tit. 14, § 15064.5). Where staff has determined that the sites for which it is recommending mitigation meet the definition of historical resources, the prohibition does not apply to the mitigation discussed in this staff assessment.

Since SMUD could not obtain access to much of the land where previously recorded sites were identified, to determine whether previously recorded intact sites still exist, staff is not able to adequately evaluate and categorize those sites. Additional testing would occur after permitting, but prior to ground disturbance pursuant to **CUL-8**. Specific information regarding potentially affected sites is located in the Impacts section.

In several areas, where there are previously recorded sites or where areas of concern were identified by member of the Ione Band of Miwok, Randy Yonemura, SMUD could not gain access to property to conduct presence/absence testing or remote sensing (SMUD 2002bc). Therefore, the treatment plan developed between staff and SMUD proposes to require that 60 days prior to ground disturbance, SMUD would provide a plan for agreed upon recording, testing, treatment of sites, and cultural resources monitoring. Presence/absence site testing would be completed at least 30 days prior to ground disturbance. This time frame is necessary to ensure that, if a site is identified and recommended eligible to the CRHR, the project owner has the time needed to conduct the necessary mitigation.

IMPACTS

Since project development and construction would entail surface and subsurface disturbance of the ground, the proposed CPP project has the potential to adversely affect both known and previously unknown cultural resources. 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, excavation, or demolition. Indirect impacts are those which may result from increased erosion due to site clearance and preparation, or from inadvertent damage or vandalism due to improved accessibility. Cumulative impacts to cultural resources may occur if increasing amounts of land are cleared and disturbed for the development of multiple projects in the same vicinity as the proposed project.

The potential for the project to cause impacts to cultural resources is related to the likelihood that such resources are present and whether they are encountered during project ground disturbance and construction activities. Although the existence of known cultural resources increases the potential for additional resources, the absence of known resources does not necessarily mean that unknown resources would not be encountered and that impacts would therefore not occur.

POTENTIAL FOR PROJECT IMPACTS

Because project-related site development and construction would entail subsurface disturbance of the ground, the proposed project has the potential to adversely affect previously unknown subsurface cultural resources.

Thirteen potential historic resources have been identified in the vicinity of the project site and laydown areas. The location of previously recorded controversial archaeological site ARS 85-15-1 could not be identified. Potential historic ranch area CA-SAC-500 and CA-SAC-504 associated with historic mining were located. Seven features that appeared to be associated with historic mining activity was also recorded. It appears that all these resources in the vicinity of the project footprint would be avoided by the project. Since the project can avoid the potential resources evaluation of those potential cultural resources is not necessary. Staff recommends full-time monitoring during ground disturbance in the vicinity of these of these previously identified cultural resources to ensure avoidance pursuant to **CUL-7** and **CUL-8**.

Along the project linears, three previously recorded archaeological sites (CA-SAC-93, CA-SAC-68, CA-SAC-02) and one newly discovered site that appears to have both a prehistoric and a historic component (CA-SAC-526/H), potentially may be impacted. Presence absence testing in the locations of CA-SAC-68 and CA-SAC-526/H did not identify cultural resource sites. However, staff recommends full-time monitoring during ground disturbance in the vicinity of these previously recorded sites. Presence/absence testing would be concluded at the location of CA-SAC-93 pursuant to the previously agreed upon test plan (SMUD 2002q). If a site is identified, plans for either avoidance or data recovery as agreed upon in the treatment plan would be implemented pursuant to **CUL-8**.

The applicant's consultant, CH2MHILL, has also identified areas along the proposed gas line route where consideration of the terrain suggests that there may have been prior human habitation. There is potential for encountering subsurface cultural resources in these areas. Some of these areas would be monitored full time and some would be monitored on an intermittent basis as described in the treatment plan required by proposed Condition of Certification **CUL-8**. **Cultural Resources Table 2** lists the known resources that may potentially be adversely affected by the project, the site investigations made to date, and staff's proposed mitigation for those resources.

Presence/Absence Testing at CA-SAC-68

Presence/absence testing was conducted on June 26, 2002 at previously recorded site CA-SAC-68 to determine whether subsurface archaeological deposits are present. Six 50 cm by 50 cm were excavated to 40 cm deep. Auger testing was then used to reach a depth of 7 ft. Historic debris was identified (bottle glass, brown bottle glass, metal and fragments of metal etc.) in the top 25cm of the excavation. The historic debris was believed to be less than 45 years old. No cultural materials were found below 25 cm. Native Americans from Miwok Tribe, Randy Yonemura and Lisa Daily, monitored the excavation (SMUD 2002r, p.1-2). It appears that the site would not be impacted by the project because it does not extend into the natural gas line route. However, the natural gas pipeline would disturb more area than the test pits. Since there is a recorded nearby, staff recommends full-time monitoring in the vicinity of CA-SAC-68.

Presence/Absence Testing at CA-SAC-93

Presence/absence testing was conducted on June 27 and 28, 2002, at previously recorded site CA-SAC-93. The proposed route of the gas line would extend through the site. However, the site is located in what is currently agricultural land where plowing activity is thought to have disturbed the surface to a depth of approximately four feet. The purpose of the test was to determine whether a subsurface component to the site still existed and if there was enough of the site left to evaluate for eligibility to the CRHR.

Three test units, 50 cm by 50 cm, were placed at 50-foot intervals, beginning in the center of the previously identified surface scatter of the site. Auger testing was used to reach a depth of seven feet, the expected depth of the gas line trench. Due to extremely muddy conditions, three additional locations were tested by augering. Native American monitor, Randy Yonemura was in agreement with the decision to auger.

The limited testing revealed 114 (one hundred fourteen) nodules, four (4) small chunks of baked clay, and seven (7) bone fragments. No cultural materials were found below the plow zone (SMUD 2002r, p.1-3). Test units 10 and 11 were discontinued at approximately 47 inches and 24 inches respectively, due to the presence of hard pan soils. Native Americans, Dwight Dutschke and Billie Blue Elliston, (of the Miwok Tribe) visited the presence/absence testing. Randy Yonemura and Lisa Daily, from the Miwok Tribe, monitored the presence/absence testing (SMUD2002r, p. 1-4). The test plan identified approximately 2,000 feet to be tested, however, only a 300-foot area was tested before the landowner requested the testing be discontinued. After permitting, but prior to construction, the agreed upon test plan would be completed pursuant to the treatment plan referenced in **CUL-8**. If a cultural resource is identified, it would be

evaluated for eligibility to the CRHR. If it is recommended eligible, it would be avoided or data recovery would be conducted.

Presence/Absence Testing in the Area Between CA-SAC-68 and CA-SAC-93

Presence/absence testing was conducted in a location situated between CA-SAC-68 and CA-SAC-93 pursuant to the agreed upon test plan. A small piece of glass that appeared to be modern was identified. Although no cultural resources site was identified, this area appears sensitive for cultural resources and would be subject to disturbance from directional drilling. Staff recommends full-time cultural resources monitoring in this area during ground disturbance.

Presence/Absence Testing at CA-SAC-02

The applicant also conducted a survey of the area of previously recorded CA-SAC-02. No cultural resources materials were identified. However, this is an area that appears sensitive for cultural resources and the location of the previously recorded site is in question. Presence/absence testing would be conducted in the vicinity of CA-SAC-02 as agreed upon in the treatment plan proposed in **CUL-8**. If a site is verified, it would be evaluated for eligibility to the CRHR. If determined eligible, data recovery and curation would be conducted. Per the to be agreed upon treatment plan, if a site is identified, an avoidance plan or data recovery would be concluded at least 30 days prior to beginning ground disturbance in the area. If no site is identified, caution is still warranted in the vicinity of the previously recorded site. Staff recommends full-time monitoring in the vicinity of the site during ground disturbance.

Presence/Absence Testing at CA-SAC-526/H

Presence/absence testing of anomalies identified during remote sensing in the area of CA-SAC-526/H did not locate any cultural resources within the route of the natural gas line (SMUD 2002ar, p.15).

Remote sensing conducted at CA-SAC-526/H revealed anomalies. Those anomalies were investigated at a later date by shovel tests. No cultural resources were identified. Staff recommends full-time monitoring during ground disturbance in the vicinity of this newly recorded cultural resource.

Hicksville Cemetery

Construction techniques (ground disturbance) in the area of Hicksville Cemetery would be agreed upon in the proposed treatment plan specified in **CUL-8**.

Cultural Resources Table 2
Potentially Affected Known Resources and Staff Proposed Mitigation Measures

Resource Designation	Testing Status	Additional Testing	Energy Commission Mitigation Requirements
CA-SAC-93	Incomplete	Backhoe/shovel	To be determined per treatment plan
CA-SAC-68	Complete	Not necessary	Full-time monitoring per treatment plan
CA-SAC-526/H	Complete	Not necessary	Full-time monitoring per treatment plan
CA-SAC-02	Incomplete	Backhoe/shovel	To be determined per treatment plan
Hicksville Cemetery	Not Necessary	Not Necessary	Construction techniques to be determined per treatment plan and full time monitoring
Area between CA-SAC-93 and SAC-68	Complete	Not necessary	Full-time monitoring of ground disturbance
ARS 85-15-1	Resource not confirmed	Not necessary	Full-time monitoing of ground disturbance
CA-SAC-500/H	Not necessary	Not necessary	Project will avoid
CA-504/H	Not necessary	Not necessary	Project will avoid
Elliot Ranch	Not necessary	Not Necessary	Project will avoid
Jungkeit Dairy	Not necessary	Not Necessary	Project will avoid
Hicksville Townsite	Not necessary	Not Necessary	Full time monitoring to ensure avoidance
Arno Townsite	Not necessary	Not Necessary	Full time monitoring to ensure avoidance

Native American Concerns

Several representatives of the Native American community have expressed concern regarding the identification and treatment of Native American sites, artifacts, human remains, and other issues. To address these cultural concerns, staff recommends that the applicant keep members of the Native American community informed regarding cultural resource activities for the proposed project. Staff recommends that not more than one paid Native American monitor be onsite at a time, unless deemed necessary by the CRS, due to construction requirements in more than one location.

Public workshops were held on June 11,18, and 25, 2002. Portions of the June 11 and June 18 workshops were allotted to cultural resources and cultural resources was the sole topic at the June 25th workshop. Concerns raised at the various workshops include, but are not limited to, the usefulness of the proposed site test plan and Native American involvement in the project. Some additional concerns expressed were that all recovered artifacts be returned to the ground, a request for a MOU with Native Americans, the recommendation that remote sensing be used to identify sites and

recommendation that a burial plan be developed. Glen Villa Jr., a spokesperson for the Ione Band of Miwok, and Randy Yonemura provided concerns in writing.

Native Americans who participated in the workshops included Randy Yonemura and Billie Blue Elliston. Dwight Dutschke, Glen Villa Sr., and Glen Villa Jr. members of the Cultural Committee and spokespersons for the Ione Band of Miwok, also attended. The Native American Heritage Commission was represented by Debbie Pilas-Treadway at the June 18th workshop.

Based on Energy Commission Regulations and policy, staff's interaction with Native American governmental authority is similar to staff's interaction with State and local agencies. On November 25, 2002, staff met with the Cultural Committee of the Ione Band of Miwok. The purpose of the meeting was to hear concerns regarding the project and to discuss several outstanding issues of concern to Native Americans. Topics discussed were Native American monitoring, concerns about Hicksville Cemetery, and remote sensing results. The Cultural Committee commented on the possible locations of Native American habitation sites and stressed that they were interested in both prehistoric and historic sites due to a Native American presence in the area during historic times. They also commented on possible curation sites, daily monitoring logs, and the selection of Most Likely Descendent (MLD) if human remains are found. They requested that they be informed of cultural finds during project ground disturbance. They also suggested procedures that would allow them to be involved and provide opportunities to provide comment on discoveries. On January 16, 2003, staff e-mailed a draft copy of the proposed cultural conditions of certification to the members of the cultural committee. On January 29, 2003 staff received confirmation that the draft proposed conditions were received. As of February 3, 2003, staff has not received comments regarding the proposed conditions.

CUMULATIVE IMPACTS

Cumulative impacts to cultural resources in the project vicinity may occur if subsurface archaeological deposits (both prehistoric and historic) and the setting of historic structures are affected by other projects in the same vicinity as the proposed project. Residential and commercial development is planned or is underway in the vicinity of portions the proposed gas line.

However, project proponents for this and future projects in the area can mitigate impacts to as yet undiscovered subsurface archaeological sites to less than significant levels. Impacts can be mitigated by requiring construction monitoring, evaluation of resources discovered during monitoring, and avoidance or data recovery for resources evaluated as significant (eligible for the CRHR or NRHP).

FACILITY CLOSURE

At the time of planned closure, all then-applicable LORS would be identified and the Energy Commission-required closure plan would address compliance with these LORS. Generally, if no additional ground disturbance occurs during closure activities and all conditions of certification have been met, no impacts to cultural resources would be expected. However, actual potential impacts are likely to depend upon the final location

of project structures in relation to existing resources, and upon the procedures used for the removal of project structures. Since the spatial relationship between the closure and removal of project structures and sensitive resources cannot be determined at this time, no conclusion can be drawn at this time with respect to the impact of facility closure on cultural resources. The closure plan, when created, would address impacts to cultural resources.

COMPLIANCE WITH APPLICABLE LORS

Implementation of the Conditions of Certification in this document would ensure that this project complies with all applicable federal and State laws with respect to cultural resources. The County of Sacramento, City of Elk Grove, and County of Yolo have specific LORS that apply to cultural preservation, and the project would also comply with the local LORS.

RESPONSE TO PUBLIC AND AGENCY COMMENTS

ELK-11 The City of Elk Grove has expressed concern regarding identification and appropriate mitigation for any eligible cultural resources within the East Franklin Specific Plan area. (Elk Grove Community Development Department, 2002c).

Response: The Jungkeit Dairy and the Elliot Ranch #2 location are both within approximately 200 feet of the proposed gas pipeline. However, the Jungkeit Dairy buildings would be separated by another parcel and a street from the gas pipeline alignment. The underground pipeline would be located on the east side of Franklin Boulevard and Elliot Ranch is located on the west. The pipeline would not affect Elliot Ranch. Staff has determined that the Jungkeit Dairy buildings, Elliot Ranch #2, and other cultural resources identified in the East Franklin Specific Plan would not be affected by the CPP.

MITIGATION

For cultural resources, the preferred method of mitigation is for project construction to avoid areas where cultural resources are known to exist, wherever possible. Often, however, avoidance cannot be achieved, and other measures such as surface collection, subsurface testing, recordation and data recovery must be implemented for archaeological resources and documentation must be implemented for historical structures. Mitigation measures are developed to attempt to reduce the potential for adverse project impacts on cultural resources to a less than significant level.

APPLICANT'S PROPOSED MITIGATION

Archaeological Resources

The applicant suggests a six point archaeological monitoring program. They are:

- Preconstruction - Conduct a preconstruction assessment and construction worker training.

- Construction Monitoring - An archaeological monitor will be present during construction activity in archaeologically sensitive areas.
- Site Recording and Evaluation - Recording and evaluation if a find is determined to be significant and provide criteria for determining significance.
- Mitigation Planning - Mitigation plan in place to avoid construction delays.
- Curation - arranged with a qualified curation facility.
- Report of Findings - If cultural resources are discovered, a final report will be prepared that addresses cultural resources activities of the project. The applicant also recommends establishing mitigation for any resources that cannot be avoided and might be impacted by emergency maintenance (SMUD 2001a, p. 26-29).

At the June 25th workshop, the applicant expressed a commitment to avoid archaeological sites that were Native American in origin.

STAFF'S PROPOSED MITIGATION MEASURES

Staff has modified the portions of the applicant's proposed mitigation measures into a series of conditions of certification, sometimes rewording for clarification, adding time frames, and/or adding other requirements.

The proposed mitigation measures would apply whenever there is a potential for impacts to sensitive cultural resources caused by the project. Mitigation measures are derived from standards of professional practice and are based on the U.S. Secretary of the Interior's guidelines. The mitigation measures set forth in the conditions have been applied to previous projects before the Energy Commission and they have proven successful in protecting sensitive cultural resources from construction-related impacts while allowing the timely completion of many projects throughout California. Adoption of staff's proposed conditions of certification is expected to reduce the potential for adverse project impacts on cultural resources to a less than significant level.

If previously unidentified or unevaluated sites are evaluated and recommended as eligible to the CRHR and they would be impacted by the project, it would be necessary to determine mitigation. Mitigation measures such as training and monitoring are designed to assist project personnel in identifying unanticipated resources before they can be damaged or destroyed. Site testing would serve to confirm whether previously identified cultural resource sites still exist. If a cultural resource were identified, it would be recorded and evaluated for eligibility to the CRHR (see Categorization of Identified Resources section). If a cultural resource is determined eligible, data recovery would be conducted to mitigate impacts to the data elements (archaeological material that has the potential to answer research questions) that make the cultural resource (in this context, usually an archaeological site) eligible to the CRHR. Archaeological data recovery is usually conducted via excavation. Archaeological material collected as a result of this project would be curated. Details of cultural resource identification, data recovery, and excavation are specified in the cultural resources treatment plan specified in proposed **CUL-8**. These mitigation measures are developed to reduce the potential for adverse project impacts on cultural resources to a less than significant level.

Including members of the Native American community in cultural resources aspects of the project would serve to mitigate any impacts to archaeological sites or other locations that are associated with cultural practices, beliefs, or that may contain human remains.

CONCLUSIONS AND RECOMMENDATIONS

Staff believes that presence/absence testing, remote sensing, and site evaluation, if necessary, should be completed prior to permitting so that staff can recommend appropriate mitigation for sites that might be encountered. However, since SMUD was unable to acquire access to privately owned property to conduct necessary tests, staff has proposed that a treatment plan be developed. The treatment plan would include a research design, proposals for testing, recording, and treatment of specific sites that would mitigate any potential impacts to below a level of significance. The treatment plan would ensure that adequate testing and treatment of sites is conducted while allowing a dialogue to continue between staff and project technical specialists concerning the mechanics of site testing and excavation or data recovery if those mitigation techniques become necessary.

The proposed treatment plan would ensure identification of any additional cultural resource sites and recordation of any potential cultural resources on a DPR 523 form. Information in the plan would demonstrate how those sites would be avoided or would provide an evaluation of any site for eligibility to the CRHR. Although the treatment plan would also include some information regarding Native American concerns, staff recommends interaction with the Native American Community pursuant to **CUL-3** (7), **CUL-5** (8), **CUL-6** (4), and **CUL-7** (2) (4).

Staff recommends that the Energy Commission adopt the following proposed conditions of certification, which incorporate the mitigation measures discussed above.

PROPOSED CONDITIONS OF CERTIFICATION

CUL-1 Prior to the start of ground disturbance, the project owner shall provide the California Energy Commission Compliance Project Manager (CPM) with the name and resume of its Cultural Resources Specialist (CRS), and alternate(s), if an alternate(s) is proposed, for approval. The CRS will be responsible for implementation of all cultural resources conditions of certification. The project owner shall ensure that an alternate CRS assumes the duties of the CRS, if the CRS is temporarily unavailable due to an emergency, vacation, illness, or other temporary circumstance.

1.) The resume for the CRS and alternate(s), shall include information that demonstrates that the minimum qualifications specified in the U.S. Secretary of Interior Guidelines, as published by the CFR 36, CFR Part 61are met. The resume shall include the names and phone numbers of contacts familiar with the CRS's work on referenced projects. In addition, the CRS shall have the following qualifications:

a. A background in anthropology, archaeology, history, architectural history, or a related field and
b. At least three years of archaeological or historic (as appropriate) resource mitigation and field experience in California.

2.) The resume shall also demonstrate to the satisfaction of the CPM, the appropriate education and experience to accomplish the cultural resource tasks that must be addressed during project ground disturbance, construction, and operation.

3.) The CRS may obtain qualified cultural resource monitors (CRM) to monitor as necessary on the project. CRMs shall meet the following qualifications:

a. A BS or BA degree in anthropology, archaeology, historic archaeology or a related field and one year experience monitoring in California; or
b. An AS or AA in anthropology, archaeology, historic archaeology or a related field and four years experience monitoring in California; or
c. Enrollment in upper division classes pursuing a degree in the fields of anthropology, archaeology, historic archaeology, or a related field and two years of monitoring experience in California.

4.) The project owner shall ensure that the CRS completes any monitoring, mitigation and curation activities necessary to this project and fulfills all the requirements of these conditions of certification. The project owner shall also ensure that the CRS obtains additional technical specialists, or additional CRMs, if needed, for this project. The project owner shall also ensure that the CRS evaluates any cultural resources that are newly discovered or that may be affected in an unanticipated manner for eligibility to the California Register of Historic Resources (CRHR).

Verification: At least 45 days prior to the start of ground disturbance, the project owner shall submit the name and resume of its CRS and alternate CRS, if an alternate is proposed, to the CPM for review and approval.

At least 10 days prior to a termination or release of the CRS, the project owner shall submit the resume of the proposed new CRS to the CPM for review and approval.

At least 20 days prior to ground disturbance, the CRS shall provide a letter naming anticipated CRMs for the project and stating that the identified CRMs meet the minimum qualifications for cultural resource monitoring required by this condition. If additional CRMs are obtained during the project, the CRS shall provide additional letters to the CPM identifying the CRMs and attesting to the CRM's qualifications. The letter shall be provided one week prior to the CRM beginning on-site duties.

At least 10 days, prior to the start of ground disturbance, the project owner shall confirm in writing to the CPM that the approved CRS will be available for onsite work and is prepared to implement the cultural resources conditions of certification.

CUL-2 Prior to the start of ground disturbance, the project owner shall provide the CRS and the CPM with maps and drawings showing the footprint of the power plant and all linear facilities. Maps will include the appropriate USGS quadrangles and a map at an appropriate scale (e.g., 1:2000 or 1" = 200') for plotting individual artifacts. If the CRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the CRS and CPM. The CPM shall approve all submittals.

If the footprint of the power plant or linear facilities changes, the project owner shall provide maps and drawings reflecting these changes, to the CRS and the CPM. Maps shall identify all areas of the project where ground disturbance is anticipated.

If construction of the project will proceed in phases, maps and drawings shall be submitted prior to the start of each phase, if they have not previously been submitted. A letter identifying the proposed schedule of each project phase shall be provided to the CPM.

At a minimum, the CRS shall consult weekly with the project superintendent or construction field manager to confirm area(s) to be worked during the next week, until ground disturbance is completed.

The project owner shall notify the CRS and CPM of any changes to the scheduling of the construction phases.

Verification: At least 40 days prior to the start of ground disturbance, the project owner shall provide the CRS and the CPM with the maps and drawings.

If this is to be a phased project, the project owner shall also provide to the CRS and CPM a letter identifying the proposed schedule of the ground disturbance or construction phases, and the associated dates for submittal of maps and drawings, along with the initial maps and drawings, if they have not been previously submitted.

If there are changes to the footprint for a project phase, revised maps and drawings shall be provided to the CRS and CPM at least 15 days prior to start of ground disturbance for that phase. If there are changes to the scheduling of the construction phases, the project owner shall submit a letter to the CPM within 5 days of identifying the changes.

CUL- 3 Prior to the start of ground disturbance, the project owner shall submit the Cultural Resources Monitoring and Mitigation Plan (CRMMP), as prepared by the CRS, to the CPM for review and approval. The CRMMP shall identify general and specific measures to minimize potential impacts to sensitive cultural resources.

The CRMMP shall include, but not be limited to, the following elements and measures:

1) A proposed general research design that includes a discussion of research questions and testable hypotheses applicable to the project area. A refined research design will be prepared for any resource where data recovery is required.

2) Specification of the implementation sequence and the estimated time frames needed to accomplish all project-related tasks during ground disturbance, construction, and post-construction analysis phases of the project.

3) Identification of the person(s) expected to perform each of the tasks; a description of each team member's qualifications and their responsibilities; and the reporting relationships between project construction management and the mitigation and monitoring team.

4) A discussion of the inclusion of Native American observers or monitors, the procedures to be used to select them, and their role and responsibilities.

5) A discussion of all avoidance measures such as flagging or fencing, to prohibit or otherwise restrict access to sensitive resource areas that are to be avoided during construction and/or operation, and identification of areas where these measures are to be implemented. The discussion shall 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.

6) A discussion of the requirement that all cultural resources encountered will be recorded on a Department of Parks and Recreation (DPR) form 523 and mapped (may include photos). In addition, all archaeological materials collected as a result of the archaeological investigations shall be curated in accordance with the State Historical Resources Commission's "Guidelines for the Curation of Archaeological Collections," into a retrievable storage collection in a public repository or museum. The public repository or museum must meet the standards and requirements for the curation of cultural resources set forth at Title 36 of the Federal Code of Regulations, Part 79.

7) A discussion of any requirements, specifications, and funding needed for curation of the materials to be delivered for curation and how the requirements, specifications and funding will be met. Include information indicating that the project owner will pay all curation fees and that any agreements concerning curation will be retained and available for audit for the life of the project. Include discussion that: collected items shall be retained and catalogued; prior to curation the items shall be reviewed by a member of the Cultural Committee of the Ione Band of Miwok to ensure items of religious significance are not designated for curation; all other items collected as a result of this project shall be curated at California State University, Sacramento, unless the curation facility is unwilling or unable to take the collection; and if the facility is unwilling to take the collection, the project owner shall provide the names of additional curation facilities acceptable to the Ione Band of Miwok.

8) A discussion of the availability and the CRS's access to equipment and supplies necessary for site mapping, photographing, and recovering any cultural resource materials encountered during construction.

9) A discussion of the proposed Cultural Resource Report (see **CUL-4**) which shall be prepared according to Archaeological Resource Management Report (ARMR) Guidelines.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall provide the CRMMP to the CPM for review and approval. A letter shall be provided to the CPM indicating that the project owner will pay curation fees for any materials collected as a result of the archaeological studies. Ground disturbing activities may not commence until the CRMMP is approved, unless agreed to by the CPM.

CUL-4 The project owner shall submit the Cultural Resources Report (CRR) to the CPM for approval. The CRR shall report on all field activities including dates, times and locations, findings, samplings and analysis. All survey reports, DPR 523 forms, and additional research reports not previously submitted to the California Historic Resource Information System (CHRIS) shall be included as an appendix to the CRR. After approval, the CRR shall be provided to any curating institution the CHRIS and the State Historic Preservation Officer (SHPO).

Verification: The project owner shall submit the subject CRR within 90 days after completion of ground disturbance (including landscaping). Within 10 days after CPM approval, the project owner shall provide documentation to the CPM that copies of the CRR have been provided to the curating institution (if archaeological materials were collected), the icer (SHPO) and the CHRIS.

CUL-5 Worker Environmental Awareness Program (WEAP) training shall be provided, on a weekly basis, to all new employees starting prior to the beginning and for the duration of ground disturbance. The training may be presented in the form of a video. The training shall include:

1. a discussion of applicable laws and penalties under the law;
2. samples or visuals of artifacts that might be found in the project vicinity;
3. information that the CRS, alternate CRS, or CRM has the authority to halt construction in the event of a discovery or unanticipated impact to a cultural resource;
4. instruction that employees are to halt or redirect work in the vicinity of a find and to contact their supervisor and the CRS or CRM;
5. an informational brochure that identifies reporting procedures in the event of a discovery;
6. an acknowledgement form signed by each worker indicating that they have received the training; and

7. a sticker that shall be placed on hard hats indicating that environmental training has been completed.
8. The Cultural Committee of the Ione Band of Miwok shall be provided an opportunity to participate in cultural resources training sessions. If a video is filmed for cultural resources training, a spokesperson for the Ione Band of Miwok shall be afforded an opportunity to express the Ione Band's concerns in the video.

Verification: The project owner shall provide in the Monthly Compliance Report (MCR) the WEAP Certification of Completion form of persons who have completed the training in the prior month and a running total of all persons who have completed training to date.

No less that two weeks prior to the beginning of training, the project owner shall provide to the CPM a copy of a letter inviting the Ione Band of Miwok to participate in cultural resources training for the CPP. The letter shall be addressed to the Cultural Committee of the Ione Band of Miwok to beginning training. Prior to the start of training, an additional letter shall be provided to the CPM that addresses whether the Band will participate and whether they will provide information in person or via a video at training sessions.

CUL-6 The project owner shall grant authority to the CRS, alternate CRS, and the CRM(s) to halt construction if previously unknown cultural resource sites or materials are encountered, or if known resources may be impacted in a previously unanticipated manner. Redirection of ground disturbance shall be accomplished under the direction of the construction supervisor in consultation with the CRS.

If such resources are found or impacts can be anticipated, the halting or redirection of construction shall remain in effect until all of the following have occurred:

1. the CRS has notified the project owner, and the CPM has been notified within 24 hours of the find description and the work stoppage;
2 the CRS, the project owner, and the CPM have conferred and determined what, if any, data recovery or other mitigation is needed;
3. any necessary data recovery and mitigation has been completed; and
4. the Cultural Committee of the Ione Band of Miwok has been notified, and in the event of a significant find (following notification and CPM concurrence with the significance of the find), the Cultural Committee has been provided an opportunity to examine the find. The opportunity to examine the find shall be within four hours of notification that the CPM has concurred that the find is significant or until 5:30 PM on the date of CPM concurrence, whichever allows the most time.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall provide the CPM and CRS with a letter confirming that the CRS, alternate CRS, and CRM(s) have the authority to halt construction activities in the vicinity of a cultural resource find. The letter shall also confirm that the CRS or project owner will

notify the CPM immediately (no later than the following morning of the incident, or Monday morning in the case of a weekend) of any cultural resources discoveries whether or not a determination of significance has been made, including the circumstance and proposed mitigation measures.

CUL-7

1. The project owner shall ensure that the CRS, alternate CRS, or CRM(s) shall monitor ground disturbance full time in the vicinity of the project site, linears and laydown areas, access roads or other ancillary areas to ensure there are no impacts to undiscovered resources or known resources affected in an unanticipated manner. In the event that the CRS determines that full-time monitoring is not necessary in certain locations, a letter providing a detailed justification for the decision to reduce the level of monitoring shall be provided to the CPM for review and approval.

2. CRM(s) shall keep a daily log of any monitoring or cultural resource activities and the CRS shall prepare a weekly summary report on the progress or status of cultural resources-related activities. The CRS may informally discuss cultural resource monitoring and mitigation activities with Energy Commission technical staff. Copies of daily monitoring logs shall be faxed or e-mailed each day to the attention of the Cultural Committee at the tribal office of the Ione Band of Miwok. Any documents that reveal site locations shall be provided under confidential cover.

3. The project owner shall ensure that the CRS notifies the project owner and the CPM within 24 hours, by telephone or e-mail, of any incidents of non-compliance with any cultural resources conditions of certification. The CRS shall also recommend corrective action to resolve the problem or achieve compliance with the conditions of certification.

   Cultural resource monitoring activities are the responsibility of the CRS. Any interference with monitoring activities, removal of a CRM from duties assigned by the CRS, or direction to a CRM to relocate monitoring activities by anyone other that the CRS shall be considered non-compliance with these conditions of certification.

4. A Native American monitor(s) shall be obtained to monitor ground disturbance in areas where archaeological monitoring is required by the conditions of certification. Only one Native American monitor shall be assigned to each construction site unless additional monitors are deemed necessary by the CRS. If a Native American monitor is not available for scheduled ground disturbance, construction may continue under the oversight of the CRS or CRM(s).

   Lists of concerned Native Americans and guidelines for monitoring shall be obtained from the Native American Heritage Commission. Consultation with the Ione Band of Miwok shall occur prior to selecting a Native American monitor(s). Preference in selecting monitors shall be

given to Native Americans with traditional ties to the area that will be monitored. The Ione Band of Miwok, a federally recognized tribe, meets this requirement.

Verification: During the ground disturbance phases of the project, if the CRS wishes to reduce the level of monitoring occurring at the project, a letter identifying the area(s) where the CRS recommends the reduction and justifying the reductions in monitoring shall be submitted to the CPM for review and approval.

During ground disturbance, the project owner shall include in the MCRs copies of the weekly summary reports prepared by the CRS regarding project-related cultural resources monitoring. Copies of daily logs shall be retained on-site and made available for audit by the CPM. The project owner shall provide a statement in the MCR that copies of cultural resources monitoring daily logs have been faxed or e-mailed to the Ione Band of Miwok tribal office. If the logs reveal site locations, they shall be provided under confidential cover.

Within 24 hours of recognition of a non-compliance issue, the CRS shall notify the CPM by telephone of the problem and of steps being taken to resolve the problem. A report that describes the issue, resolution of the issue, and the effectiveness of the resolution measures shall be provided in the next MCR.

One week prior to ground disturbance, in areas where archaeological monitoring will occur, the project owner shall send notification to the CPM identifying the person(s) retained to conduct Native American monitoring. The project owner shall also provide a plan identifying the proposed monitoring schedule and information explaining how Native Americans who wish to provide comments will be allowed to comment. If efforts to obtain the services of a qualified Native American monitor are unsuccessful, the project owner shall immediately inform the CPM. The CPM will either identify potential monitors or will allow ground disturbance to proceed without a Native American monitor.

CUL-8 Prior to construction-related ground disturbance or site mobilization, the project owner shall submit a Cultural Resources Treatment Plan for approval by the CPM. The project owner shall ensure that site recording, presence/absence testing and treatment of sites agreed upon in the approved treatment plan, are completed.

Following completion of site recording, presence/absence testing and treatment of sites required in the treatment plan and prior to construction related ground disturbance, the project owner shall provide the results of testing or treatment as a technical report (in Archaeological Research Management Report (ARMR) format. The report shall provide the procedures, methodology, and findings of the presence/absence testing and treatment of sites and site records to the CPM for approval. If necessary, the technical report shall also provide a plan for avoidance, data recovery or other recovery, as appropriate. Any data recovery required by the report shall be completed and approved by the CPM.

Prior to construction-related ground disturbance or site mobilization, the project owner shall also ensure that avoidance, data recovery or other

recovery based on information obtained during presence/absence testing or treatment of sites, and deemed necessary to mitigate impacts to cultural resources by the CPM, is completed and approved by the CPM prior to construction related ground disturbance. If, avoidance, data recovery or other recovery has been conducted, a report (in ARMR format) documenting completed avoidance or data recovery shall be provided for CPM approval.

Verification: At least 90 days prior to construction-related ground disturbance, the project owner shall submit the treatment plan for CPM approval.

At least 30 days prior to ground disturbance, the project owner shall provide a technical report (in ARMR format) that provide procedures, methodology, and findings of the presence/absence testing completed pursuant to the treatment plan, to the CPM for approval.

Prior to ground disturbance, if avoidance or data recovery or other recovery are necessary, a report (in ARMR format) including the procedures, methodology and findings, shall be provided to the CPM for approval.

CUL-9 The project owner shall ensure, that copies of correspondence with the State Historic Preservation Officer (SHPO) are provided to the CPM, as may be required by the other federal permitting agencies (i.e., Section 106 Compliance; 16 U.S.C. § 470).

Verification: The project owner shall concurrently send copies of all correspondence (transmittals and reports) to the State Historic Preservation Officer and the CPM.

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SMUD (Sacramento Municipal Utility District) 2002ax. AFC Supplement D-Pipeline Alignment and Construction Laydown Modifications. November 1, 2002. Docket date November 1, 2002.

SMUD (Sacramento Municipal Utility District) 2002bk. Remote Sensing Surveys for the Cosumnes Power Plant, Sacramento County, California. November 22, 2002. Docket date November 22, 2002.

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HAZARDOUS MATERIALS MANAGEMENT

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

INTRODUCTION

The purpose of this staff analysis is to determine whether the proposed 1,000-MW Cosumnes Power Plant (CPP) project (Phase 1 and Phase 2) complies with applicable laws, ordinances, and regulations (LORS), or has the potential to cause significant impact on the public as a result of the use, handling or storage of hazardous materials at the proposed facility. If significant adverse impacts on the public are identified, Energy Commission staff must also evaluate the potential for facility design alternatives and additional mitigation measures to reduce impacts to the extent feasible.

This analysis does not address potential exposure of workers to hazardous materials used at the proposed facility. Staff's **Worker Safety and Fire Protection** analysis describes the requirements applicable to the protection of workers from such risks.

The only hazardous material that would be stored at the Cosumnes Power Plant in quantities exceeding the reportable amounts (defined in the California Health and Safety Code, section 25532 (j)), is aqueous ammonia (29 percent ammonia in water). The use of aqueous ammonia significantly reduces the risk that would otherwise be associated with use of the more economical anhydrous form of ammonia. Use of the aqueous form eliminates the high internal energy associated with the more hazardous anhydrous form, which is stored as a liquefied gas at elevated pressure. The high internal energy associated with the anhydrous form of ammonia can act as a driving force in an accidental release, which can rapidly introduce large quantities of the material to the ambient air and result in high down-wind concentrations. Spills associated with the aqueous form are much easier to contain and emissions are limited by the slow mass transfer from the surface of the spilled material.

Other hazardous materials stored in smaller quantities, such as mineral and lubricating oils, corrosion inhibitors and water conditioners, would be present at the proposed facility. However, these materials pose no significant potential for off-site impacts as a result of the quantities on-site, their relative toxicity, and/or their environmental mobility. Although no natural gas is stored, the project also involves the construction and operation of a natural gas pipeline and handling of large amounts of natural gas. Natural gas poses some risk of both fire and explosion. This pipeline would be approximately 26 miles in length (involving the construction and operation of two new compressor stations). The CPP would also require the transportation of aqueous ammonia to the facility. Analysis of the potential for impact associated with such deliveries is addressed below.

LAWS, ORDINANCES, REGULATIONS, STANDARDS, AND POLICIES

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

FEDERAL

The Superfund Amendments and Reauthorization Act of 1986 (Pub. L. 99-499, §301,100 Stat. 1614 [1986]), also known as SARA Title III, contains the Emergency Planning and Community Right To Know Act (EPCRA) as codified in 42 U.S.C. §11001 et seq. This Act requires that certain information about any release to the air, soil, or water of an extremely hazardous material must be reported to state and local agencies.

The Clean Air Act (CAA) of 1990 (42 U.S.C. §7401 et seq. as amended) 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 CAA section on Risk Management Plans (codified in 42 U.S.C. §112(r)) requires 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 the CAA are reflected in the California Health and Safety Code, section 25531 et seq.

STATE

The California Accidental Release Prevention Program (Cal-ARP), implemented pursuant to Health and Safety Code, section 25531, directs facility owners storing or handling acutely hazardous materials in reportable quantities to develop a Risk Management Plan (RMP) and submit it to appropriate local authorities, the United States Environmental Protection Agency (EPA), and the designated local Administering Agency for review and approval. The plan must include an evaluation of the potential impacts associated with an accidental release, the likelihood of an accidental release occurring, the magnitude of potential human exposure, any preexisting evaluations or studies of the material, the likelihood of the substance being handled in the manner indicated, and the accident history of the material. This program supersedes the California Risk Management and Prevention Plan.

Section 25503.5 of the California Health and Safety Code requires facilities which store or use hazardous materials to prepare and file a Business Plan with the local Certified Unified Program Authority (CUPA), in this case the Sacramento County Environmental Management Department (EMD). This Business Plan is required to contain information on the business activity, the owner, a hazardous materials inventory, facility maps, an Emergency Response Contingency Plan, an Employee Training Plan, and other recordkeeping forms.

Title 8, California Code of Regulations, section 5189, requires facility owners to develop and implement effective safety management plans to ensure that large quantities of hazardous materials are handled safely. While such requirements primarily provide for the protection of workers, they also indirectly improve public safety and are coordinated with the RMP process.

Title 8, California Code of Regulations, section 458 and sections 500 – 515, set forth requirements for design, construction, and operation of vessels and equipment used to store and transfer anhydrous ammonia. These sections generally codify the requirements of several industry codes, including the ASME Pressure Vessel Code, ANSI K61.1 and the National Boiler and Pressure Vessel Inspection Code. While these

codes apply to anhydrous ammonia, they may also be used to design storage facilities for aqueous ammonia.

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.”

GAS PIPELINE

The safety requirements for pipeline construction vary according to the population density and land use, which characterize the surrounding land. The pipeline classes are defined as follows (Title 49, Code of Federal Regulations, Part 192):

- Class 1: Pipelines in locations within 220 yards of ten or fewer buildings intended for human occupancy in any 1-mile segment.
- Class 2: Pipelines in locations within 220 yards of more than ten but fewer than 46 buildings intended for human occupancy in any 1-mile segment. This class also includes drainage ditches of public roads and railroad crossings.
- Class 3: Pipelines in locations within 220 yards of more than 46 buildings intended for human occupancy in any 1-mile segment, or where the pipeline is within 100 yards of any building or small well-defined outside area occupied by 20 or more people on at least 5 days a week for 10 weeks in any 12 month period (the days and weeks need not be consecutive).
- Class 4: Pipelines in locations within 220 yards of buildings with 4 or more stories above ground in any 1-mile segment.

The natural gas pipeline will be designed for Class 3 service and will meet California Public Utilities Commission General Order 112-E and 58-A standards as well as various SMUD standards. The natural gas pipeline must be constructed and operated in accordance with the Federal Department of Transportation (DOT) regulations, Title 49, Code of Federal Regulations (CFR), Parts 190, 191, and 192:

- Title 49, Code of Federal Regulations, Part 190 outlines the pipeline safety program procedures;
- Title 49, Code of Federal Regulations, Part 191, Transportation of Natural and Other Gas by Pipeline; Annual Reports, Incident Reports, and Safety-Related Condition Reports, requires operators of pipeline systems to notify the U.S. Department of Transportation of any reportable incident by telephone and then submit a written report within 30 days;
- Title 49, Code of Federal Regulations, Part 192, Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards, specifies minimum safety requirements for pipelines and includes material selection, design requirements, and corrosion protection. The safety requirements for pipeline construction vary according to the population density and land use which

characterize the surrounding land. This part contains regulations governing pipeline construction, which must be, followed for Class 2 and Class 3 pipelines.

LOCAL AND REGIONAL

The Uniform Fire Code (UFC 1997) contains provisions regarding the storage and handling of hazardous materials in Articles 4 and 79. The most recent version of the UFC was adopted in 1997.

The Sacramento County Code (SCC) chapters 6.96 and 6.99 contain ordinances regulating hazardous materials in the county. The Sacramento County Environmental Management Department (EMD) is the designated Certified Unified Program Authority (CUPA) and is responsible for administering Hazardous Materials Business Plans, Hazardous Materials Management Plans, Spill Prevention, Control, and Countermeasure Plans and RMPs.

The California Building Code (CCR Title 24, Part 9) contains requirements regarding the storage and handling of hazardous materials. The Chief Building Official must inspect and verify compliance with these requirements prior to issuance of an occupancy permit. A further discussion of these requirements is provided under Seismic Issues, below.

Additionally, the Sacramento Fire Code contains requirements for proper storage and handling of hazardous materials.

SETTING

The proposed CPP site is located on approximately 30 acres of a portion of a 2,480-acre area, owned by the Sacramento Municipal Utility District (SMUD) in southern Sacramento County, about 25 miles southeast of the city of Sacramento. The CPP site is located about 0.5 miles south of the former Rancho Seco Nuclear Power Plant, which is currently being decommissioned. The project site is located about four miles north of the San Joaquin County line and 5 miles west of the Amador County line. Access to the site is via two roads leading from Clay East Road. Site topography gradually slopes downhill from northeast to southwest, with an elevation of 160 feet above sea level. The locale is sparsely populated and generally agricultural, with incorporated and unincorporated low-density urban and suburban areas. See **Project Description** for more details.

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:

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

METEOROLOGICAL CONDITIONS

Meteorological conditions, including wind speed, wind direction and air temperature, affect 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 in the event of an accidental release.

Recorded wind speeds and ambient air temperatures are described in the **Air Quality** section of the AFC (SMUD 2001a, Section 8.1). Staff agrees with the applicant's use of F stability (stagnated air, very little mixing), 1.0 meter/second wind speed, and an ambient temperature of 115° F in its modeling analysis of an accidental release of aqueous ammonia. This is an extremely conservative scenario and reflects worst-case atmospheric conditions (SMUD 2002l, Table HM181-2).

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. The terrain in the vicinity of the site gradually slopes downhill from northeast to southwest, and is surrounded by hills as low as 200-feet and as high as 500-feet that mark the beginning of the foothills to the Sierra Nevada Range to the east.

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. For this analysis, sensitive receptor locations are generally considered hospitals, schools, daycare centers, and other facilities where large numbers of sensitive individuals are likely to be frequently present. In addition, the location of the population in the area surrounding a project site may have a large bearing on health risk. The locations of sensitive receptors in the project vicinity are shown in Figure 8.6-1 of the AFC. There are no sensitive receptors within a 3-mile radius. However, a school exists along the proposed hazardous materials transportation route approximately 8.5 miles from the project site in Herald.

ENVIRONMENTAL IMPACTS

Staff thoroughly reviewed and assessed the potential for the handling and use of hazardous materials during both construction and operations to impact the surrounding community. All chemicals and natural gas were evaluated.

METHODOLOGY

In order to assess the potential for released hazardous materials to travel off-site, and impact the public, staff analyzed several aspects of the proposed use of these materials at the facility. Staff recognizes that some toxic chemicals must be used. Therefore, staff conducted its analysis by examining the need for hazardous materials, the choice

of chemical to be used and its amount, the manner in which the applicant will use the chemical, the manner it would be transported to the facility and transferred to facility storage tanks, and the way the applicant chooses to store the material on-site. Staff reviewed the applicant's proposed engineering controls and administrative controls concerning hazardous materials usage. Engineering controls are those physical or mechanical systems (such as storage tanks or automatic shut-off valves) which can prevent a spill of hazardous material from occurring or which can limit the spill to a small amount or confine it to a small area. Administrative controls are those rules and procedures that workers at the facility must follow that would help to prevent accidents or keep them small if they do occur. Both engineering and administrative controls can act as methods of prevention or as methods of response and minimization. In both cases, the goal is to prevent a spill from moving off-site and causing harm to people.

Staff conducted a thorough review and evaluation of the applicant's proposed use of hazardous materials as described by the applicant (SMUD 2001a, Section 8.12). Staff's assessment followed the five steps listed below:

- Step 1: Staff reviewed the chemicals and the amounts proposed for use as listed in Table 8.12-3R of the AFC and determined the need and appropriateness of their use.
- Step 2: Those chemicals, proposed for use in small amounts or whose physical state is such that there is virtually no chance that a spill would migrate off the site and impact the public, were removed from further assessment.
- Step 3: Measures proposed by the applicant to prevent spills were reviewed and evaluated. These included engineering controls such as automatic shut-off valves and different size transfer-hose couplings and administrative controls such as worker training and safety management programs.
- Step 4: Measures proposed by the applicant to respond to accidents were reviewed and evaluated. These measures also included engineering controls such as catchment basins, methods to keep vapors from spreading, and administrative controls such as training emergency response crews.
- Step 5: Staff then analyzed the theoretical impacts on the public worst-case spill of hazardous materials even with the mitigation measures proposed by the applicant. If the mitigation methods proposed by the applicant were found to be sufficient, no further mitigation would be required. If the mitigation proposed by the applicant was found to be insufficient to reduce the potential for adverse impacts to an insignificant level, staff would then propose additional prevention and response controls until the potential for causing harm to the public was reduced to an insignificant level. It is only at this point that staff can recommend that the facility be allowed to use hazardous materials.

PROJECT IMPACTS

Small Quantity Hazardous Materials

In addressing the potential for impacts during the construction phase of the project, the only hazardous materials proposed for use include gasoline, fuel oil, hydraulic fluid,

lubricants, solvents, cleaners, sealants, welding flux, paint, and paint thinner. Any impact of spills or other releases of these materials would be limited to the site due to the small quantities involved and thus no further analysis of construction phase activities appears warranted.

In conducting this analysis for chemicals used during operation, staff determined in Steps 1 and 2 that some materials, although present at the proposed facility, pose a minimal potential for off-site impacts as they will be stored in a solid form, in smaller quantities, have low mobility, or have low levels of toxicity. These hazardous materials were eliminated from further consideration.

An example of these types of chemicals are those proposed for use in a Zero Liquid Discharge (ZLD) system that would process all wastewater and reduce the use of fresh water by the plant. The applicant indicated that the operation of the ZLD system would require the use of six new chemicals (calcium sulfate, sodium chloride, hydrotreated light distillate, EDTA, polyacrylate, and possibly other scale inhibitors) and the increase in use of three others (sodium hydroxide, sulfuric acid, and sodium carbonate) (SMUD 2002ac and SMUD 2002ae). These chemicals would be present in very small quantities – or the incremental increase would not be significant compared to other uses - and some are solids, thus posing an insignificant risk of off-site impacts.

Continuing with the assessment for the operational phase, after removing from consideration those chemicals that fit into Steps 1 and 2, staff continued with Steps 3, 4 and 5 to review the remaining hazardous materials: Hydrochloric acid, sodium hypochlorite, natural gas, sodium hydroxide, and aqueous ammonia.

Large Quantity Hazardous Materials

Hydrochloric acid

Hydrochloric acid, which is used in large quantities once every four years for the cleaning of the Heat Recovery Steam Generators (HRSG), does not pose a significant risk of off-site impacts because of the infrequent use and the safety measures taken by the HRSG cleaning company, including the use of temporary berms.

Sodium Hypochlorite

According to the Table 8.12-3R (SMUD 2002ae), a maximum of 16,800 gallons of sodium hypochlorite would be stored at the site. Sodium hypochlorite has a low potential to affect the off-site public because its vapor pressure is low and it is in an aqueous solution. In fact, hypochlorite is used at many such facilities as a substitute for chlorine gas, which is much more toxic and much more likely to migrate off-site because it is a gas and is stored in concentrated form under pressure. Thus, the use of a water solution of sodium hypochlorite is much safer to use than the alternative chlorine gas. The amount of sodium hypochlorite that would be stored on the site is below the Reportable Quantity as defined in the Cal-ARP regulations. Based upon staff's knowledge about the use of this material and the modeling of accidental releases, an aqueous solution of sodium hypochlorite poses an insignificant risk to the off-site public. However, the chances for accidental spills during transfer from delivery vehicles to the storage tanks should still be reduced as much as possible. Thus, measures to prevent

transfer spills are extremely important and would be required as a standard condition in a Safety Management Plan for delivery of sodium hypochlorite (see Condition of Certification **HAZ-3**).

Sodium Hydroxide

Sodium hydroxide would be stored on site but would not pose a risk of off-site impacts because it has relatively low vapor pressure and thus spills would be confined to the site. Therefore, no further analysis is needed.

Natural Gas

Natural gas poses a fire and/or explosion risk as a result of its flammability. Natural gas is composed of mostly methane but also contains ethane, propane, nitrogen, butane, isobutane, and isopentane. It is colorless, odorless, and tasteless and is lighter than air. Natural gas can cause asphyxiation when methane is ninety percent in concentration. Methane is flammable when mixed in air at concentrations of 5 to 14 percent, which is also the detonation range. Natural gas, therefore, poses a risk of fire and/or explosions if a release were to occur. However, it should be noted that, due to its tendency to disperse rapidly (Lees 1998), natural gas is less likely to cause explosions than many other fuel gases, such as propane or liquefied petroleum gas. While natural gas would be used in significant quantities, it would not be stored on-site. The risk of a fire and/or explosion on-site can be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices.

In particular, gas explosions can occur in the HRSG and during start-up. 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 would significantly reduce the likelihood of an explosion in gas-fired equipment. Additionally, start-up procedures would require air purging of the gas turbines prior to start-up, thus precluding the presence of an explosive mixture. The safety management plan proposed by the applicant would address the handling and use of natural gas and significantly reduce the potential for equipment failure due to improper maintenance or human error.

Since the proposed facility would require the installation of a new gas pipeline off-site, impacts from this pipeline were evaluated.

The design of the natural gas pipeline is governed by laws and regulations discussed here. These LORS require use of high quality arc welding techniques by certified welders and inspection of welds. Many failures of older natural gas lines have been associated with poor quality gas welds. Many failures in older pipelines have also resulted from corrosion. Current codes address this failure mode by requiring use of corrosion resistant coatings and cathodic corrosion protection. Another major cause of pipeline failure is damage resulting from excavation activities near pipelines. Current codes address this mode of failure by requiring clear marking of the pipeline route. An additional mode of failure particularly relevant to the project area is damage caused by earthquake. Existing codes also address seismic hazard in design criteria (see discussion below). Evaluation of pipeline performance in recent earthquakes indicates

that pipelines designed to modern codes perform well in seismic events while older lines frequently fail. Staff believes that existing regulatory requirements are sufficient to reduce the risk of accidental release from the pipeline to insignificant levels.

Failures of gas pipelines, according to data from the U.S. Department of Transportation (the National Transportation Safety Board) from the period 1984 - 1991, occur as a result of pipeline corrosion, pipeline construction or materials defects, rupture by heavy equipment excavating in the area such as bulldozers and backhoes, weather effects, and earthquakes. Given the gas line failures which occurred in the Marina District of San Francisco during the 1989 Loma Prieta earthquake, the January 1994 Northridge earthquake in Southern California, and the January 1995 gas pipeline failures in Kobe, Japan, as well as the January 19, 1995 gas explosion in San Francisco, the safety of the gas pipeline is of paramount importance. However, it must be noted that those pipelines which failed were older and not manufactured nor installed to modern code requirements. The February 2001 Nisqually earthquake near Olympia Washington caused no damage to natural gas mains and there was only one reported gas line leak due to a separation of a service line going into a mobile home park.

The natural gas pipeline proposed for the CPP facility would be installed, owned, and operated by SMUD. If loss of containment occurs as a result of pipe, valve, or other mechanical failure or external forces, significant quantities of compressed natural gas could be released rapidly. Such a release can result in a significant fire and/or explosion hazard, which could cause loss of life and/or significant property damage in the vicinity of the pipeline route. However, the probability of such an event is extremely low if the pipeline is constructed according to present standards.

According to DOT statistics, the frequency of reportable incidents is about 0.25 for all pipeline incidents per 1,000 miles per year or 2.5×10^{-4} incidents per mile per year. DOT has also evaluated and categorized the major causes of pipeline failure. To summarize, the four major causes of accidental releases from natural gas pipelines are: Outside Forces-43 percent, Corrosion-18 percent, Construction/Material Defects-13 percent, and Other-26 percent. Outside forces are the primary causes of incidents. Damage from outside forces includes damage caused by use of heavy mechanical equipment near pipelines (e.g., bulldozers and backhoes used in excavation activities), weather effects, vandalism, and earthquake-caused rupture as seen in the Marina District of San Francisco during the 1989 Loma Prieta earthquake and in Kobe, Japan in January 1995. The fourth category, “Other” includes equipment component failure, compressor station failures, operator errors, and sabotage. The average annual service incident frequency for natural gas transmission systems varies with age, the diameter of the pipeline, and the amount of corrosion.

Older pipelines have a significantly higher frequency of incidents. This results from the lack of corrosion protection and use of less corrosion resistant materials compared to modern pipelines, limited use of modern inspection techniques, and higher frequency of incidents involving outside forces. The increased incident rate due to outside forces is the result of the use of a larger number of smaller diameter pipelines in older systems, which are generally more easily damaged and the uncertainty regarding the locations of older pipelines.

In the United States, extensive federal and state pipeline codes and safety enforcement minimize the risk of severe accidents related to natural gas pipelines. In November 2000, the DOT Office of Pipeline Safety proposed a program requiring the preparation of risk management plans for gas pipelines throughout the United States. These risk management plans are proposed to include the use of diagnostic techniques to detect internal and external corrosion or cracks in pipelines and to perform preventive maintenance. The project owner would be required to develop and implement these plans if the proposal is promulgated as a regulation.

Staff believes the worst-case scenario for off-site natural gas hazard is a large rupture of the pipeline caused by improper use of heavy equipment near the pipeline. The applicant would provide an analysis of the likelihood (which is thought to be very low) of explosion and fire resulting from sparks generated from heavy equipment rupture of the pipeline if the DOT proposal for a pipeline risk management plan becomes regulation. This worst-case scenario would not result in significant asphyxiation hazard since natural gas disperses to the atmosphere rapidly when released. The worst-case scenario is primarily a safety hazard to construction workers. The project owner would mark the pipeline in conformance with State and Federal regulations to lower the probability of the above scenario.

The following safety features would be incorporated into the design and operation of the natural gas pipeline (as required by current federal and state codes): (1) while the pipeline will be designed, constructed, and tested to carry natural gas at a certain pressure, the working pressure will be less than the design pressure; (2) butt welds will be X-rayed and the pipeline will be tested with water prior to the introduction of natural gas into the line; (3) the pipeline will be surveyed for leakage annually (4) the pipeline will be marked to prevent rupture by heavy equipment excavating in the area; and (5) valves at the meter will be installed to isolate the line if a leak occurs.

Aqueous Ammonia

Aqueous ammonia would be used at the CPP in controlling the emission of oxides of nitrogen (NO_x) from the combustion of natural gas in the facility. The accidental release of aqueous ammonia without proper mitigation can result in hazardous down-wind concentrations of ammonia gas. One 18,000-gallon tank would be used to store a maximum amount of 15,000 gallons of 29 percent aqueous ammonia solution (SMUD 2001a; Page 8.12-8).

Based on the screening analysis discussed above, aqueous ammonia is the other hazardous material that may pose a risk of off-site impacts. The use of aqueous ammonia can result in the formation and release of toxic gases in the event of a spill even without interaction with other chemicals. This is a result of its moderate vapor pressure and the large amounts of aqueous ammonia, which would be used and stored on-site. However, as with aqueous sodium hypochlorite, the use of aqueous ammonia instead of the much more hazardous anhydrous ammonia (i.e., ammonia that is not diluted with water) poses far less risk.

To assess the potential impacts associated with an accidental release of ammonia, staff typically evaluates where four “bench mark” exposure levels of ammonia gas occur off-site. These include: 1) the lowest concentration posing a risk of lethality, 2,000 ppm; 2)

the Immediately Dangerous to Life and Health (IDLH) level of 300 ppm; 3) the Emergency Response Planning Guideline (ERPG) level 2 of 150 ppm (recently changed from the 200 ppm value), which is also the RMP level 1 criterion used by U.S. EPA and California; and 4) the level considered by the Energy Commission staff to be without serious adverse effects on the public for a one-time exposure of 75 ppm. (A detailed discussion of the exposure criteria considered by staff and their applicability to different populations and exposure-specific conditions is provided in Appendix A of this analysis.) If the potential exposure associated with a potential release exceeds 75 ppm at any public receptor, staff presumes that the potential release poses a risk of significant impact. However, staff also assesses the probability of occurrence of the release and/or the nature of the potentially exposed population in determining whether the likelihood and extent of potential exposure are sufficient to support a finding of potentially significant impact.

Data Response 181 (SMUD 2002l) provided the results of modeling for a worst-case accidental release of aqueous ammonia. The analysis assumed winds of 1.0 meter per second and atmospheric stability category F would exist at the time of the accidental release. An air temperature of 115º F was assumed. The ALOHA (Areal Locations of Hazardous Atmospheres) air dispersion model was used to estimate airborne concentrations of ammonia. These analyses were designed to predict the maximum possible impacts based on distance from the storage tank without regard to specific direction of transport.

The worst-case release is associated with a failure of the ammonia storage tank releasing all of its content into the secondary containment area, and the alternative scenario is a failure of a supply truck loading hose spilling aqueous ammonia onto the truck unloading pad with flow to the capture sump.

The results indicated that concentrations exceeding 75 ppm in the worst-case scenario would be present at 801 feet, which is mostly limited to the project site. The off-site areas impacted by the 75-ppm concentration would be to the north and east of the fenceline and approximately 75 feet to the west (just past the transmission towers). In the alternative scenario the concentration of 75 ppm would be present 318 feet away from the truck unloading pad which would impact off-site areas only to the north and east. The areas immediately to the north, south, east, and west are open fields. The Rancho Seco Nuclear Plant is located approximately 0.5 miles north and northeast of the CPP site. In response to a data request (SMUD 2002s), the applicant indicated that workers would continue to be employed and active during decommissioning of the nuclear power plant through sometime in the year 2008. However, workers would be present only at the facility and not on the surrounding fields and thus not be within the 801-foot radius of the 75-ppm airborne concentration of ammonia.

There are no sensitive receptors (schools, hospitals, day care centers, etc.) in a three-mile radius and the 75 ppm level does not extend to the public road (Clay East Road) to the south of the site.

Staff reviewed the applicant's modeling calculations and found that due to the engineering controls proposed to be implemented by the applicant for the storage and transfer of aqueous ammonia, any accidental release of aqueous ammonia used for the

project would not cause a significant impact (with the exception of Rancho Seco workers noted above).

Seismic Issues

A hazardous materials spill could also occur during an earthquake, which would cause the failure of a hazardous materials storage tank. The quake could also cause the failure of the secondary containment system (berms and dikes) as well as electrically controlled valves, pumps, and neutralization systems. The failure of all these preventive control measures might then result in a vapor cloud of hazardous materials moving off-site and impacting the residents and workers in the surrounding community. This concern over earthquake safety is heightened by the Loma Prieta earthquake of 1989, the Northridge earthquake of 1994, and the earthquake in Kobe, Japan in January 1995.

Information obtained after the January 1994 Northridge earthquake showed that some damage was caused to several large storage tanks and smaller tanks associated with the water treatment system of a cogeneration facility. Those tanks with the greatest damage - including seam leakage - were older tanks while the newer tanks sustained displacements and failures of attached lines. Therefore, staff conducted an analysis of the codes and standards, which should be followed in adequately designing and building storage tanks and containment areas to withstand a large earthquake. Staff also reviewed the impacts of the February 2001 Nisqually earthquake near Olympia, Washington, a state with similar seismic design codes as California. No hazardous materials storage tanks were impacted by this quake. Referring to the sections on **Geologic Hazards** and **Facility Design** in the AFC, staff notes that the proposed facility will be designed and constructed to the applicable standards of the California Building Code (CCR Title 24) and therefore the 1997 Uniform Building Code for Seismic Zone 3 (SMUD 2001a, page 2-19). Therefore, on the basis of what occurred in Northridge with older tanks and the lack of failures during the Nisqually earthquake with newer tanks, staff determined that tank failures during seismic events are not probable and do not represent a significant risk to the public.

Transportation of Hazardous Materials

Hazardous materials, including aqueous ammonia, sodium hypochlorite, and others would be transported to the facility via tanker truck or shipping trucks. While many types of hazardous materials would be transported to the site, it is staff's belief that transport of aqueous ammonia poses the predominance of risk associated with such transport. If the risks of transporting this hazardous material are insignificant, all other transportation risks would be insignificant as well.

Although an accidental release of aqueous ammonia during transportation to an Energy Commission-certified gas power plant has never occurred, it is theoretically possible for aqueous ammonia to be released during a transportation accident. The extent of impact in the event of such a release would depend on the location and on the rate of dispersion of ammonia vapor from the surface of the aqueous ammonia pool. The likelihood of an accidental release during transport is dependent on three factors:

1. the skill of the tanker truck driver,
2. the type of vehicle used for transport, and on

3. accident rates.

Staff routinely focuses on the surface streets within the project area after the delivery vehicle leaves the main highway. Staff believes that it is appropriate to rely on the extensive regulatory program that applies to shipment of hazardous materials on main California Highways to ensure safe handling in general transportation (see the Federal Hazardous Materials Transportation Law 49 USC §5101 et seq, the U.S. Department of Transportation Regulations 49 CFR Subpart H, §172-700, and California DMV Regulations on Hazardous Cargo). These regulations also address the issue of driver competence. (See AFC section 8.10.2. for additional information on regulations governing the transportation of hazardous materials.)

To address the issue of tank truck safety, aqueous ammonia would be delivered to the proposed facility in Department of Transportation (DOT) certified vehicles with design capacity of 6,000 gallons. These vehicles are designed to DOT Code MC-307. These are high integrity vehicles designed for hauling of caustic materials such as ammonia. Staff has therefore proposed a Condition of Certification (**HAZ-5**) to ensure that regardless of which vendor supplies the aqueous ammonia, delivery would be made in a tanker which meets or exceeds the specifications described by these regulations.

To address the issue of accident rates, staff reviewed the technical and scientific literature on hazardous materials transportation (including tanker trucks) accident rates in the United States and California. Staff relied on six references (Rhyne 1994, Davies and Lees 1992, Harwood 1990, Harwood 1993, Vilchez 1995, and Pet-Armacost 1999) and three federal government databases (National Response Center, Chemical Incident Reports Center, and National Transportation Safety Board) to assess the risks of a hazardous materials transportation accident.

Staff used this data and that from the Davies and Lee (1992) article, which references the 1990 Harwood study, to determine that the frequency of release for transportation of hazardous materials in the U.S. is between 0.06 and 0.19 releases per million miles traveled on well designed roads and highways. The maximum usage of aqueous ammonia each year of operation of the proposed Cosumnes Power Plant would require about 104-156 tanker truck deliveries of aqueous ammonia per year (maximum of 2-3 trucks per week; SMUD 2002f). Each deliver truck would travel about 10 miles between State Route (SR) 99 and the facility per delivery along the designated transportation route (Twin Cities Road to Clay East Road). (If Interstate 5 were used instead of SR-99, an additional 8 miles would be traveled per trip.) The result is a maximum of 1,560 miles of delivery truck travel in the project area per year (2808 miles per year if I-5 were used). Previous assessments by staff have found that the risk over this distance is negligible.

Data from the U.S. DOT show that the actual risk of a fatality over the past five years from all modes of hazardous material transportation (rail, air, boat, and truck) was approximately 0.1 fatalities per one million shipments of hazardous materials.

Staff therefore believes the risk of exposure to significant concentrations of aqueous ammonia during transportation to the facility are insignificant because of the remote possibility of accidental release of a sufficient quantity to present a danger to the public.

The transportation of similar volumes of hazardous materials on the nation's highways is not unique nor an infrequent occurrence. Staff's analysis of the transportation of aqueous ammonia to the proposed facility (along with data from the U.S. DOT) demonstrates that the risk of accident and exposure is less than significant.

However, staff has some concerns about the route used to gain access to the project site. Twin Cities Road is narrow and has no shoulder. Because there are farming and livestock operations in the area, it is reasonable to expect that slow-moving or wide loads (tractors, hay trucks, etc.) would use this road and thus be encountered when transporting hazardous materials to the power plant. It is staff's opinion that due to the narrowness of this road, it would be impossible for a tanker truck to pass a hay truck going in the opposite direction without at least one vehicle (and perhaps both) going slightly off the road. This would present an unacceptable risk of upset of the tanker truck. Additionally, the route passes a school in Herald and heavy fog exists during morning hours during certain times of the year (late winter and early spring). In order to mitigate this risk, staff recommends adoption of Condition of Certification (**HAZ-8**); that all hazardous materials tankers carrying more than 1000 gallons be escorted from SR 99 or I-5 to the facility by a lead vehicle equipped with fog lights and a two-way radio or other method of communicating with the transportation vehicle.

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

Site Security

This facility proposes to use hazardous materials which have been identified by the US Environmental Protection Agency (EPA) as materials where special site security measures should be developed and implemented to ensure that unauthorized access is prevented. The EPA published a Chemical Accident Prevention Alert regarding Site Security (EPA 2000a) and the US Department of Justice published a special report on Chemical Facility Vulnerability Assessment Methodology (US DOJ 2002). In order to ensure that this facility or a shipment of hazardous material is not the target of unauthorized access, staff's proposed General Condition of Certification on Construction and Operations Security Plan **COM-8** would require the preparation of a Vulnerability Assessment and the implementation of Site Security measures consistent with the above-referenced documents.

The level of security should be dependent upon the threat imposed and the consequences of a successful breach of the facility boundaries. In order to determine the level of security, Energy Commission staff will provide guidance in the form of a decision matrix modeled after the U.S. Department of Justice Chemical Vulnerability Assessment Methodology (July 2002). Basic site security measures should be required at all locations in order to protect the infrastructure and electrical power generation within the state. These measures would include perimeter fencing, guards, alarms, law enforcement contact in the event of security breach, and fire detection systems. Other

locations would have additional security measures dependent upon the results of the vulnerability assessment.

The level of security at each power plant should be a function of the likelihood of an adversary attack, the likelihood of adversary success in causing a catastrophic event, and the severity of consequences of that event. It is only after conducting a vulnerability assessment would the level of security required be known. The vulnerability assessment would be based, in part, on the use and storage of certain quantities of acutely hazardous materials as described by the California Accidental Release Prevention Program (Cal-ARP - Health and Safety Code, section 25531). This would allow staff to use the results of the off-site consequence analysis prepared as part of the Risk Management Plan (RMP) to determine the severity of consequences of a catastrophic event.

Site personnel background checks should be required for this site and would most likely be limited to ascertaining that the employee's claims of identity and employment history are accurate. All site personnel background checks would be consistent with state and federal law regarding security and privacy.

Site access for vendors should be strictly controlled. Consistent with recent state and current federal regulations governing the transport of hazardous materials, hazardous materials vendors would have to maintain their transport vehicle fleet and employ only drivers properly licensed and trained. The project owner would be required through the use of contractual language with vendors to ensure that vendors supplying hazardous materials conduct background security checks on any employee involved in the transportation and delivery of hazardous materials to the power plant. This requirement would be similar to those Conditions of Certification which require a project owner to ensure that hazardous materials deliveries are made only in approved vehicles and only via an approved delivery route. All hazardous materials vendor delivery personnel background checks would be consistent with state and federal laws regarding security and privacy.

APPLICANT'S PROPOSED MITIGATION

The potential for accidents resulting in the release of hazardous materials is greatly reduced by the implementation of a safety management program, which includes the use of both engineering and administrative controls. Administrative controls include the development and implementation of a Safety Management Plan. Elements of facility controls and the safety management plan are summarized below.

ENGINEERING CONTROLS

Engineering controls help to prevent accidents and releases (spills) from moving off-site and impacting the community by incorporating engineering safety design criteria into the design of the facility. The engineered safety features proposed by the applicant for use at this facility include:

- construction of curbs, berms, and/or catchment basins in the hazardous materials storage areas to contain accidental releases that might happen during storage or delivery;

- physical separation of stored chemicals in separate containment areas in order to prevent accidental mixing of incompatible materials which may result in the evolution and release of toxic gases or fumes;
- construction of an underground spill containment vault with a wide 24-inch diameter drain from the aqueous ammonia secondary containment basin;
- a sloped containment pad for the aqueous ammonia tanker truck delivery area that will drain through into the same subsurface covered vault placed beneath the storage tank; and
- process protective systems including continuous tank level monitors, alarms, automatic shut-off valves, and fire protection systems.

ADMINISTRATIVE CONTROLS

Administrative controls also help to prevent accidents and releases (spills) from moving off-site and impacting the community by establishing worker training programs and process safety management programs and by complying with all applicable health and safety laws, ordinances and standards.

The worker health and safety program proposed by the applicant for use at this facility would include (but is not limited to) the following elements:

- worker training regarding chemical hazards, health and safety issues, and hazard communication;
- the proper use of personal protective equipment;
- safety operating procedures for operation and maintenance of systems utilizing hazardous materials; and
- fire safety and prevention; and emergency response actions including facility evacuation, hazardous material spill cleanup, and fire prevention.

At the facility, the project owner would designate an individual who has the responsibility and authority to ensure a safe and healthful workplace. The project health and safety professional oversees the health and safety program and has the authority to halt any action or modify any work practice in order to protect the workers, facility, and the surrounding community or in the event that the health and safety program is violated.

The facility's Safety Management Program would include regular inspection and maintenance of equipment, valves, piping, and appurtenances. Additionally, the safety management program requires that only trained facility personnel are assigned to the transfer and handling of hazardous chemicals. SMUD would also prepare a Hazardous Materials Business Plan and a Risk Management Plan (RMP).

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

STAFF'S PROPOSED MITIGATION

Staff proposes eight Conditions of Certification mentioned throughout the text (above) and listed below. **HAZ-1** ensures that no hazardous material would be used at the facility except those listed in the AFC unless there is prior approval by the County and the Energy Commission Compliance Project Manager. **HAZ-2** requires that a RMP be prepared and submitted prior to the delivery of aqueous ammonia. The worst-case accidental release scenario evaluated in the AFC assumed that accidental spills of aqueous ammonia would occur from the storage tank into the catchment system. Staff believes that the most likely event resulting in a spill would be during transfer from the delivery tanker to the storage tank. Staff therefore proposes a condition (**HAZ-3**) requiring development of a safety management plan for the delivery of aqueous ammonia (as well as aqueous hypochlorite solution). The development of a Safety Management Plan addressing delivery of ammonia would further reduce the risk of any accidental release not addressed by the proposed spill prevention mitigation measures and the required Risk Management Plan (RMP). **HAZ-4** requires that the aqueous ammonia storage tank be designed to certain rigid specifications, **HAZ-5 and -8** address the transportation of aqueous ammonia, and **HAZ-6 and -7** address the safety of the gas pipeline.

CUMULATIVE IMPACTS

Staff reviewed the potential for the operation of the CPP combined with any existing or planned industrial facilities to result in cumulative impacts on the population within the area. Projects that could potentially contribute to cumulative impacts are those located or which will be located in the same geographic area of influence defined as within a 1-mile radius of the proposed power plant. Staff found no other facilities within a 1-mile radius of the CPP, with the exception of the Rancho Seco Nuclear Power Plant, which is no longer in operation and thus no longer using hazardous materials.

Staff toured the site on June 11, 2002 and confirmed this fact. Some hazardous waste remains on-site but no significant quantities of hazardous materials remain. The site visit was further confirmation of the information provided by the applicant in a response to a staff data request (SMUD 2002s, Data Response 231) where the applicant stated that 99% of asbestos has been removed (which is regulated as a waste, not as a hazardous material), chemicals and chemical systems necessary for plant operation have been removed, and that small quantities of hazardous materials are still in use. During the site visit, staff confirmed that the small quantities consisted of only industrial/commercial cleaning supplies (floor and bathroom cleaners).

Staff believes that the only thing left for decommissioning at Ranch Seco is removal of the nuclear waste. The cooling tower has already been cleaned (staff walked under it and inspected the area), the reactor pool has been drained, and all hazardous material storage tanks have been removed. Radioactive waste fuel rods are regulated as waste and not as hazardous materials by either federal law (section 112r of the Clean Air Act) or by the Cal ARP program. Wastes are handled differently and nuclear wastes are handled even more differently. And, there is no other facility in the area that contains large enough quantities of hazardous materials to cause a cumulative impact.

Therefore, staff finds that the CPP facility, as proposed by SMUD and with the additional mitigation measures proposed by staff, poses a minimal risk of accidental release that could result in off-site impacts. Even if another source of large quantities of hazardous materials were to be in proximity to the proposed project, it is extremely unlikely that an accidental release that has very low probability of occurrence (about one in a million per year) would independently occur simultaneously at the CPP and another facility at the same time.

ENVIRONMENTAL JUSTICE

Staff has reviewed Census 2000 information that shows the minority population is less than 50 percent within a six-mile radius of the proposed Cosumnes Power Plant (please refer to **Socioeconomics Figure 1** in this Staff Assessment). However, as indicated in **Socioeconomics Figure 1**, there are multiple census blocks with greater than 50 percent minority persons within the six-mile radius; staff considers these to be pockets or clusters. Staff also reviewed Census 2000 information that shows the low-income population is less than 50 percent within the same radius. However, based on the hazardous materials analysis, staff has not identified significant direct or cumulative impacts resulting from the construction or operation of the project, and therefore there are no hazardous materials environmental justice issues related to this project.

FACILITY CLOSURE

The requirements for the handling of hazardous materials remain in effect until such materials are removed from the site regardless of facility closure. Therefore, SMUD is responsible for continuing to handle such materials in a safe manner, as required by applicable laws. The **General Conditions** section of this report discusses planned, unexpected temporary and unexpected permanent closure. Staff's General Conditions for Facility Closure require preparation of an on-site contingency plan, which must provide for removal of hazardous wastes and draining of all chemicals from storage tanks and other equipment for temporary closures exceeding 90 days or unexpected permanent closure.

For planned permanent closure, CPP would develop a facility closure plan at least 12 months prior to commencement of closure and is committed to complying with LORS which are applicable at the time of closure.

In the event that SMUD abandons the facility in a manner, which poses a risk to surrounding populations, staff would coordinate with the California Office of Emergency Services, Herald Fire District, and the California Department of Toxic Substances Control (DTSC) to ensure that any unacceptable risk to the public is eliminated. Funding for such emergency action can be provided by federal, state, or local agencies until the cost can be recovered from the responsible parties.

RESPONSE TO PUBLIC AND AGENCY COMMENTS

PUBLIC COMMENTS

Comment: *Joe Rominger and Sheri Tall, residents of Yolo County, asked if there would be any health risks to residents living close to the 4,000+ horsepower compressor station proposed to be built by SMUD at their tap line into the PG&E natural gas line located on County Road 29 in Yolo County.*

Response: The compressor that is proposed to be built in Yolo County would be electric-driven, and therefore, the operation of this compressor would not require any hazardous chemicals, fuels, or result in the emission of pollutants (see the **Air Quality** and **Public Health** sections of the staff assessment which address release of pollutants into the air). Natural gas pipelines do, however, present a very small risk of fire or explosion. Current laws and regulations require all natural gas pipelines to be built and maintained to the strictest of standards. Please refer to the extensive discussion of laws and engineering controls discussed earlier in this section. Therefore, it is staff's opinion that the construction and operation of the proposed compressor poses an insignificant risk to the public.

AGENCY COMMENTS

The Community Development Department, City of Elk Grove

ELK-3 *The PSA does not indicate if there are schools, hospitals, or residences along the hazardous material transportation route that could potentially be affected by accidental releases*.

Response: Arcohe Union Elementary School is located at 11755 Ivie Road in Herald, which is in the vicinity of the proposed hazardous material transportation route. To minimize the potential of accidental releases during transport, staff has recommended the adoption of condition of certification **HAZ-8**. **HAZ-8** requires a lead vehicle equipped with fog lights and 2-way radios to escort trucks transporting hazardous materials of 1,000 gallons or greater from the freeway to the CPP site.

ELK-5 *The Community Development Department, City of Elk Grove, requested that staff provide a discussion of emergency response plans associated with accidental release of hazardous materials during transportation along Twin Cities Road.*

Response: Throughout the entire certification process, it is the goal of staff to identify and mitigate potential risks to the public due to the use of hazardous materials at the proposed power plant. That is, staff focuses on preventing an accidental release either at the facility or during transport to the facility. However, should an unlikely event occur during transportation to the facility, it would be the responsibility and jurisdiction of the local authorities – police, fire, and sheriff – and the hazardous materials transport vendor to respond to, contain, and manage accidental releases. Neither the project owner nor the Energy Commission has jurisdiction over an accidental release on a public roadway. Thus, emergency response plans are the responsibility of the hazardous materials transport vender and the local fire department.

CONCLUSIONS AND RECOMMENDATIONS

Staff's evaluation of the proposed project (with staff's proposed mitigation measures) indicates that hazardous materials use would pose little potential for significant impacts on the public. With adoption of the proposed Conditions of Certification, the proposed project would comply with all applicable Laws, Ordinances, Regulations and Standards (LORS). In response to Health and Safety Code, section 25531 et seq., the applicant would be required to develop an RMP. To insure adequacy of the RMP, staff's proposed conditions of certification require that the RMP be submitted for concurrent review by U.S. EPA, Sacramento County Environmental Management Department, and Energy Commission staff. In addition, staff's proposed conditions of certification require Sacramento County Environmental Management Department's review, and staff review and approval of the RMP prior to delivery of any hazardous materials to the facility. Other proposed conditions of certification address the issue of the transportation, storage, and use of aqueous ammonia and sodium hypochlorite.

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

PROPOSED CONDITIONS OF CERTIFICATION

HAZ-1 The project owner shall not use any hazardous material not listed in Appendix B (AFC Table 8.12-3R), below, or in greater quantities than those identified by chemical name in Appendix B, below, unless approved in advance by the - Sacramento County Environmental Management Department and the CPM.

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

HAZ-2 The project owner shall concurrently provide a Business Plan and a Risk Management Plan (RMP) to the Certified Unified Program Authority - CUPA (Sacramento County Environmental Management Department) for review and to the CPM for review at the time the RMP is first submitted to the U.S. Environmental Protection Agency (EPA). After receiving comments from the CUPA, the EPA, and the CPM, the project owner shall reflect all recommendations in the final documents. Copies of the final Business Plan and RMP shall then be provided to the CUPA and EPA for information and to the CPM for approval.

Verification: At least 60 days prior to receiving any hazardous material on the site, the project owner shall provide a copy of a final Business Plan to the CPM for approval. At least 60 days prior to delivery of aqueous ammonia to the site, the project owner shall provide the final RMP to the Sacramento County Environmental Management Department for information and to the CPM for approval.

HAZ-3 The project owner shall develop and implement a Safety Management Plan for delivery of aqueous ammonia and sodium hypochlorite and shall submit

this plan to the CPM for approval. The plan shall include procedures, protective equipment requirements, training, and a checklist. It shall also include a section describing all measures to be implemented to prevent mixing of aqueous ammonia with incompatible hazardous materials.

Verification: At least 60 days prior to the delivery of aqueous ammonia or sodium hypochlorite to the facility, the project owner shall provide the plan to the CPM for review and approval.

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

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

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

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

HAZ-6 The project owner shall require that the gas pipeline undergo a complete design review and detailed inspection 30 years after initial startup and every 5 years thereafter.

Verification: At least 30 days prior to the initial flow of gas in the pipeline, the project owner shall provide an outline of the plan to accomplish a full and comprehensive pipeline design review to the CMP for review and approval. The full and complete plan shall be amended, as appropriate, and submitted to the CPM for review and approval, not later than one year before the plan is implemented by the project owner.

HAZ-7 After any significant seismic event in the area where surface rupture occurs within one mile of the pipeline, the gas pipeline shall be inspected by the project owner.

Verification: At least 30 days prior to the initial flow of gas in the pipeline, the project owner shall provide a detailed plan to accomplish a full and comprehensive pipeline inspection in the event of a significant seismic event where surface rupture occurs within one mile of the pipeline to the CMP for review and approval. This plan shall be amended, as appropriate, and submitted to the CPM for review and approval, at least every five years.

HAZ-8 All hazardous material tanker trucks transporting any hazardous material solution in an amount equal to or greater than 1,000 gallons shall be escorted from State Route 99 or Interstate 5 to the facility by a lead vehicle equipped

with fog lights. Both vehicles shall also be equipped with radios to provide communication between the lead vehicle and the tanker truck. Both vehicles shall have their headlights on at all times when traversing the route.

Verification: At least 30 days prior to the initial delivery of any hazardous material solution in an amount equal to or greater than 1,000 gallons, the project owner shall certify by letter to the CPM that the required hazardous material transportation escort will be implemented.

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APPENDIX A

HAZARDOUS MATERIAL MANAGEMENT

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

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

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

HAZARDOUS MATERIAL MANAGEMENT
APPENDIX A TABLE 1
Acute Ammonia Exposure Guidelines

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

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

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Abbreviations for Appendix A, Table 1

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

Appendix B
[Attach revised Table 8.12-3R from Supplement C to the AFC]

LAND USE

Testimony of James Adams

INTRODUCTION

The land use analysis of the Cosumnes Power Plant (CPP), Phases 1 and 2, focuses on the project's consistency with local land use plans, ordinances, and policies; and the project's compatibility with existing and planned land uses. In general, an electric generation project and its related facilities could be incompatible with existing and planned land uses if it creates unmitigated noise, dust, public health hazard or nuisance, traffic, or visual impacts or if it unduly restricts or precludes existing or planned future uses.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

FEDERAL

There are no federal LORS applicable to the project.

STATE

Subdivision Map Act (Pub. Resources Code § 66410-66499.58)

The Subdivision Map Act provides procedures and requirements regulating land divisions (subdivisions) and the determination of parcel legality. Pursuant to the Act, regulation and control of the design and improvement of subdivisions has been vested in the legislative bodies of local agencies. Each local agency, by ordinance, regulates and controls the initial design and improvement of common interest developments and subdivisions for which the Map Act requires a tentative and final map.

State Planning and Zoning Law (Gov. Code § 65000-66037)

Under State planning law, each county and incorporated city must adopt a comprehensive, long-term general plan that governs the physical development of all lands under its jurisdiction. The general plan is a broadly scoped planning document and defines large-scale planned development patterns over a relatively long timeframe. The general plan consists of a statement of development policies and must include a diagram and text setting forth the objectives, principles, standards, and proposals of the document. At a minimum, a general plan has seven mandatory elements: Land Use, Circulation, Housing, Conservation, Open Space, Noise, and Safety.

California Government Code *(Gov. Code § 53091)*

Section 53091 of the Government Code specifically exempts local agency (e.g., SMUD) projects involving the production of energy from city or county zoning code and building permit requirements, but does not exempt them from General Plan policies, nor does it exempt transmission lines. Therefore, staff will analyze the CPP to determine its compatibility with the Sacramento County, Yolo County, and the City of Elk Grove's general plans. The CPP is not bound by any Sacramento County zoning code or building permit requirement. Similarly, the construction of the natural gas pipeline or

related facilities are not bound by any zoning code or permit requirement from Sacramento or Yolo counties or the City of Elk Grove.

LOCAL

Sacramento County General Plan

The Sacramento County General Plan (GP) was adopted on December 15, 1993. Elements of the General Plan most relevant to the proposed project include Land Use, Agricultural, and Public Facilities. These elements provide guidelines and policies that pertain to industrial developments such as the CPP (County of Sacramento 1993). Staff considers the General Plan the primary document for determining the CPP's consistency with local LORS, as long it is compatible with the local zoning ordinance.

Land Use Element

General Plan Land Use (LU) Policies numbers 22 through 25 provide guidelines related to structures and lighting to minimize adverse visual affects to nearby neighbors (see the **Visual Resources** section of this document for more information). Land Use Policy (LU-70) directs the County to work with public service providers, including electric and other service providers in developing financial and service planning strategies consistent with the General Plan policies.

Agricultural Element

The purpose of this element is to maintain agricultural land and its productivity. The County recognizes the importance of agriculture not only for food production, but for open space considerations as well. Specifically, Policy AG-1 requires the County to protect prime farmland and lands with intensive agricultural investments from urban encroachment policy.

Public Facilities Element

The most relevant portion of this element is the Energy Facilities section that offers suggestions to minimize environmental impacts caused by the construction and operation of energy facilities.

- Public Facilities (PF) -70 states that the Sacramento County Board of Supervisors and Policy Planning Commission should not approve development projects for energy facilities if they violate any policies in the Public Facilities section unless justified through findings.
- PF-72 encourages energy production and distribution facilities to be located and designed in a manner that is compatible with surrounding land uses.
- PF-85 through 89, 92, 93, 99, and 100 describe siting priorities and design features for transmission lines. The goal is to utilize existing transmission line corridors whenever possible, avoid existing and planned urban areas, minimize visual impacts, preserve existing land uses, and avoid biological and cultural resources.
- PF-112 and 113 relate to the location of electrical distribution substations and efforts to minimize visual impacts in residential areas.

- PF-118 requires that new high-pressure gas lines be routed within railway and electric and transmission corridors, along collector roads, and within existing easements.
- PF-120 states that all Community Plans shall include an Energy Facility Siting Element.

Sacramento County Zoning Code

The CPP site is zoned AG-80, which allows single-family dwellings at a density no greater than one unit per 80 acres. There are development standards within the County Zoning Code that would be applicable to the CPP but for California Government Code Section 53091. The development standards are found in Sections 320-1 to 320-8, and 301-21. They pertain to setback, landscaping, fencing and height requirements (County of Sacramento 2001a).

Yolo County General Plan

The second phase of the CPP would require installing two gas compressor stations, one of which would be in agricultural lands in rural Yolo County five miles north of the City of Winters. The land is designated for agricultural uses directly related to the production of crops. The relevant goals from the Yolo County General Plan for the proposed project are: 1) to protect prime and other agricultural land from urban development, encourage conservation (energy, open space, and materials); 2) to ensure that efficient utility service is provided, and 3) to assure that the costs of new projects are borne by the beneficiaries of such development. More specifically, Land Use Policy 35 provides for mitigation and avoidance of adverse impacts by managing industrial and commercial locations and development configurations (County of Yolo 1983).

Yolo County Zoning Ordinance

The compressor station site is zoned AG1, which provides land in rural areas for uses directly related to agricultural industry. Section 8-2.612 describes the principal uses for AG1 land. In general, any requested change in an authorized use shall require a Minor Use Permit. One of the listed uses pertains to electrical distribution substations, transmission substations, communication equipment buildings, and public utility service yards (County of Yolo 2000).

City of Elk Grove General Plan

The City of Elk Grove has nearly completed its first general plan with approval expected in June 2003 (City of Elk Grove 2003). The City of Elk Grove General Plan is a broad framework for planning future development. The Land Use Element of the Plan describes several land use planning areas, including the East Franklin area.
The East Franklin Specific Plan guides the land use within this portion of Elk Grove (City of Elk Grove 2002a). The Plan applies development policies to an area of approximately 2,470 acres located about two miles west of the center of the City of Elk Grove. Its purpose is to provide direct and comprehensive correlation between land use, public facilities, and services necessary for support of land use.

Among other items, the Plan acknowledges the presence of natural gas and petroleum pipelines within the Union Pacific Railroad right-of-way located west of Franklin Boulevard and south of Elk Grove Boulevard (City of Elk Grove, 2000). The dominant

land use is and will remain residential development. The relevant policy within the Land Use Element of the Plan is Land Use-18 that requires new development to be compatible with surrounding development (County of Sacramento 2000).

The CPP natural gas pipeline would cross the southwest portion of the East Franklin area. The area west of Franklin Boulevard, south of Elk Grove Boulevard, and east of the Union Pacific Railroad tracks is designated public open space/recreation. The area east of Franklin is designated low density residential (City of Elk Grove 2003).

City of Elk Grove Zoning Ordinance

The City of Elk Grove has adopted the Sacramento County Zoning Code. See the above discussion for applicable zoning codes.

SETTING

POWER PLANT SITE AND VICINITY

Existing Land Use

The proposed power plant site is located in southeastern Sacramento County, approximately 25 miles southeast of the City of Sacramento. The site is about one-half mile south of the Rancho Seco Nuclear Power Plant (SMUD 2001a, pg. 8.4-4). This facility is currently being decommissioned and has not operated for many years. The CPP would be built on a 30-acre site located within a 2,480-acre site owned by SMUD. The project is bordered by Clay East Road to the south, and is approximately 1.75 miles east of the junction of Clay East Road and Twin Cities Road. It is located about four miles north of the San Joaquin County line and five miles west of Amador County. The land use in this general area is predominantly agricultural with incorporated and unincorporated urban/suburban areas. The site is currently grazed by cattle for weed control purposes.

Existing land uses within a one-mile radius of the site include the Rancho Seco Nuclear Power Plant to the north, four solar photovoltaic electricity facilities to the northeast, agricultural areas (i.e., vineyards and grazing lands) to the south and west. The Rancho Seco Reservoir and recreation area is about two miles to the east. The recreation area is used for camping, picnicking, fishing, swimming, wind surfing, and miscellaneous small boat activities. Existing land uses within one mile of the power plant site and 0.25 mile of the proposed natural gas line are shown on **Land Use Figures 1A - 1E**. The nearest residence is approximately 800 feet southwest of the proposed site, and there are a few other residences/ranches within one mile. A grape vineyard is about 1,200 feet to the west of the power plant site.

Historically, much of the flat portions of the southeast portion of Sacramento County have been used for agriculture (SMUD 2001a, pg.8.4-4). The CPP site, related transmission line, and access road are located in areas that do not involve irrigated agricultural lands. The majority of the 26-mile long natural gas line would be constructed in existing public right-of-way (road and utility easement), or just outside

railroad right-of way. However, a portion of the gas line would cross lands used for agricultural and natural preservation purposes.

Planned Land Use

The Rancho Seco Nuclear Power Plant is currently being decommissioned. Part of the decommissioning involves the construction and operation of an Independent Spent Fuel Storage Installation within the Rancho Seco plant site. This process involves removing the spent fuel rods from the nuclear reactor and storing them in large steel canisters which will eventually be sent to a nuclear waste facility in accordance with U.S. Department of Energy and Nuclear Regulatory Commission guidelines. This project will be taking place over the next several years (SMUD 2001a, pg. 8.4-7).

The only other planned development in the proposed power plant vicinity is an expansion of SMUD's photovoltaic facility. The planned expansion is still in the concept stage. SMUD periodically review proposals for commercial uses of its property, although there are none at this time. Presumably, any future development will be consistent with the AG-80 zoning and Public/Quasi-Public General Plan designation (SMUD 2001b). In general, there are ongoing and anticipated developments along the natural gas pipeline route but these are relatively minor projects, or they will be completed by the start of construction of the pipeline (County of Sacramento 2002a, City of Elk Grove 2002b). Permitted, pending, or recorded projects located in the vicinity of the power plant and the gas pipeline alignment are shown in Land Use Figures 1A through 1E. Given the agricultural nature of the proposed power plant area, no urban growth is currently anticipated.

LINEAR FACILITIES

Electrical Transmission Line

Electrical transmission features of the CPP consists of a new 230 kV switchyard onsite and two 0.4 mile-long 230 kV transmission lines to the Rancho Seco substation. The lines would be mounted on dual line monopole tower structures approximately 100 to 125 feet tall. The transmission corridor would be wide enough to allow two sets of poles from the CPP to the Rancho Seco substation (SMUD 2002p, pg. 1-3). The transmission lines, switchyard, and relay and control building would be built on property owned by SMUD (SMUD 2001, pgs. 5-7 & 8).

Natural Gas Pipeline Route

The proposed 26-mile long natural gas pipeline would connect with SMUD's gas line at the Carson Ice-Cogeneration facility to the northwest of the power plant site. As noted earlier, the pipeline route would head south and east to the CPP adjacent to or through railroad, road, and utility rights-of-way. When possible, SMUD would acquire additional right-of-way to avoid sharing right-of-way with other entities. The 24-inch diameter gas pipeline would be buried in a trench approximately three to seven feet wide and at least five feet deep (SMUD 2001, pg. 6-4). Land uses along the route are primarily agricultural with the exception of the northern portion in Elk Grove, which is a combination of residential and commercial uses. These uses are expected to remain the same for the foreseeable future.

Water Supply Pipeline and Waste Discharge

The proposed 0.4-mile water supply pipeline would connect to an existing 66-inch underground water main that services Rancho Seco and originates from the Folsom-South Canal (SMUD 2001, pg. 1-4). Potable water would be filtered and stored in a bulk storage tank with a capacity of 2,500 gallons (SMUD 2001, pg. 2-10). Wastewater discharge would be processed in a packaged sanitary waste treatment system. Cooling tower process water would ultimately be sent to a zero-liquid discharge system (SMUD 2002ac, pg. ii).

Power Plant Site Access Road

SMUD is proposing to develop an access road about one-half mile east of the CPP (see **Project Description Figure 8**). This paved road would be 24 feet wide and could withstand heavy loads (SMUD 2002d).

VALVE STATIONS

The project would require adding three additional valve stations to the gas line for emergency shut-off capability (SMUD 2002p). These 50-foot square stations would be located at the intersections of Core Road and Bruceville Road, Arno Road and Valensin Road, and Valensin Road and Alta Mesa Road.

NATURAL GAS COMPRESSOR STATIONS

As noted above, Phase 2 of the project would require the installation of two natural gas compressor stations. One would be located at PG&E's 400/401 inter-tie north of County Road 29, approximately five miles north of the City of Winters in Yolo County (see **Land Use Figure 6**). The other would be located at SMUD's Valve Station #190, north of the Carson Ice-Cogeneration facility and west of the Union Pacific railroad tracks (see **Project Description Figure 7**).

IMPACTS

According to Appendix G of the Guidelines to the California Environmental Quality Act (CEQA), a project may have a significant effect on land use and agricultural resources if the project will:

- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect;
- Physically divide an established community; or
- Conflict with any applicable habitat conservation plan or natural community conservation plan.
- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.
- Conflict with existing zoning for agricultural use, or a Williamson Act contract.

- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use.

To determine direct and cumulative impacts, staff has reviewed the CPP AFC, data responses, applicable land use plans, and correspondence with Sacramento County, the City of Elk Grove, and Yolo County planning staff.

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

Public Resources Code section 25525 states that the Energy Commission shall not certify any facility when it finds "that the facility does not conform with any applicable state, local, or regional standards, ordinances, or laws, unless the commission determines 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." When determining if a project is in conformance with state, local, or regional ordinances or regulations, the Energy Commission typically meets and consults with the applicable agencies to determine conformity and, when necessary, "to attempt to correct or eliminate any noncompliance" (Pub. Resources Code, § 25523(d)(1)). The laws, ordinances, regulations, standards (LORS), and policies applicable to the project have been analyzed below to determine the extent to which the project is consistent with each requirement or standard. The LORS analysis also responds to the first bulleted item in the CEQA significance criteria noted earlier.

State

Subdivision Map Act

Page 8.4-5 of the AFC, section 8.4.2.2.1 states that the proposed project is to be located on two parcels identified as Assessor's Parcel Numbers 140-0050-010, and –008, totaling 30 acres. In addition, a third parcel (140-0050-013) located south of Clay East Road would be used for parking and construction laydown. The vesting deed for the Rancho Seco area shows that the land was conveyed to SMUD (a public utility) in 1966 with a fee interest payment. Pursuant to Section 66426.5 of the Subdivision Map Act, the applicant was not required to file a parcel map. Therefore, staff finds the proposed project is consistent with the Subdivision Map Act.

Local

Sacramento and Yolo County General Plans

As noted in the LORS discussion above, the Sacramento County General Plan is the primary document for determining the CPP's consistency with local LORS. In particular, the Land Use, Agricultural, Public Facilities, and Conservation elements within the Plan are the most relevant. Staff believes that the proposed project is consistent with these elements which is also noted in the Sacramento County staff correspondence (County of Sacramento 2001b). The CPP is also consistent with the Yolo County General Plan. The power plant site, which is designated Public-Quasi Public with a Resource Conservation overlay by Sacramento County, is within an approximately 2,480-acre area owned by SMUD. A power plant is consistent with the Public-Quasi Public

designation of the site because it is a public use project of large scale and regional importance (County of Sacramento 2001b).

City of Elk Grove General Plan

The Elk Grove General Plan (draft) and the East Franklin Specific Plan, are applicable to the area crossed by the proposed CPP gas pipeline with the City of Elk Grove. The CPP natural gas line would cross the southwest portion of the East Franklin Specific Plan area. Within the Specific Plan, policy Land Use-18 requires new development to be compatible with surrounding development. The Economic Development Element of Draft Elk Grove General Plan encourages businesses to install necessary infrastructure improvements. Since there are natural gas and other utility lines adjacent to the project's proposed gas line, staff believes the gas line is compatible with the General and Specific plans.

Sacramento and Yolo County and City of Elk Grove Zoning Codes

Sacramento County grants use permits to allow public utilities to be built in the AG-80 zone. The zoning rationale is that agricultural activities can co-exist with utility facilities, and utilities provide a public good (e.g., electricity) for both rural and urban users. The CPP, as a public utility project, is exempt from Sacramento County's permitting process. Furthermore, the Energy Commission's permit process functions in lieu of local permitting processes, although Energy Commission staff generally incorporate applicable local conditions in its permit. The applicable AG-80 zoning development standards within Sacramento County Zoning Code are found in Sections 320-1 to 320-8, and 301-21 and pertain to setback, landscaping, fencing, and height. Sacramento County and the Energy Commission have reviewed the proposed plans to determine if the project generally complies with these sections although it is not mandatory. In addition, the CPP site's Public/Quasi-Public designation allows for other uses such as utilities.

The Sacramento County Zoning Code applies to Sacramento County and the City of Elk Grove. Section 301-17 entitled Underground Utilities requires that all utilities should be placed underground. The CPP pipeline is consistent with this code section. The City of Elk Grove has requested that the project owner coordinate with City of Elk Grove and the Sacramento County departments of water resources with respect to the installation and/or upgrade of water and sewer lines that are planned to cross the railroad right-of way (City of Elk Grove 2002c). The construction of these lines may overlap with the construction of the gas, sewer and water lines (County of Sacramento 2002c). Condition of Certification **LAND-2** would ensure that this coordination takes place. The applicant has stated that it will work with the City of Elk Grove and the County to avoid construction conflicts.

Section 8-2.612 of the Yolo County Zoning Code contains a permitted use for land zoned AG1, which applies to the natural gas compressor station site north of the City of Winters. Compatible uses include distribution substations, public utility service yards, and related facilities.

Staff believes the CPP is consistent with the Sacramento and Yolo County zoning codes because the CPP facilities, as public utility uses, are permitted in these zones.

COMPATIBILITY WITH EXISTING AND PLANNED LAND USES

Power Plant

Construction laydown and parking areas for the power plant would be located within the 30-acre project site and a 20-acre area located south of Clay East Road (see **Project Description Figure 8**). The 20-acre laydown area would temporarily displace some grazing land, however SMUD proposes to restore the 20-acre area after construction is complete. The temporary impact of removing grazing land is not considered a significant impact. In addition, the permanent loss of 30 acres of grazing land for the project is a minor impact given the large amount of agricultural land in the area.

The CPP would not disrupt or divide the established community of rural residences. The project is compatible with the surrounding agricultural uses such as grazing, and vineyards to the west and north. It is merely an expansion of the long established energy facility use in the area. It is compatible with recreational uses (e.g., swimming, fishing, boating, and wind surfing) at the Rancho Seco Park as it would not disrupt or preclude any activities. Therefore, the power plant would not disrupt or divide the physical arrangement of an established community.

Temporary construction impacts, such as increased dust, noise, and traffic may affect nearby land uses. Operational impacts would include a minor increase in traffic and air emissions (please see the **Noise and Vibration**, **Traffic and Transportation** and **Air Quality** sections of the FSA).

As noted earlier, the 30-acre power plant site is currently grazed for weed control purposes. The area within a one-mile radius of the site is similar to the proposed site except for vineyards 0.25 miles to the west and north, and the Rancho Seco Nuclear Power Plant 0.25 mile to the north. The open area around the proposed plant would provide a buffer between the project site and adjoining properties. The proposed project is compatible and consistent with the Land Use, Public Facilities, and Agricultural Elements of the Sacramento County General plan. The CPP is consistent with Land Use Policy LU-70 which encourages electric and other service providers to develop and implement service planning strategies which include plans for new generation facilities. Given the proximity of Rancho Seco and associated linear facilities, the CPP is consistent with PF-70 of the Public Facilities Element that encourages energy production and distribution facilities to be located and designated in a manner that is compatible with surrounding land uses and would not impede agricultural operations. As noted earlier, an electric power plant is consistent with the AG-80 land use designation.

The CPP would consist of, among other things, four heat recovery steam generators, the exhaust stacks of which would be 160 feet high. In addition, two water storage tanks would be approximately 42 feet high with a slightly greater than 1,600 square foot base. However, as noted earlier, variances from local zoning codes are not required since the CPP, an energy production project, is exempt from local zoning codes pursuant to Government Code Section 53091.

Gas Pipeline

The proposed 26-mile long natural gas pipeline would connect with the end of SMUD's gas line at the Carson Ice-Cogeneration power facility in Elk Grove and would proceed south and east to the CPP. The majority of the route would be constructed adjacent to and within an existing railroad and transmission rights-of-way, and roadways (Franklin Road, Core Road, Arno Road, Valensin Road, Laguna Road, Twin Cities Road, and Clay East Road). The pipeline would also be placed beneath the Cosumnes River within the Cosumnes River Nature Preserve and other sensitive habitats. The **Biological Resources** section of the FSA discusses potential impacts on biological resources (e.g., Cosumnes River and the Cosumnes River Nature Preserve) and related mitigation. Since the majority of the pipeline would be underground and placed within or adjacent to existing easements, the proposed gas pipeline would not preclude or unduly restrict existing or future surrounding land uses. Please refer to the **Traffic and Transportation** section for a discussion of temporary impacts to local roadways during construction.

There are numerous pending or approved projects along or near Franklin Boulevard. Some of the projects are displayed on **Land Use Figures 1A - 1E**. Three of these are located adjacent to the northern portion of the proposed gas line (see **Land Use Figure 1E**). These include two residential developments, and a RV and boat storage facility. The other six projects are a considerable distance away from the proposed natural gas line. Staff believes that these projects would not be adversely impacted by the construction and operation of the gas pipeline, which would have a short-term construction period, and would be buried underground.

Interconnection and Valve Stations

The three proposed valve stations (to be enclosed within an approximate 50-foot x 50-foot enclosure) and one interconnection station (to be enclosed within a 100-foot x 100-foot enclosure) would be located in rural areas along the proposed natural gas pipeline alignment (see **Project Description Figure 4**). Staff believes that they are compatible with the existing and planned land uses as discussed in the above Gas Pipeline section.

Natural Gas Compressor Stations

The second phase of the CPP project would require the installation of two gas compressor stations. One station would be located in Yolo County, approximately 5 miles north of the City of Winters (see **Project Description Figure 6).** The Yolo County Zoning Code requires a conditional Use Permit, franchise Agreement, and encroachment Permit for any requested change in electrical distribution and transmission substations, communication equipment buildings, and public utility service yards. However, since the compressor would be installed on SMUD's property and outside of the Yolo County road right-of-way, where the natural gas pipelines from PG&E and SMUD are linked, Yolo County Planning staff believe that no agreement or encroachment permit is required (County of Yolo 2002c). Staff concurs with this determination.

The second gas compressor would be located within SMUD's existing natural gas Valve Station #190 enclosed facility, north of the Carson Ice-Cogeneration facility in Elk Grove, that is surrounded by the Sacramento Regional Wastewater Treatment facility

buffer land. Because this compressor station would expand the existing fenced Station #190 station and there are no planned uses in the vicinity, staff believes this compressor station is a compatible use.

Electrical Transmission Line

The proposed 0.4 mile interconnection route between the power plant switchyard and the existing Rancho Seco 230 kV transmission line crosses SMUD-owned, undeveloped property. The SMUD-owned property is planned for energy production uses and is therefore consistent with the planned use of the area.

Water Supply Pipeline

Construction of the 0.4-mile water supply pipeline would be located on SMUD-owned property in the open area between Rancho Seco and the CPP (see **Project Description Figure 8**). The water supply pipeline is consistent with the power production designated use of the land.

Construction Access Road

SMUD proposes to construct an access road heading south off of the road to the Rancho Seco Reservoir, which is the eastern boundary of the project site within SMUD's 2,480-acre property (see **Project Description Figure 8**). The access road follows an existing dirt road which currently functions as a fire break. It would not disrupt or divide the physical arrangement of the local area.

Agricultural Impacts

Development of the CPP would preclude future use of the site for agriculture. The lack of irrigation, the relatively small amount of acreage, and the absence of cultivation leads staff to conclude that the conversion from grazing land to industrial use is not a significant impact.

CUMULATIVE IMPACTS

The proposed project would add to the industrial character of the existing Rancho Seco power plant site. The CPP would contribute to the cumulative loss of agricultural land in Sacramento County but the impact is considered less than significant. The project would be a small component of the overall development of the local area, and would not contribute to the loss of irrigated and cultivated agricultural land. The CPP plant site will not affect other proposed projects in the local area. The CPP, in conjunction with other permitted, pending, or recorded projects, would not create a significant adverse impact. Staff believes that there would be no significant cumulative impacts from the construction and operation of the CPP.

ENVIRONMENTAL JUSTICE

Staff has reviewed Census 2000 information that shows the minority population within a six-mile radius of the proposed CPP is less than 50 percent. However, there are multiple census blocks with greater than 50 percent minority persons within the six-mile

radius; staff considers these to be pockets or clusters. Staff also reviewed Census 200 information shows the low-income population is less than 50 percent within the same radius. Staff has not identified unmitigated significant direct or cumulative land use impacts resulting from the construction or operation of the CPP, and therefore there are no land use environmental justice issues related to this project.

FACILITY CLOSURE

At some point in the future, the project would cease operation and close down. At that time, it would be necessary to ensure that closure occurs in such a way that public health and safety and the environment are protected from adverse impacts.

The information provided in the AFC did not specifically address the effects of project closure on land use issues and concerns. The planned lifetime of the project is 30 years. Compliance staff would require that the project owner prepare a Facility Closure Plan for Energy Commission review and approval at least twelve months prior to the initiation of decommissioning. At the time of closure, all applicable LORS would be identified and the closure plan would discuss conformance of decommissioning activities with these LORS.

There are at least two other circumstances under which a facility closure can occur, unexpected temporary closure and unexpected permanent closure. Staff has not identified any LORS from a land use perspective that the applicant would have to comply with in the event of an unexpected temporary closure or an unexpected permanent closure of the project.

MITIGATION

Staff generally propose conditions of certification that would ensure that power plant projects and related facilities comply with minimum design and performance standards for items such as setbacks, signs, and parking spaces, which are set forth in the local zoning ordinances. As noted earlier in the LORS section, the CPP, pursuant to Cal. Gov. Code Section 53091, is exempt from city and county zoning codes and building permit requirements. However, the project owner has stated its willingness to submit a variety of plans (e.g., grading and erosion permit, erosion and sediment control plan) and relevant information to the Sacramento County Planning Department, the Sacramento County Department of Water Resources, the City of Elk Grove, and the Yolo County Planning Department (SMUD 2001a, pg. 8.4-3).

RESPONSES TO PUBLIC AND AGENCY COMMENTS

CITY OF ELK GROVE

ELK-6 In a letter dated September 27, 2002, the Community Development Department for the City of Elk Grove noted that the Verification for Condition of Certification **LAND-1** should include the City of Elk Grove's Zoning Ordinance.

Response: SMUD has indicated it intends to review both the Elk Grove and Sacramento County zoning ordinances to ensure that the relevant sections are identified. In addition, SMUD sent a letter to the City of Elk Grove dated January, 31, 2003 outlining in significant detail how the utility intends to work with Elk Grove before and during the gas pipeline construction (SMUD 2003e).

YOLO COUNTY PLANNING AND PUBLIC WORKS DEPARTMENT

YOLO-1 This correspondence shall serve to supersede the previous correspondence regarding the compressor station siting relative to the County's right-of-way.

Response: Comment noted.

YOLO-2 through YOLO-5 The Yolo County Public Works Department sent a letter dated November 7, 2002 requesting that the CPP gas compressor station that the would be built in Phase 2 of the CPP, comply with applicable county setback requirements. In addition, there are suggestions for the project area in terms of site layout, maintenance, and notification of potentially affected property owners.

Response: SMUD has expressed its willingness to work with the local jurisdictions to help maintain consistency with county processes and record keeping.

YOLO-6 The applicant shall acquire local approvals from the Winters Fire District, Yolo/Solano Air Quality Management District; and Yolo County Environmental Health, Hazardous Materials Division.

YOLO-7 The applicant shall obtain all other applicable and required state and federal permits and approvals prior to construction.

Response to YOLO-6 and YOLO-7: The CPP, as a public utility project, is exempt from local permitting processes. Additionally, the Energy Commission's permit process functions in lieu of local permitting processes. However, Energy Commission staff encourages review and comment of the project by federal, state, and local agencies. When appropriate, staff incorporates applicable local agency comments into staff's proposed conditions of certification.

Phase 2, and hence the compressor station in Yolo County, is not being licensed during this proceeding. Although to the extent sufficient information is available, staff analyzed the impacts of both phases of the project in this FSA. If and when SMUD decides to seek permitting of Phase 2, staff would perform additional analysis. Agency comments received during the Phase 2 proceeding would be considered and incorporated in staff's analysis, as appropriate.

CONCLUSIONS AND RECOMMENDATION

The project would comply with all applicable land use laws, ordinances, regulations and standards. The CPP would be compatible with existing and planned land uses because the project: 1) is compatible with the general plan designations and zoning for the three affected jurisdictions (i.e., Sacramento County, Yolo County, and City of Elk

Grove); 2) would not physically divide or disrupt an established community; 3) would not substantially preclude or restrict existing land uses; 4) would not preclude or restrict any planned land uses; and 5) with mitigation, would not cause any significant dust, noise, traffic, or visual impacts. See the **Noise and Vibration**, **Traffic and Transportation**, **Visual Resources**, and **Visible Plume** sections of the FSA for more information regarding these subject areas. The CPP would not contribute substantially to any cumulative land use impacts.

From a land use perspective, staff recommends that the Energy Commission grant the permit to construct and operate the CPP. No conditions of certification are proposed at this time. However, as noted earlier, SMUD has indicated that its willingness to work with all applicable jurisdictions to ensure that the CPP complies with the applicable local conditions.

REFERENCES

CEC (California Energy Commission) 2001a. Letter from Kristy Chew, CEC, to Colin Taylor, SMUD, regarding Data Requests #1-165. Docketed on December 10, 2001.

City of Elk Grove 2000. East Franklin Specific Plan. Adopted by the Sacramento Board of supervisors on April 28, 2000.

City of Elk Grove 2002a. Letter from Craig Hoffman, Planner for the City of Elk Grove, to James Adams California Energy Commission, dated February 12, 2002.

City of Elk Grove 2002b. Letter from Patrick Angell, Planner, City of Elk Grove, to Paul Richins, Jr., California Energy Commission, dated May 6, 2002.

City of Elk Grove 2002c. Letter from Christine M. Crawford, Planning Director, City of Elk Grove, to Kristy Chew, dated September 27, 2002.

City of Elk Grove 2003. The City of Elk Grove General Plan, Public Hearing Draft. January 20, 2003.

County of Sacramento 1993. County of Sacramento General Plan. Land Use Diagram, Land Use, Agricultural and Public Facilities Elements. Adopted on December 15, 1993. Land Use and Agricultural Elements last revised on May 2, 1997; Public Facilities Element last revised on August 12, 1998.

County of Sacramento 2000. Final Environmental Impact Statement for the East Franklin Specific Plan, Volume 1. Released on February 18, 2000.

County of Sacramento 2001a. E-mail from Robert Burness, Senior Planner, Planning and Community Development Department, to Sandra Fromm (California Energy Commission) on October 11, 2001.

County of Sacramento 2001b. Inter-Department Correspondence from Planning and Community Development Department to Policy Planning Commission, dated November 9, 2001.

County of Sacramento 2002e. Correspondence from Board of Supervisors to Planning and Community Development Department, dated September 30, 2002.

County of Yolo 1983. County of Yolo General Plan. Adopted on July 17, 1983.

County of Yolo 2000. County of Yolo Zoning Ordinance. Amended on August 1, 2000.

County of Yolo 2002. Letter from David Morrison, Assistant Director, Planning and Public Works Department to Jim Adams, dated November 7, 2002.

SMUD (Sacramento Municipal Utility District) 2001a. Application for Certification, Volumes 1 and 2 (01-AFC-19). Submitted to the California Energy Commission on September 13, 2001.

SMUD (Sacramento Municipal Utility District) 2002p. AFC Supplement B. Submitted to the California Energy Commission on April 15, 2002.

SMUD (Sacramento Municipal Utility District) 2002ac. AFC Supplement C – Zero Liquid Discharge Arrangement, Executive Summary. Date July 10, 2002.

SMUD (Sacramento Municipal Utility District) 2002ax. AFC Supplement D – Pipeline Realignment of “Alignment 3A” and Revised Construction Laydown Area. Submitted to the California Energy Commission on November 1, 2002.

SMUD (Sacramento Municipal Utility District) 2003e. Letter from Jim Shetler, Assistant General Manager, to Christine Crawford, Planning Director, City of Elk Grove, regarding gas pipeline. January 31, 2003. Docket date February 5, 2003.

NOISE AND VIBRATION

Testimony of Jim Buntin

INTRODUCTION

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

The purpose of this analysis is to identify and examine the likely noise and vibration impacts from the construction and operation of the Cosumnes Power Plant (CPP), and to recommend procedures to ensure that the resulting noise and vibration impacts would be adequately mitigated, and would comply with applicable laws, ordinances, regulations, and standards (LORS).

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

FEDERAL

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

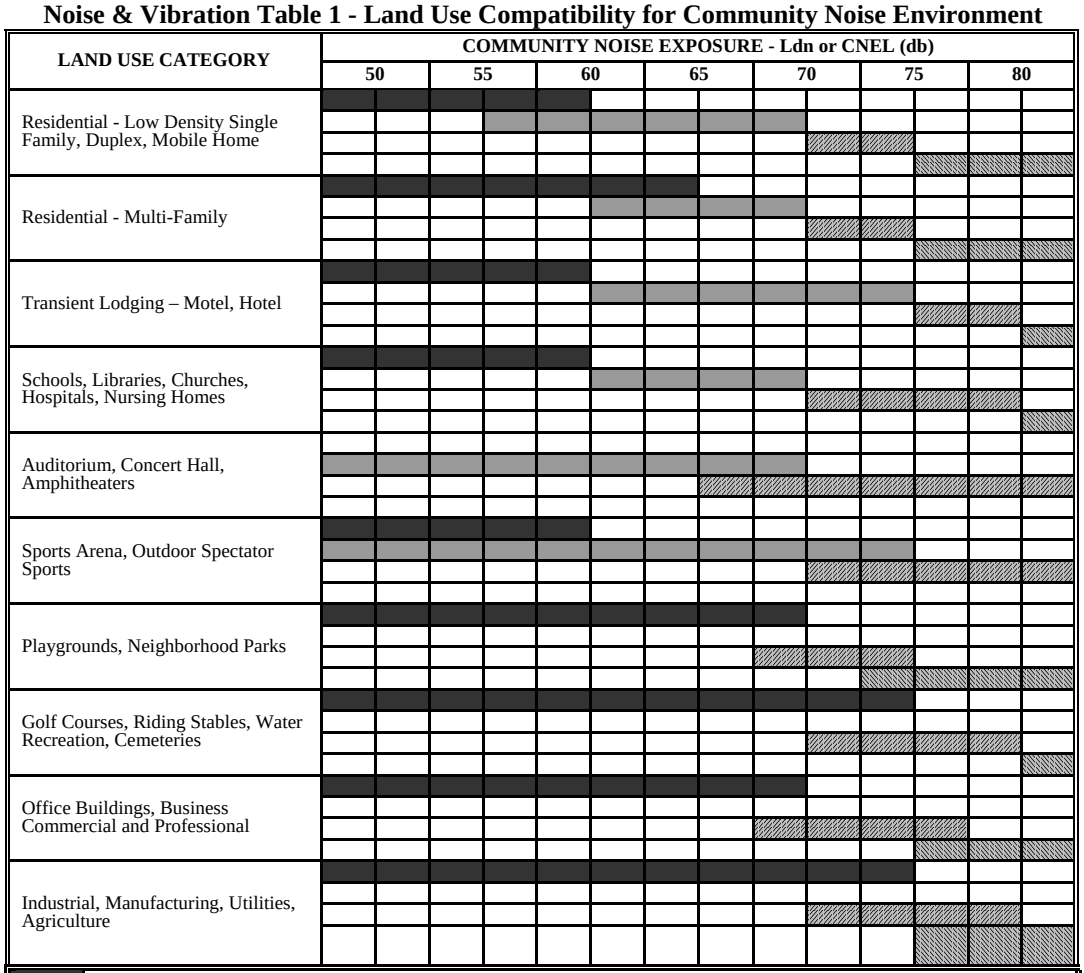
There are no federal laws governing off-site (community) noise.

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

STATE

California Government Code Section 65302(f) encourages each local governmental entity to perform noise studies and implement a noise element as part of its General Plan. In addition, the California Office of Planning and Research has published guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure. The State land use compatibility guidelines are listed in **Noise & Vibration Table 1**. Refer to **Noise Appendix A** for definitions of the terms used in this table and subsequent sections.

Noise & Vibration Table 1 - Land Use Compatibility for Community Noise Environment



	Normally Acceptable	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
	Conditionally Acceptable	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design.
	Normally Unacceptable	New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirement must be made and needed noise insulation features included in the design.
	Clearly Unacceptable	New construction or development generally should not be undertaken.

Source: State of California General Plan Guidelines, Office of Planning and Research, June 1990.

The State of California, Office of Noise Control, prepared a Model Community Noise Control Ordinance, which provides guidance for acceptable noise levels in the absence of local noise standards. The Model also contains a definition of a simple tone, or "pure tone," in terms of one-third octave band sound pressure levels that can be used to determine whether a noise source contains annoying tonal components. The Model Community Noise Control Ordinance further recommends that, when a pure tone is present, the applicable noise standard should be lowered (made more stringent) by 5 dBA.

Other State LORS include the California Occupational Safety and Health Administration (Cal-OSHA) regulations.

California Environmental Quality Act

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

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

b) exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;

c) a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or

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

The Energy Commission staff, in applying Item c) above to the analysis of this and other projects, has concluded that a potential for a significant noise impact exists where the noise of the project plus the background exceeds the background by 5 dBA L_{90} or more at the nearest noise sensitive receptor.

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

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

1. the resulting noise level[1];

[1] For example, a noise level of 40 dBA would be considered quiet in many locations. A noise limit of 40 dBA would be consistent with the recommendations of the California Model Community Noise Control Ordinance for rural environments, and with the data supporting the noise guidelines of the World Health Organization. If the project would create an increase in ambient noise no greater than 10 dBA at nearby sensitive receptors, and the resulting noise level would be 40 dBA or less, the project noise level would likely be insignificant.

2. the duration and frequency of the noise;
3. the number of people affected; and
4. the land use designation of the affected receptor sites.

Staff usually considers noise due to construction activities to be insignificant if:

1. The construction activity is temporary,
2. Use of heavy equipment and noisy activities is limited to daytime hours, and
3. All feasible noise abatement measures are implemented for noise-producing equipment.

Cal-OSHA

Cal-OSHA has promulgated Occupational Noise Exposure Regulations (Cal. Code Regs., tit. 8, §§ 5095-5099) that set employee noise exposure limits. These standards are equivalent to the federal OSHA standards (see **Noise Appendix A, Table A4**).

LOCAL

Sacramento County General Plan Noise Element

The Noise Element of the Sacramento County General Plan contains provisions and policies that are intended to minimize noise impacts to the community. The noise level standards for new projects, including non-transportation noise sources, affecting residential land uses are shown by **Noise & Vibration Table 2**.

Noise & Vibration Table 2 – Sacramento County Noise Element Standards

Noise Level Descriptor	Daytime Standard, dBA (7 a.m. to 10 p.m.)	Nighttime Standard, dBA (10 p.m. to 7 a.m.)
Median Level (L50)	50	45
Maximum Level	70	65
Source: County of Sacramento, 1993		

Each of the above standards is reduced by 5 dBA when applied to simple tone noise, noise consisting primarily of music or speech, or recurring impulsive noise. These standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).

Sacramento County Code

Sacramento County has adopted specific noise performance standards for existing stationary sources in Chapter 6.68 of the Sacramento County Code. These standards are five decibels higher than the Noise Element standards shown by **Noise & Vibration Table 2**.

Construction noise is exempt from the above noise standards between the hours of 6:00 a.m. to 8:00 p.m. on weekdays, from 7:00 a.m. to 8:00 p.m. on Saturdays, and from 8:00 a.m. to 8:00 p.m. on Sundays.

City of Elk Grove General Plan Noise Element

The City of Elk Grove has adopted the Noise Element of the Sacramento General Plan; the noise standards are shown by **Noise & Vibration Table 2**.

Yolo County General Plan Noise Element

The Noise Element of the Yolo County General Plan contains provisions and policies that are intended to minimize noise impacts to the community. The Noise Element indicates that a noise level of 60 dB DNL or CNEL, or less, is “Clearly Acceptable” for residential land uses. This is equivalent to a steady-state noise level of 54 dBA or less.

The applicant noted that Yolo County, in recent land use decisions, has adopted the following additional policies:

- New development of commercial, industrial or other noise-generating land uses shall not be permitted if resulting noise levels shall exceed 60 dBA in areas where residential or other noise sensitive land uses exist or are planned.
- New development shall mitigate outdoor and indoor noise levels for existing residences that would be exposed to an increase of 5 dBA or more, and would be exposed to a DNL in excess of 60 dB.
- Noise sensitive land uses shall not be allowed where the noise due to non-transportation noise sources will exceed an hourly Leq of 55 dB between 7:00 a.m. and 10:00 p.m., and 50 dB between 10:00 p.m. and 7:00 a.m. These noise levels shall be lowered by 5 dB for simple tone noises or for noises consisting primarily of speech or music.

SETTING

PROJECT BACKGROUND

The CPP project involves the construction and operation of a nominal 1,000-megawatt (MW) combined cycle power plant, which is proposed to be located on a portion of a 2,480-acre area owned by SMUD, south of the Rancho Seco nuclear power plant site in Sacramento County. The project is comprised of two power blocks (Phase 1 and Phase 2), each consisting of two natural gas combustion turbines with heat recovery steam generators, and a condensing steam turbine. Mechanical draft cooling towers would be employed. The CPP would be connected to the existing SMUD transmission system. The CPP would include construction of a natural gas supply line, which would require installation (in Phase 2) of two gas compressor stations, one near Winters in Yolo County, and one in Elk Grove near existing Valve Station 190. Valve stations would also be installed.

The equipment that has the greatest potential to generate significant noise levels includes the gas and steam turbines, steam generators, the auxiliary boiler, pumps, motors, main transformers, the mechanical draft evaporative cooling towers, and the gas compressors.

Power Plant Site

This site is located within Sacramento County. Land uses in the project vicinity include agricultural, industrial, and residential uses.

The CPP would be constructed on currently vacant land south of the existing Rancho Seco nuclear power plant site. The nearest noise sensitive uses are a mobile home on

Clay East Road, about 800 feet from the site boundary, and homes located on Kirkwood Street, about 5,100 feet away.

Linear Facilities

The CPP would connect with the SMUD electrical transmission system via the existing Rancho Seco switchyard.

The project would include construction of a 26-mile natural gas pipeline, in addition to two gas compressors and three valve stations. These facilities would be located primarily on agricultural lands, and are in close proximity to some houses.

EXISTING NOISE LEVELS

In order to predict the likely noise effects of the project on adjacent sensitive receptors, the applicant commissioned ambient noise surveys of the area. The surveys were conducted during May 2001, April 2002, and June 19-20, 2002. The noise surveys were conducted using Bruel & Kjaer and Larson Davis sound level meters meeting the requirements of the American National Standards Institute (ANSI) for Type 1 sound level measurement systems. The measurements were performed at heights of approximately five feet above ground level to simulate the average height of the human ear (SMUD 2001a, § 8.5.3.1, SMUD 2002p §§ 2.5.1.2.1 and 2.5.2.2.1, SMUD 2002y). The applicant's noise survey monitored existing noise levels at the following five off-site monitoring locations, which are shown by **Noise & Vibration Figures 1 – 4:**

1. Southern site boundary (M1).
2. Yolo County, near Winters compressor station (M2).
3. North side of Dwight Road, about 8,500 feet south of the Valve #190 (Elk Grove) compressor station (M3).
4. Residential area at Sea Forrest Way and McNamara Way about 1,200 feet from the Valve #190 (Elk Grove) compressor station (M4).
5. The residence at 11615 Kirkwood Street (R2 and M5), about 5,000 feet from the project boundary.

Noise & Vibration Table 3 summarizes the ambient noise measurement results (SMUD 2001a, § 8.5.2.2, and Appendix 8.5A, SMUD 2002p §§ 2.5.1.2.1 and 2.5.2.2.1, SMUD 2002y). The data for sites M1, M2, M3, and M5 are presented for the quietest contiguous 4-hour periods. At Site M4, the data represent the results of a series of 10-minute samples in the time period of 3 a.m. to 4 a.m. on two separate nights.

Noise & Vibration Table 3 - Summary of Measured Noise Levels

Measurement Sites	Measured Noise Levels, dBA		
	Quietest Contiguous Nighttime Hours		CNEL
	L_{eq}	L_{90}	
M1	37 - 47	28 - 35	55.6*
M2	32	31	54.3*
M3	42 - 64	41	66.5*
M4	33 - 43	30 - 32	55 - 60*
M5 (R2)	40 - 49	29 - 33	55 – 60*
* Energy Commission staff calculation or estimate			

In general, the environment in the immediate vicinity of the project site can be described as relatively quiet, especially at night. One caretaker's mobile home (R1) is close to the project site and to monitoring site M1, while several single family residences are located on Kirkwood Street (near M5/R2), over 5,000 feet away.

In the vicinity of the proposed Winters gas compressor, the environment may be considered very quiet. There are three houses within about 1,600 feet of the proposed compressor station. Another residence, formerly the Union House School building, is located about 1,700 feet away.

In the vicinity of the proposed Valve Station #190 gas compressor (Elk Grove), the environment is relatively noisy near the roadways and railroad tracks, and relatively quiet in the residential area removed from traffic noise sources. The nearest homes are 800 to 900 feet north of the proposed gas compressor site.

IMPACTS

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

PROJECT SPECIFIC IMPACTS — CONSTRUCTION

Community Effects

General Construction Noise

Construction noise is usually considered a temporary phenomenon. In this case, the construction period for the CPP would occur in two phases of 24-month and 18-month durations, respectively. Sensitive receptors near the plant site and near the gas compressors could be affected by noise from these activities. Construction of an industrial facility such as a power plant is typically noisier than permissible under usual noise ordinances. In order to allow the construction of new facilities, construction noise during certain hours is commonly exempt from enforcement by local ordinances. Sacramento County regulates the permissible hours of construction, but does not have any specific noise limits during those hours.

The applicant has prepared an analysis of construction noise impacts, listing predicted noise levels due to specific types of equipment and of generalized construction activities. The construction noise analysis results are summarized for the most-affected residential receptor locations during the busiest periods of construction in **Noise & Vibration Table 4**. It is assumed that the noise levels experienced at more distant receivers would be lower than those shown by **Noise & Vibration Table 4**.

The worst-case noise exposures would occur if several pieces of equipment were in use at a given time, in close proximity to one another. The predicted construction sound levels would result in cumulative noise levels within the range of the ambient daytime noise level conditions at locations R2 and M4, and would not significantly affect ambient noise levels. The construction noise levels would exceed ambient noise levels at R1 and M2. These increases would be perceptible in any case because of the differences

in frequency content as compared to ambient noise sources. The changes in ambient noise levels would be of a temporary nature. The unmitigated increases in ambient noise levels due to construction are potentially significant. However, because construction would be restricted to daytime hours by Condition of Certification **NOISE-8**, the noise effect of construction is considered to be less than significant.

The noise levels shown in **Noise & Vibration Table 4** include the contribution of pile driving; the applicant has indicated that pile driving may be required. If pile driving were needed, noise levels could be approximately 80 dBA at the nearest receptor. This level would exceed the range of ambient noise levels in most cases, and is potentially significant. However, pile driving typically occurs over a relatively short period (a few days), and is of a temporary nature. Because construction would be restricted to daytime hours by Condition of Certification **NOISE-8**, the noise effect of pile driving, if it occurs, is expected to be less than significant.

Given the minimum distance of 800 feet from potential pile driving to the nearest residence, it is not likely that vibration from pile driving would be significant. However, staff has recommended Condition of Certification **NOISE-9** to ensure that pile driving vibration would not exceed the FTA-recommended construction vibration guidelines.

Based upon the potential noise impacts of construction, the Energy Commission staff recommends the inclusion of three Conditions of Certification (**NOISE-1**, **NOISE-2**, and **NOISE-8**) to monitor and mitigate potential construction noise impacts.

Noise & Vibration Table 4 - Construction Noise Level Predictions

Construction Equipment/Phase	Predicted Average Noise Level, dBA			
	R1 Mobile home near Site Boundary 800 feet away	R2 Residence near Site Boundary 5,100 feet away	M2 Nearest home to Winters Gas Compressor 800 feet away	M4 Nearest home to Valve #190 Gas Compressor 1,200 feet away
Pile drivers	80	64	N/A	N/A
Bulldozer	64	48	64	54
Front-end Loader	64	48	64	54
Trucks	62	46	62	52
Grader	61	45	61	51
Shovels	60	44	60	50
Generators	60	44	60	50
Derrick Crane	59	43	59	49
Mobile Crane	59	43	59	49
Concrete Pumps	57	41	57	47
Tractor	56	40	56	46
Paving Breaker	56	40	56	46
Paving Breaker – Quieted	49	33	49	39
Multiple sources-worst case*	68	52	68	58
Source: SMUD 2001a, Table 8.5-8. * Energy Commission staff estimates				

Because construction activity would be limited by the proposed Condition of Certification **NOISE-8**, and would be of limited duration, potential construction noise impacts to receptors in the CPP project area are considered to be less than significant.

Pile Driving Vibration

Conventional pile driving produces potentially significant ground-borne vibration at nearby receivers. In this case, the nearest potentially affected receptor (R1) is about 800 feet from the construction site, and vibration from pile driving would be potentially significant. The applicant considers pile driving an option, pending final engineering design (SMUD 2002am, p. 21). In the event that pile driving is necessary, staff proposes Condition of Certification **NOISE-9**, which requires compliance with the vibration level criteria described by the Federal Transit Administration guidelines listed at the beginning of this section. It appears to staff that pile driving vibration could be feasibly controlled to satisfy these criteria, although it may be necessary to implement alternative pile driving or drilling methods.

Steam Blows

Typically, the steam blows during construction and start-up create the loudest noise encountered during the construction phase. Steam blows are necessary after erection

and assembly of the feedwater and steam systems because the piping and tubing that comprises the steam path accumulate dirt, rust, scale, and construction debris such as weld spatter, dropped welding rods, and the like. If the plant were to start up without thoroughly cleaning out the piping and tubing, all this debris would find its way into the steam turbine, quickly destroying the machine.

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

In recent years, a new, quieter steam blow process, variously referred to as QuietBlow™ or Silentsteam™, has become popular. This method utilizes lower pressure steam over a continuous period of 36 hours or so. Resulting noise levels reach only about 80 dBA at 100 feet; noise levels at nearby receptors are typically similar to the daytime ambient background noise level, and thus barely noticeable. Even more recently, compressed air has been substituted for steam in the continuous blow process; resulting noise levels are similar.

According to the applicant, un-silenced high pressure steam blow noise levels could be as high as 105 dBA at the nearest receiver (R1). With an appropriate silencer, such as a Fluid Kinetics Model TBS 16-AC, or similar, the noise levels could be reduced by 40 to 45 dBA, or to a level ranging from 60 to 65 dBA at the nearest residence (SMUD 2001a, § 8.5.4.2.2). The resulting noise levels would be in the range of conversation sound levels, during daytime hours. The steam blow noise levels could therefore interfere with speech outdoors.

The applicant has proposed to mitigate the noise generated from construction steam blows by use of a silencer similar to that described above. Energy Commission staff proposes that any high pressure steam blows be muffled with an appropriate silencer, and that they be performed only during daytime hours to minimize annoyance to residents (see proposed Condition of Certification **NOISE-4** below).

Energy Commission staff further proposes a notification process to make neighbors aware of scheduled steam blows (see proposed Condition of Certification **NOISE-5** below).

Linear Facilities

A new natural gas line would be installed from the existing SMUD pipeline near the cogeneration facility in Elk Grove, to the project site.

Trenching for the proposed pipeline would involve use of diesel-powered equipment. Noise produced by this equipment could be annoying to nearby residents. To ensure

that trench construction noise would not be significant, staff has recommended Condition of Certification **NOISE-8**.

The applicant has indicated that horizontal drilling would be required for the natural gas line in at least four locations, and that this activity would occur continuously (24 hours per day) over a period of less than one week at each location. The noise source associated with this activity would be the engine driving the drill rig. This noise source is potentially significant. The drill rig could be located about 900 feet from the nearest residence, near the Laguna South Canal. If the drill rig were fitted with adequate mufflers, and if the receptors were shielded from the noise of the drill rig, it is not expected that the noise due to horizontal drilling would be significant. For example, assuming a standard adequately muffled engine-powered drill rig, the maximum predicted noise level at 900 feet would be about 61 dBA. Shielding could reduce the noise level to less than 56 dBA. However, to ensure that horizontal drilling would not result in significant noise effects, the Energy Commission staff recommends the specific requirements of Condition of Certification **NOISE-8**.

Construction of the gas compressor stations is expected to involve site grading and preparation, and installation of the compressor units and enclosures. Equipment used for the construction would be typical of other light construction projects. No unusual noise producing equipment (such as pile drivers) would be required. To ensure that compressor station construction noise would not be significant, staff has recommended Condition of Certification **NOISE-8**.

Worker Effects

The applicant has acknowledged the need to protect construction workers from noise hazards, and has recognized those applicable LORS that would protect construction workers (SMUD 2001a, § 8.5.4.2.1). To ensure that construction workers are, in fact, adequately protected, Energy Commission staff proposes Condition of Certification **NOISE-3**.

PROJECT SPECIFIC IMPACTS — OPERATION

Community Effects

The applicant has incorporated noise reduction measures into the design of the project. The applicant intends to achieve noise level standards that would prevent a significant noise impact as defined by staff; the allowable noise levels under LORS could be substantially higher than existing background noise levels.

Power Plant Operation

During its operating life, the CPP represents essentially a steady, continuous noise source day and night. Occasional brief increases in noise levels would 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 would decrease.

The primary noise sources anticipated from the 1,000 MW facility include the combustion turbines, steam turbine generators, relief valves, circulating water pumps,

cooling towers, and the brine concentrator compressor. The noise emitted by power plants during normal operations is generally broadband, steady state in nature. The resulting hourly average noise levels are typically dominated by the steady-state noise sources.

The applicant performed acoustical calculations to determine the facility noise emissions, and to develop noise mitigation measures. The calculations were based on typical manufacturer noise data for the major equipment planned for the facility (SMUD 2001a, § 8.8.3.4). The modeling assumed that the units for both phases would be operated at full load. This is generally conservative for sources such as turbines and fans, as actual power generation requirements (and consequent noise levels) would vary with the time of day and electrical demands. Noise levels generated during system start-up and shutdown may be elevated compared to steady-state operations, as steam relief valves may be employed for short periods under those conditions. It is currently estimated that 40 to 60 start-ups could occur in a typical year.

Specific noise mitigation measures evaluated by the applicant included:

- Enclosing combustion turbines to meet 85 dBA at 3 feet
- Installing silencers on relief valve stacks
- Installing Totally Enclosed Water/Air Cooled motors on circulating water pumps
- Designing major components to limit noise to less than 90 dBA at 3 feet
- Locating the power block in central portion of site
- Locating the cooling towers on east side of site

The applicant stated that the initial baseline noise levels used for the analysis are representative of the normal in-situ performance of standard equipment. That is, the equipment was not upgraded or specially improved to reduce noise (SMUD 2001a, § 8.5.4.3.3).

The project has been re-designed since the AFC was submitted, which changed the orientation of some equipment on the plant site. The applicant stated that the revised footprint would not substantially change the projected noise contours, and that the noise levels would be slightly quieter with the new configuration (SMUD 2002j). Energy Commission staff reviewed the applicant's analysis, and agreed with the applicant.

The proposed gas compressors would be installed in Phase 2 of the project. The compressors would be electrically-driven, and would be of a reciprocating pump design. The applicant proposes to enclose the compressor units, and to provide other noise attenuation design features as needed to achieve noise limits at the nearest residences of 37 dBA (for the Winters unit) and 40 dBA (for the Elk Grove unit) (SMUD 2002p, §§ 2.5.1.3.3 and 2.5.2.3.3).

Noise & Vibration Table 5 lists the predicted nighttime project noise levels at the nearest sensitive receptors in terms of the background noise level (L_{90}). The predicted project noise level at site R1 is about 62 dB DNL/CNEL. At the other sites listed below, the predicted project noise level is less than 55 dB DNL/CNEL. The predicted noise

levels include the applicant's proposed mitigation measures, listed above. It is assumed that the noise levels experienced at more distant receivers would be lower than those shown by **Noise & Vibration Table 5.**

Based upon the predicted noise levels at the nearest receptors, Energy Commission staff believes that the operation of the power plant, as proposed, would result in substantial increases in background noise levels at the nearest sensitive receptors (R1 and R2). The resulting noise levels at Site R1 would also exceed the 45 dBA nighttime standard of the Sacramento County Noise Element.

At Site M2, which represents the potential exposure for several houses, the gas compressor noise level is predicted to be 38 dBA. This noise level is within the range of existing daytime noise levels, and is not expected to result in speech or activity interference either inside or outside the houses.

The applicant provided a listing of the modeled plant noise levels at receptor R2 (SMUD 2002o). These data showed that the dominant noise sources would be the gas compressor and "Condenser Areas 1 and 2". Other significant sources included the generators and HRSG units. No "additional noise abatement" was listed for any of these sources. It therefore appears that additional noise abatement could be provided to reduce the overall plant noise.

Noise & Vibration Table 5 – Summary of Predicted Operational Noise Levels

Nearest Sensitive Receptor Sites	Nighttime L_{90}, dBA			
	Ambient	Project	Cumulative	Change
R1 – Caretaker's Mobile Home	32*	56	56	+24
R2- 11615 Kirkwood Road	31	42	42	+11
M2 - Winters	31**	37	38	+7
M4 – Elk Grove	32	40	41	+9

Source: SMUD 2001a, 2002p, 2002r.
* - Average of values for the four quietest contiguous hours at M1.
** - Average of values for the four quietest contiguous hours.
Note that plant operation noise affects sites R1 and R2. The only project-related noise sources affecting sites M2 and M4 are in-line gas compressors.

The proposed Condition of Certification **NOISE-6** would require that the noise level produced by the plant operation not exceed 39 dBA L_{eq} at any existing permanent residence. This would ensure that the cumulative nighttime background noise level (L_{90}) at any permanent residential receptor would not increase by more than 9 dBA, and that noise due to the plant operations would not exceed the standards of the Sacramento County Noise Element at any sensitive receptor. The resulting change in ambient noise levels of 9 dBA would be noticeable, but not necessarily annoying in and of itself.

The proposed Condition of Certification **NOISE-6** would also require that the noise level produced by the Elk Grove (Valve 190 Station) gas compressor operation not exceed 39 dBA L_{eq} at any residence, as proposed by the applicant. This would ensure that the cumulative nighttime background noise level (L_{90}) at any residential receptor would not increase by more than 8 dBA, and that noise due to the gas compressor would not exceed the standards of the Elk Grove Noise Element at any sensitive receptor.

In the vicinity of the Winters gas compressor, the proposed Condition of Certification **NOISE-6** would require that the noise level produced by the gas compressor operation not exceed 37 dBA L_{eq} at any residence, as proposed by the applicant. This would ensure that the cumulative nighttime background noise level (L_{90}) at any residential receptor would not increase by more than 7 dBA, and that noise due to the gas compressor would not exceed the standards of the Yolo County Noise Element at any sensitive receptor.

Staff recognizes that, at receiver R1 (the adjacent caretaker's mobile home), power plant noise levels are likely to exceed 39 dBA, which would result in a significant noise impact. SMUD has reached an agreement with the landowner (Mr. Loretz) to relocate the caretaker's mobile home so that the plant noise exposure would be less than 45 dBA (see **Noise and Vibration Figure 5**) (SMUD 2003b). In addition, the applicant and landowner have agreed that the landowner's property within the 45 dBA noise contour will be restricted from residential development. These measures would ensure that the noise exposure at residences on the Loretz property would not exceed that allowed by LORS. However, the resulting background noise level would be approximately 11 dB higher than under existing conditions. However, to mitigate the noise exposure at receiver R1, staff has proposed Condition of Certification **NOISE-10**, which would require that the operator ensure that the mobile home be relocated to a site where the cumulative noise level from plant operations and ambient noise does not exceed 42 dBA, which would ensure that the increase in the background noise would not exceed 10 dBA.

Specifically, implementation of the proposed Conditions of Certification **NOISE-6** and **NOISE-10** would result in the noise levels shown in **Noise & Vibration Table 6**.

Noise & Vibration Table 6 - Conditioned Plant Operational Noise Levels and Resulting Ambient Noise Levels

Site	Noise Level, dBA			
	4-Hour Background Noise Level	Permitted Plant Noise Level	Cumulative	Resulting Increase in Ambient Noise Levels
R1 – Mobile Home (relocated)	32	42	42	+10
R2 – 11615 Kirkwood Street	31	39	40	+9
M1 – Winters	31	37*	38	+7
M2 – Elk Grove	32	39	40	+8

* Proposed by applicant.

Energy Commission staff believes that achieving the noise limits as required by **NOISE-6** would ensure that noise impacts would be less than significant. Staff recognizes that a noise level of 40 dBA or less would be considered quiet, and notes that the proposed noise limit is intended to ensure that the noise from the power plant or gas compressor would not constitute an annoyance to a reasonable person accustomed to the pre-project noise environment. Application of a noise limit of 40 dBA is consistent with the recommendations of the California Model Community Noise Control Ordinance for rural residential environments. Similarly, given the transient nature of the occupancy of the caretaker's mobile home, and the fact that the noise levels there would be in compliance with LORS, staff believes that achieving the noise limits as required by **NOISE-10** would ensure that noise impacts at the caretaker's mobile home would be less than significant.

Other factors that were considered in reaching this conclusion were:

1. No unusual noise frequency characteristics are predicted for the project.
2. A relatively small number of homes (less than ten) and people would likely be potentially affected by power plant and gas compressor noise.
3. In the project site area and the Winters area, the potentially affected residences are adjacent to agricultural lands. In Elk Grove, the potentially affected residential area is adjacent to the Union Pacific main line railroad track and a busy arterial (Franklin Boulevard). In all cases, permitted uses in the adjacent lands would be allowed (under LORS) to produce noise levels exceeding the observed ambient conditions.

Energy Commission staff prefers that power plant noise level reductions be achieved by applying on-site noise abatement measures. To date, the applicant has provided no technical or feasibility data to support a determination that the lower noise levels required by the recommended Conditions of Certification cannot be attained.

Staff believes, on the basis of Energy Commission experience with other power plants, that significant additional noise reduction can be achieved using a variety of measures, such as those listed below:

- low-noise equipment such as pumps and electrical transformers
- quieter gas turbine inlet air mufflers
- noise attenuating vents on turbine generator enclosures
- noise lagging on the HRSG transition ducts
- low noise cooling fans for the cooling tower that incorporate additional fan blades or specially-designed "super low noise" fans combined with noise-reducing motor enclosures
- noise barriers adjacent to either sources or receivers

The applicant has not stated whether such measures have been considered in the plant acoustical design, nor whether they consider them to be feasible. Staff notes that the above design features have been technologically feasible for other power plant installations.

Applicant's Proposed Mitigation

The applicant has offered to provide additional sound attenuation at receptors where post-project noise levels would exceed ambient noise levels by 5 dBA, and where residents complain of disturbance from increased noise due to the project (SMUD 2001a, § 8.5.5). The specific attenuation measures would be case-specific, and could include installation of weather-stripping, acoustically-rated windows and doors, sound insulation in walls and ceilings, attic vent baffles, and provision of mechanical ventilation. These treatments could be expected to reduce interior noise levels by 5 to 10 dBA, but would have no effect on project noise levels outdoors. However, the applicant has provided no indication that the affected receptors are willing to accept the proposed measures.

Tonal and Intermittent Noises

One possible source of annoyance would be strong tonal noises. Tonal noises are individual sounds (such as pure tones) that, while not louder than permissible levels, stand out in sound quality. The applicant has stated that no strong tonal noises would be generated during the operation of the project.

The applicant has stated that steam relief vents would be silenced to mitigate the intermittent noise from pressure relief valves (SMUD 2001a, § 8.5.4.3.3). Although these noise sources are expected to be in compliance with the LORS, their noise effects may be significant in the context of the quiet ambient noise environment. For example, data presented in other AFC documentation indicate that mitigated steam relief valve noise levels would be in the range of 64 to 67 dBA at a distance of 100 feet. At the nearest sensitive receptor (R1), the predicted mitigated noise level would be about 46 to 49 dBA. This range of noise levels would be audible, but would not be expected to result in startle or sleep disturbance (inside the home). At receptor R2, the predicted mitigated noise level would be in the range of 30 to 33 dBA, which would be subjectively very quiet outdoors.

To ensure that no strong tonal noises are present and that intermittent noises are mitigated, Energy Commission staff proposes Condition of Certification (**NOISE-6**, below), which requires the applicant to ensure that there are no pure tones, and to mitigate the noise from steam relief valves.

Linear Facilities

The electrical output of the plant would be connected to the existing SMUD transmission lines, and would have no significant effect on corona discharge hum, which is expected to be audible only within 100 feet of the power lines.

Worker Effects

The applicant recognizes the need to protect plant operating and maintenance personnel from noise hazards, and has committed to comply with applicable LORS (SMUD 2001a, § 8.5.4.2.1). Signs would be posted in areas of the plant with noise levels exceeding 85 dBA (the level that OSHA recognizes as a threat to workers' hearing), and hearing protection would be required. The applicant would implement a comprehensive hearing conservation program. To ensure that construction workers

are, in fact, adequately protected, Energy Commission staff proposes Conditions of Certification **NOISE-3** and **NOISE-7**, below.

CUMULATIVE IMPACTS

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

Pursuant to CEQA, a cumulative impacts analysis can be performed by either 1) summarizing growth projections in an adopted general plan or in a prior certified environmental document, or 2) compiling a list of past, present, and probable future projects producing related or cumulative impacts. The second method has been utilized for the purposes of this Staff Assessment.

The AFC identified no planned projects that could contribute to cumulative noise impacts in the project study area, and staff agrees this is the case.

ENVIRONMENTAL JUSTICE

Staff has reviewed Census 2000 information that shows the minority population is less than 50 percent within a six-mile radius of the proposed Cosumnes Power Plant (please refer to **Socioeconomics Figure 1** in this Staff Assessment). However, as indicated in **Socioeconomics Figure 1**, there are multiple census blocks with greater than 50 percent minority persons within the six-mile radius; staff considers these to be pockets or clusters. Staff also reviewed Census 1990 information that shows the low-income population is less than fifty percent within the same radius. The residences in these pockets or clusters are located farther from the project noise sources than the nearest sensitive receptors identified in the noise analysis, and would be exposed to lower noise levels than described for those receptors.

Based on the noise analysis, staff has identified a potentially significant direct impact resulting from the operation of the project, but with the mitigation proposed in the Conditions of Certification, the impact would be reduced to less than significant. Therefore, there is no potential disparate impact on the minority population, and there are no noise environmental justice issues related to this project.

FACILITY CLOSURE

In the future, upon closure of the CPP, all operational noise from the entire CPP site would cease, and no further adverse noise impacts from operation of the CPP would be possible. The remaining potential temporary noise source is the dismantling of the structures and equipment, and any site restoration work that may be performed. Since this noise would be similar to that caused by the original construction of the CPP, 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 that are in

existence at that time would apply; applicable Conditions of Certification included in the Energy Commission Decision would also apply unless modified.

CONCLUSIONS AND RECOMMENDATIONS

Energy Commission staff concludes that both phases of the CPP, with the recommended mitigation, could be built and operated to comply with all applicable noise laws, ordinances, regulations, and standards. Energy Commission staff further concludes that if the CPP facility were designed as described above, and further mitigated as described below in the proposed Conditions of Certification, it would not be expected to produce significant adverse noise impacts. *The following proposed Conditions of Certification will ensure compliance with all applicable noise LORS, and ensure that the project would not result in a significant increase in ambient noise levels.*

PROPOSED CONDITIONS OF CERTIFICATION

NOISE-1 At least 15 days prior to the start of ground disturbance, the project owner shall notify by mail all residents within one-half mile of the site and the linear facilities 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: Prior to ground disturbance, the project owner shall transmit to the CPM a statement, signed by the project manager, stating that the above notification has been performed, and describing the method of that notification, verifying that the telephone number has been established and posted at the site, and giving that telephone number.

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

- Use the Noise Complaint Resolution Form (below), or 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 the complainant's satisfaction.

Verification: Within 5 business days of receiving a noise complaint, the project owner shall file with the Sacramento County Planning and Community Development Department and the CPM a copy of the Noise Complaint Resolution Form, documenting the resolution of the complaint. If mitigation is required to resolve a complaint, and the complaint is not resolved within a 3-business day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is implemented.

NOISE-3 The project owner shall submit to the CPM for review and approval a noise control program. The noise control program shall be used to reduce employee exposure to high noise levels during construction and also to comply with applicable OSHA and Cal-OSHA standards.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit to the CPM the noise control program. The project owner shall make the program available to Cal-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 65 dBA, measured at any residential receptor.

If a low-pressure continuous steam blow process is proposed, the project owner shall submit a description of this process, with expected noise levels and projected period of execution, to the CPM. The resulting noise level shall not exceed 45 dBA during nighttime hours at any residence. If the low-pressure process is approved by the CPM, the project owner shall implement it in accordance with the requirements of the CPM.

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

At least 15 days prior to any 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 projected time schedule for execution of the process.

NOISE-5 Prior to the first high-pressure steam blow(s), the project owner shall notify all residents or business owners 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. 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: Project owner shall notify residents and businesses at least 15 days prior to the first high-pressure steam blow(s). 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 The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that the noise level produced by operation of the project will not exceed an hourly average noise level of more than the following values, measured at any residence.

For the power plant operation: 39 dBA
For the Winters gas compressor: 37 dBA
For the Valve Station #190 gas compressor: 39 dBA

No new pure tone components may be introduced. No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints. Steam relief valves shall be adequately muffled to preclude noise that draws legitimate complaints.

A. Within 30 days of the Phase 1 project first achieving a sustained output of 80 percent or greater of rated capacity, the project owner shall conduct a 25-hour community noise survey at Site R2. Within 30 days of the Phase 2 project first achieving a sustained output of 80 percent or greater of rated capacity, the project owner shall conduct a 25-hour community noise survey at Sites R2, M2, and M4. The noise surveys shall also include short-term measurement of one-third octave band sound pressure levels at each of the above locations to ensure that no new pure-tone noise components have been introduced.
B. If the results from the noise survey indicate that the noise level due to the plant operations exceeds the noise standard listed above for any given hour during the 25-hour period, mitigation measures shall be implemented to reduce noise to a level of compliance with these limits.
C. If the results from the noise survey indicates that pure tones are present, mitigation measures shall be implemented to eliminate the pure tones.

Verification: Within 30 days after completing the community noise survey, the project owner shall submit a summary report of the survey to the Sacramento County, Yolo County, and City of Elk Grove planning departments, and to the CPM. Included in the post-construction survey 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 Following Phase 1 first achieving a sustained output of 80 percent or greater of rated capacity, and again following Phase 2, the project owner shall conduct an occupational noise survey to identify the noise hazardous areas in the facility.

The survey shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations, sections 5095-5099 (Article 105) and Title 29, Code of Federal Regulations, section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure.

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

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

NOISE-8 Noisy construction or demolition work shall be restricted to the times of day delineated below:

Weekdays	6 a.m. to 8 p.m.
Saturdays	7 a.m. to 8 p.m.
Sundays and holiday	8 a.m. to 8 p.m.

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

Horizontal drill rigs may be operated on a continuous basis, provided that the rigs are fitted with adequate mufflers and engine enclosures, and that the rigs are shielded from view of residences within a one-half mile radius by berms, canal banks or other suitable barriers, such as loaded vinyl curtains or straw bales.

Verification: The project owner shall transmit to the CPM in the first Monthly Construction Report a statement acknowledging that the above restrictions will be observed throughout the construction of the project.

NOISE-9 Vibration due to pile driving for site investigations or project construction shall be limited to a peak particle velocity of 0.2 in/sec at the nearest sensitive receptor.

A. Upon commencement of pile driving, the project owner will conduct continuous vibration monitoring at the nearest residential receptor, and will continue the monitoring until the pile nearest that residence is installed.

B. If vibration measurements indicate at any time that the pile driving vibration at any sensitive receptor has exceeded a peak particle velocity of 0.2 in/sec, the project owner shall notify the CPM immediately, and shall cease pile driving until a mitigation plan is developed and implemented to achieve compliance.

Verification: Within 30 days after completing the vibration measurements, the project owner shall submit a summary report of the measurements to the Sacramento County Planning and Community Development Department and to the CPM. The report shall include a description of any mitigation measures that were required to achieve compliance with this Condition.

NOISE-10 Prior to operation of Phase 1, the operator shall ensure that the dwelling at receiver R1 is relocated to a site where the cumulative hourly average noise level due to plant operations and ambient noise will not exceed 42 dBA.

A. Within 30 days of the Phase 1 project first achieving a sustained output of 80 percent or greater of rated capacity, the project owner shall conduct a 25-hour community noise survey at Receiver R1. Within 30 days of the Phase 2 project first achieving a sustained output of 80 percent or greater of rated capacity, the project owner shall conduct a subsequent 25-hour community noise survey at Site R1. The noise surveys shall include short-term measurement of one-third octave band sound pressure levels at the above location to ensure that no new pure-tone noise components have been introduced.

B. If the results from the noise survey indicate that the noise level due to the plant operations exceeds the noise standard listed above for any given hour during the 25-hour period, mitigation measures shall be implemented to reduce noise to a level of compliance with these limits.

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

Verification: Prior to operation of Phase 1, the project owner shall transmit to the CPM a statement, signed by the project manager, stating that the mobile home has been relocated.

Within 30 days after completing the noise survey, the project owner shall submit a summary report of the survey to the Sacramento County Planning Department and to the CPM. Included in the post-construction survey report will be a description of any additional mitigation measures necessary to achieve compliance with the above listed noise limit, and a schedule, subject to CPM approval, for implementing these measures. 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.

EXHIBIT 1 - NOISE COMPLAINT RESOLUTION FORM

Cosumnes Power Plant Project
(01-AFC-19)

NOISE COMPLAINT LOG NUMBER _____

Complainant's name and address:

Phone number: _____

Date complaint received: _____
Time complaint received: _____

Nature of noise complaint:

Definition of problem after investigation by plant personnel:

Date complainant first contacted: _____

Initial noise levels at 3 feet from noise source _____ dBA Date: _____
Initial noise levels at complainant's property: _____ dBA Date: _____

Final noise levels at 3 feet from noise source: _____ dBA Date: _____
Final noise levels at complainant's property: _____ dBA Date: _____

Description of corrective measures taken:

Complainant's signature: _____ Date: _____

Approximate installed cost of corrective measures: $ _____
Date installation completed: _____
Date first letter sent to complainant: _____ (copy attached)
Date final letter sent to complainant: _____(copy attached)

This information is certified to be correct:

Plant Manager's Signature: _____

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

REFERENCES

County of Sacramento. 1993. Noise Element of the Sacramento County General Plan.

County of Yolo. 1975. Noise Element of the Yolo County General Plan.

County of Sacramento. Chapter 6.68 of the Sacramento County Code.

SMUD (Sacramento Municipal Utility District) 2001a. Application for Certification, Volumes 1 and 2 (01-AFC-19). Submitted to the California Energy Commission on September 13, 2001. Docket date September 13, 2001.

SMUD (Sacramento Municipal Utility District) 2002a. Data Response, Set 1A. January 9, 2002. Docket date January 9, 2002.

SMUD (Sacramento Municipal Utility District) 2002e. Data Response, Set 1C. February 4, 2002. Docket date February 5, 2002.

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SMUD (Sacramento Municipal Utility District) 2002aa. Informal Data Response, Set 2. July 1, 2002. Docket date July 2, 2002.

SMUD (Sacramento Municipal Utility District) 2002am. Preliminary Staff Assessment Comments Set 1. September 6, 2002. Docket date September 6, 2002.

SMUD (Sacramento Municipal Utility District) 2003b. Data Responses, Set 3N. January 8, 2003. Docket date January 9, 2003.

Federal Transit Administration. 1995. *Transit Noise and Vibration Impact Assessment*. DOT-T-95-16. Harris, Miller, Miller and Hanson, Inc. Burlington, Massachusetts.

State of California. 1990. General Plan Guidelines, Office of Planning and Research, June 1990.

State of California. 1977. Model Community Noise Control Ordinance, Office of Noise Control, April 1977.

NOISE APPENDIX A
FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

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

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

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

In order to help the reader understand the concept of noise in decibels (dBA), **Noise Table A2** has been provided to illustrate common noises and their associated sound levels, in dBA.

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

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

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

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

SUBJECTIVE RESPONSE TO NOISE

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

- Subjective effects of annoyance, nuisance, dissatisfaction.
- Interference with activities such as speech, sleep, and learning.
- Physiological effects such as anxiety or hearing loss.

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

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

With regard to increases in A-weighted noise levels, knowledge of the following relationships (Kryter 1970) can be helpful in understanding the significance of human exposure to noise.

1. Except under special conditions, a change in sound level of one dB cannot be perceived.
2. Outside of the laboratory, a three dB change is considered a barely noticeable difference.
3. A change in level of at least five dB is required before any noticeable change in community response would be expected.
4. A ten dB change is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response.

COMBINATION OF SOUND LEVELS

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

Noise Table A3
Addition of Decibel Values

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

Source: Architectural Acoustics, M. David Egan, 1988

SOUND AND DISTANCE

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

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

WORKER PROTECTION

OSHA noise regulations are designed to protect workers against the effects of noise exposure, and list permissible noise level exposure as a function of the amount of time to which the worker is exposed:

Noise Table A4
OSHA Worker Noise Exposure Standards

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

Source: 29 C.F.R. § 1910.95

Insert

Noise Figure 1 - AFC Figure 8.5-1
Noise Figure 2 - AFC Supplement B Figure 2.5-1
Noise Figure 3 - AFC Supplement B Figure 2.5-2
Noise Figure 4 - AFC Supplement B Figure 2.5-3
Noise Figure 5 – Data Response 3N, Figure 8.5-2R3

PUBLIC HEALTH

Testimony of Alvin J. Greenberg, Ph.D.

INTRODUCTION

The purpose of staff's public health analysis is to determine if toxic emissions from the proposed 1000-MW Cosumnes Power Plant (CPP) project (both Phase 1 and Phase 2) have the potential to cause significant adverse public health impacts or to violate standards for public health protection. If potentially significant health impacts are identified, staff will evaluate mitigation measures to reduce such impacts to insignificant levels. Staff assumed that Health Risk Assessment conducted for the applicant and described in the AFC applies to the entire 1000-MW project.

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

The following sections describe staff's method of analyzing potential health impacts and the criteria used to determine their significance.

METHOD OF ANALYSIS

Public health staff is concerned about toxic emissions to which the public could be exposed during project construction and routine operation. Following the release of toxic contaminants into the air or water, people may come into contact with them through inhalation, dermal contact, or ingestion via contaminated food or water.

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

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

1. Identify the types and amounts of hazardous substances that the CPP project could emit to the environment;
2. Estimate worst-case concentrations of project emissions in the environment using dispersion modeling;
3. Estimate amounts of pollutants to which people could be exposed through inhalation, ingestion, and dermal contact; and

4. Characterize potential health risks by comparing worst-case exposure to safe standards based on known health effects.

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

- Using the highest levels of pollutants that could be emitted from the plant;
- Assuming weather conditions that would lead to the maximum ambient concentration of pollutants;
- Using the type of air quality computer model which predicts the greatest plausible impacts;
- Calculating health risks at the location where the pollutant concentrations are 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.

A screening level risk assessment will, at a minimum, include the potential health effects from inhaling hazardous substances. Some facilities may also emit certain substances that could present a health hazard from noninhalation pathways of exposure (see CAPCOA 1993, Table III-5). When these substances are present in facility emissions, the screening level analysis includes the following additional exposure pathways: soil ingestion, dermal exposure, and mother's milk (CAPCOA 1993, p. III-19).

The risk assessment process addresses three categories of health impacts: acute (short-term) noncancer health effects, chronic (long-term) noncancer effects, and cancer risk (also long-term). Acute health effects result from short-term (1-hour) exposure to relatively high concentrations of pollutants. Acute effects are temporary in nature, and include symptoms such as irritation of the eyes, skin, and respiratory tract.

Chronic health effects are those that arise as a result of long-term exposure to lower concentrations of pollutants. The exposure period is considered to be approximately from ten to one hundred percent of a lifetime (from seven to seventy years). Chronic health effects include diseases such as reduced lung function and heart disease.

The analysis for noncancer health effects compares the maximum project contaminant levels to safe levels called "reference exposure levels" or RELs. These are amounts of toxic substances to which even sensitive people can be exposed and suffer no adverse health effects (CAPCOA 1993, p. III-36). These exposure levels are designed to protect the most sensitive individuals in the population, such as infants, the aged, and people suffering from illness or disease which makes them more sensitive to the effects of toxic substance exposure. The RELs are based on the most sensitive adverse health effect

reported in the medical and toxicological literature, and include margins of safety. The margin of safety addresses uncertainties associated with inconclusive scientific and technical information available at the time of standard setting and is meant to provide a reasonable degree of protection against hazards that research has not yet identified. The margin of safety is designed to prevent pollution levels that have been demonstrated to be harmful, as well as to prevent lower pollutant levels that may pose an unacceptable risk of harm, even if the risk is not precisely identified as to nature or degree. Health protection is achieved if the estimated worst-case exposure is below the relevant reference exposure level. In such a case, an adequate margin of safety exists between the predicted exposure and the estimated threshold dose for toxicity.

Exposure to multiple toxic substances may result in health effects that are equal to, less than, or greater than effects resulting from exposure to the individual chemicals. Only a small fraction of the thousands of potential combinations of chemicals have been tested for the health effects of combined exposures. In conformance with CAPCOA guidelines, the health risk assessment assumes that the effects of each substance are additive for a given organ system (CAPCOA 1993, p. III-37). In those cases where the actions may be synergistic (where the effects are greater than the sum), this approach may underestimate the health impact.

For carcinogenic substances, the health assessment considers the risk of developing cancer and assumes that continuous exposure to the cancer-causing substance occurs over a 70-year lifetime. The risk that is calculated is not meant to project the actual expected incidence of cancer, but rather a theoretical upper-bound number based on worst-case assumptions. In reality, the risk is generally too small to actually be measured. For example, the one in one million risk level represents a one in one million increase in the normal risk of developing cancer over a lifetime, at whatever location is estimated to have the worst-case risk.

Cancer risk is expressed in chances per million, and is a function of the maximum expected pollutant concentration, the probability that a particular pollutant will cause cancer (called “potency factors”, and established by the California Office of Environmental Health Hazard Assessment), and the length of the exposure period. Cancer risks for each carcinogen are added to yield total cancer risk. The conservative nature of the screening assumptions used means that actual cancer risks are likely to be lower or even considerably lower than those estimated.

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

SIGNIFICANCE CRITERIA

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

As described earlier, 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

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

Cancer Risk

Staff relied upon regulations implementing the provisions of Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986 (Health & Safety Code, §§ 25249.5 et seq.) for guidance to determine a cancer risk significance level. Title 22, California Code of Regulations, § 12703(b) states that "the risk level which represents no significant risk shall be one which is calculated to result in one excess case of cancer in an exposed population of 100,000, assuming lifetime exposure." This level of risk is equivalent to a cancer risk of ten in one million, or 10×10^{-6}. An important distinction is that the Proposition 65 significance level applies separately to each cancer-causing substance, whereas staff determines significance based on the total risk from all cancer-causing chemicals. Thus, the manner in which the significance level is applied by staff is more conservative (health-protective) than that which applies to Proposition 65.

The significant risk level of ten in one million is consistent with the level of significance adopted by the various Air Boards in California pursuant to Health and Safety Code § 44362(b), which requires notification of nearby residents when an air district determines that there is a significant health risk from a facility. In addition, Sacramento Metropolitan Air Quality Management District's Risk Management Policy states that a project with an incremental cancer risk of between one and ten in a million is acceptable if best available control technology has been applied to reduce risk. In general, Sacramento Metropolitan Air Quality Management District would not approve a project with a cancer risk exceeding ten in one million (SMAQMD 2000).

As noted earlier, the initial risk analysis for a project is typically performed at a screening level, which is designed to overstate actual risks. When a screening analysis shows cancer risks to be above the significance level, refined assumptions would likely result in a lower, more realistic risk estimate. If facility risk, based on refined assumptions, exceeds the significance level of ten in one million, staff would require appropriate measures to reduce risk to less than significant. If, after all risk reduction measures had been considered, a refined analysis identifies a cancer risk greater than ten in one million, staff would deem such risk to be significant, and would not recommend project approval.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

FEDERAL

Clean Air Act section 112 (42 U.S. Code section 7412)

Section 112 requires new sources which emit more than ten tons per year of any specified hazardous air pollutant (HAP) or more than 25 tons per year of any combination of HAPs to apply Maximum Achievable Control Technology (MACT).

STATE

California Health and Safety Code sections 39650 et seq.

These sections mandate the California Air Resources Board (CARB) and the Department of Health Services to establish safe exposure limits for toxic air pollutants and identify pertinent best available control technologies. They also 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

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

California Code of Regulations, Title 22, Section 60306

The regulation requires whenever a cooling system uses recycled water in conjunction with an air conditioning facility and a cooling tower creates a mist that could come into contact with employees or members of the public, a drift eliminator, chlorine, or other, biocides shall be used to treat the cooling system recirculating water to minimize the growth of Legionella and other micro-organisms.

LOCAL

Sacramento Metropolitan Air Quality Management District (SMAQMD) administers California H&SC 41700 with California Air Resources Board (CARB) overview. Rule 904, Air Toxics Control Measures, incorporates by reference the provisions of Title 17 of the California Code of Regulations, section 93000 et seq. which apply to the control of toxic air contaminants. This section was adopted by the Air Resources Board to comply with California H&SC section 39650 et seq. In addition, the SMAQMD Supplemental Risk Assessment Guidelines for New and Modified Stationary Sources (SMAQMD 2000) must be followed.

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. Consequently, areas of elevated terrain can often be subjected to increased pollutant impacts. Also, the types of land use near a site influence the surrounding population distribution and density, which, in turn, affects public exposure to project emissions. Additional factors affecting potential public health impacts include existing air quality and environmental site contamination.

SITE AND VICINITY DESCRIPTION

The CPP site is located on approximately 30 acres of a portion of a 2,480-acre area in southern Sacramento County, about 25 miles southeast of Sacramento. The property is owned by the Sacramento Municipal Utility District and is located about 0.5 miles south of the former Rancho Seco Nuclear plant. The project site is located about four miles north of the San Joaquin County line and 5 miles west of the Amador County line. Site topography gradually slopes downhill from northeast to southwest, with an elevation of 160 feet above sea level. The locale is sparsely populated and generally agricultural, with incorporated and unincorporated low-density urban and suburban areas.

Land use at the site is designated by Sacramento County as Public/Quasi-Public with a Resource Conservation overlay, which is consistent with the Agricultural zoning of the location. The project site is currently used for cattle grazing. While a power plant project is not a defined use for this zoning district, the proposed project is an allowable use for this zoning designation, per Section 205-09 of the Sacramento County Zoning Ordinance. In addition, portions of this 2,480-acre property were formerly used for power production.

Sacramento County is located within 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 is classified as a moderate Mediterranean Climate, characterized by hot, dry summers and cool, rainy winters.

Few residences are located in the vicinity of the site. The nearest existing residence is a mobile home located about 800 feet southwest of the CPP site, however SMUD and the property owner have agreed to move the mobile home to about 0.7 mile west of the CPP site (SMUD 2003c). The next closest residences are located about one mile to the west and southwest of the project. The nearest local communities are Rancho Murieta to the north, the town of Ione to the east, the town of Herald to the west, and Lockeford to the south. As mentioned above, the location of sensitive receptors (such as schools, hospitals, day care facilities, nursing homes, etc.) near the proposed site is an important factor in considering potential public health impacts. No sensitive receptors were identified within a 3-mile radius of the project site. However, as noted earlier, health

based standards are meant to protect every sensitive member of the population, not just those located at sensitive receptor locations.

METEOROLOGY

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

The climate at the project site is dominated by the influence of the Pacific Ocean and the Pacific high-pressure system, which is a semi-permanent, subtropical high-pressure system located off the coast. The size and strength of the Pacific high is at a maximum during the summer, when it is at its northernmost position, and results in strong northwesterly airflow and negligible precipitation. During this period, inversions become strong, winds are light, and the pollution potential is high. The Pacific high's influence weakens during the fall and winter when it moves southwestward, which allows storms from the Gulf of Alaska to reach northern California. About 80 percent of the region's annual rainfall occurs between November and March. During the winter, inversions are weak, winds often moderate, and the potential for air pollution is low.

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

EXISTING AIR QUALITY

The proposed site is within the jurisdiction of Sacramento Metropolitan Air Quality Management District (SMAQMD). By examining average toxic concentration levels from representative air monitoring sites in California with cancer risk factors specific to each contaminant, lifetime cancer risk can be calculated to provide a background risk level for inhalation of ambient air. For comparison purposes, it should be noted that the overall lifetime cancer risk for the average individual is about 1 in 4, or 250,000 in one million.

The toxic air monitoring station closest to the CPP project is on Hazelton Street in Stockton, approximately 30 miles southwest of the CPP site. Based on levels of toxic air contaminants measured at this monitoring station in 2000, the background cancer risk calculated for this location is 185 in one million (CARB 2002). The pollutants 1,3-butadiene and benzene, emitted primarily from mobile sources (cars, trucks, and buses), were the two highest contributors to risk and together accounted for over half of the total. The risk from 1,3-butadiene was about 58 in one million, while the risk from benzene was about 54 in one million. Formaldehyde accounts for about 6.5 percent of the ambient cancer risk determined for Stockton, with a risk of about 12 in one million. Formaldehyde is emitted directly from vehicles and other combustion sources, such as

the proposed CPP. Since the CPP is not located in an urban area like Stockton, traffic and industrial emissions are considerably less. Consequently, the background cancer risk would also be considerably less. In the absence of an on-site monitoring station, staff concludes that the Stockton monitoring station represents the best estimate of background cancer risk for comparison purposes, noting that the estimated risk from mobile source emissions for the rural area of the CPP would be less when compared with an urban area.

The use of reformulated gasoline, beginning in the second quarter of 1996, as well as other toxics reduction measures, have led to a decrease of ambient levels of toxics and associated cancer risk during the past few years. For example, at the Stockton monitoring station, cancer risk was 376 in one million based on 1991 data, 212 in one million based on 1996 data, and 185 in one million based on the 2000 data.

SITE CONTAMINATION

Site disturbances would occur during facility construction from excavation, grading, and earth moving. Such activities have the potential to adversely affect public health through various mechanisms, such as the creation of airborne dust, material being carried off-site through soil erosion, and uncovering buried hazardous substances.

On behalf of SMUD, a Phase I Environmental Site Assessment (ESA) was conducted by B. Demar Hooper, Esq., Taylor, Hooper & Wiley. Information was obtained during a site visit by visual inspection and interviews of long-time employees of the Rancho Seco Nuclear Plant (SMUD 2002l). The purpose of an ESA is to determine the potential for the presence or likely presence of any hazardous substances or petroleum products under conditions that may indicate a release or threat of a release from present or past activities. The results of the ESA are summarized in staff's **Waste Management** section.

IMPACTS

Construction

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

As described above and in the **Waste Management** section, an Phase 1 ESA was performed. The Phase 1 ESA was found by staff to be inadequate and therefore staff requested that the applicant conduct soil sampling and analysis to ensure that site preparation activities would not pose a significant risk to on-site workers or the off-site public. The applicant provided additional information as part of their Data Response (SMUD 2002z), which staff reviewed and evaluated which supports the applicant's position that migration of hazardous waste and/or radioactive waste from the Rancho Seco Nuclear plant to the proposed site and laydown areas did not occur in the past. Therefore, staff finds it unnecessary for the applicant to conduct a sampling and

analysis plan at the proposed site and laydown areas. Staff believes that standard **Waste Management** Conditions of Certification which require having a Registered Professional Engineer or Geologist with experience in remedial investigation and feasibility studies available for consultation during soil excavation and grading activities are adequate to address any soil or groundwater contamination that may be encountered. The applicant also provided a modified Phase I ESA for the 26-mile pipeline which demonstrated that minimal hazardous wastes are expected to be encountered during construction of the facility and gas pipeline (SMUD 2002z).

The operation of construction equipment would result in air emissions from diesel-fueled engines. Although diesel exhaust contains criteria pollutants such as nitrogen oxides, carbon monoxide, and sulfur oxides, it also includes a complex mixture of thousands of gases and fine particles. These particles are primarily composed of aggregates of spherical carbon particles coated with organic and inorganic substances. Diesel exhaust contains over 40 substances that are listed by the U.S. EPA as hazardous air pollutants and by the Air Resources Board (ARB) as toxic air contaminants.

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

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

Construction of Phase I and Phase II of CPP is anticipated to take place over a period of 24 and 18 months, respectively. As noted earlier, assessment of chronic (long-term) health effects assumes continuous exposure to toxic substances over a significantly longer time period, typically from seven to seventy years.

AFC Appendix 8.1A presents diesel exhaust emissions from engines and fugitive dust from construction activities. Worst-case daily dust emissions of 49.6 lb/day PM_{10} (particulate matter 10 microns or less in size) are expected to occur in month five. Diesel emissions are generated from sources such as trucks, graders, cranes, welding machines, electric generators, air compressors, and water pumps. Modeling construction activities gives an annual maximum total predicted concentration of PM_{10} of 30.6 $\mu g/m^3$ (5.5 $\mu g/m^3$ calculated added to a background of 25.1 $\mu g/m^3$) (SMUD 2001a, Table 8.1A-5). Mitigation measures are proposed to reduce the maximum calculated PM_{10} concentrations. These include the use of extensive fugitive dust control measures

(stipulated by SMAQMD rule 403). The fugitive dust control measures are assumed to result in 90% reductions of emissions.

In order to mitigate potential impacts from particulate emissions during the operation of diesel-powered construction equipment, staff recommends the use of ultra low sulfur diesel fuel and the installation of soot filters on diesel equipment. The catalyzed diesel particulate filters are passive, self-regenerating filters that reduce particulate matter, carbon monoxide, and hydrocarbon emissions through catalytic oxidation and filtration. The degree of particulate matter reduction is comparable for both mitigation measures in the range of approximately 85-92 percent. Such filters would reduce diesel emissions during construction and reduce any potential for significant health impacts.

Operation

Emissions Sources

The emissions sources at the proposed CPP project include:

- four gas turbines with heat recovery steam generators
- two condensing steam turbine generators
- cooling towers

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

As noted earlier, the first step in a health risk assessment is to identify potentially toxic compounds that may be emitted from the facility.

Table 8.6-3 of the AFC lists non-criteria pollutants that may be emitted from CPP project turbines as combustion byproducts. Emission factors used in the analysis are from CARB and U.S. EPA. Table 8.6-4 of the AFC lists toxicity values used to characterize cancer and noncancer health impacts from project pollutants. The toxicity values include reference exposure levels, which are used to calculate short-term and long-term noncancer health effects, and cancer unit risks, which are used to calculate the lifetime risk of developing cancer, as published in the CAPCOA Guidelines (CAPCOA 1993). **Public Health Table 1** lists toxic emissions and shows how each contributes to the health risk analysis. For example, the first row shows that oral exposure to acetaldehyde is not of concern, but if inhaled, may have cancer and chronic (long-term) noncancer health effects, but not acute (short-term) effects.

Emissions Levels

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

Annual average and 1-hour emission rates used are presented in the health risk assessment program output included in Appendix 8.1E. Emission factors are estimates

of the amounts of toxic substances released per unit of fuel burned and are from data compiled by the CARB and U.S. EPA.

Public Health Table 1
Types of Health Impacts and Exposure Routes Attributed to Toxic Emissions

Substance	Oral Cancer	Oral Noncancer	Inhalation Cancer	Noncancer (Chronic)	Noncancer (Acute)
Acetaldehyde			✔	✔	
Acrolein				✔	✔
Ammonia				✔	✔
Arsenic	✔	✔	✔	✔	✔
Benzene			✔	✔	✔
1,3-Butadiene			✔	✔	
Cadmium		✔	✔	✔	
Chromium			✔	✔	
Copper				✔	✔
Ethylbenzene				✔	
Formaldehyde			✔	✔	✔
Hexane				✔	
Lead	✔	✔	✔	✔	
Mercury		✔		✔	✔
Napthalene		✔		✔	
Nickel			✔	✔	✔
Polynuclear Aromatic Hydrocarbons (PAHs)	✔	✔	✔	✔	
Propylene				✔	
Propylene oxide			✔	✔	✔
Toluene				✔	✔
Xylene				✔	✔
Zinc				✔	

Source: SMUD 2001a, Table 8.6-4 using reference exposure levels and cancer unit risks from CAPCOA Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines, October 1993 and SRP 1998.

The next step in the health risk assessment process is to estimate the ambient concentrations of toxic substances. This is accomplished by using a screening air dispersion model and assuming conditions that result in maximum impacts. The screening analysis was performed using the U.S. EPA approved ISCST3 dispersion modeling program (please see staff's **Air Quality** section for a detailed discussion of the modeling methodology). Finally, ambient concentrations were used in conjunction with RELs and cancer unit risk factors to estimate health effects which might occur from exposure to facility emissions. Exposure pathways, or ways in which people might

come into contact with toxic substances, include inhalation, dermal (through the skin) absorption, soil ingestion, consumption of locally grown plant foods, and mother's milk.

The above method of assessing health effects is consistent with the California Air Pollution Control Officers Association (CAPCOA) Air Toxics "Hot Spot" Program Revised 1992 Risk Assessment Guidelines (October 1993) referred to earlier, and results in the following health risk estimates.

Impacts

The screening health risk assessment prepared by the applicant for the project, including combustion and non-combustion emissions, resulted in a maximum acute hazard index of 0.10 about 0.12 miles south of the project boundary. The chronic hazard index at the point of maximum impact is 0.015. The location of the maximum chronic hazard is about 1.4 miles northeast of the site boundary (SMUD 2001a, Figure 8.1E-1). As **Public Health Table 2** shows, both acute and chronic hazard indices are under the REL of 1.0, indicating that no short- or long-term adverse health effects are expected.

Public Health Table 2
Operation Hazard/Risk

Type of Hazard/Risk	Hazard Index/Risk	Significance Level	Significant?
ACUTE NONCANCER	0.10	1.0	No
CHRONIC NONCANCER	0.015	1.0	No
INDIVIDUAL CANCER	0.26×10^{-6}	10×10^{-6}	No

Source: SMUD 2002j, Tables 8.1E-1 (revised), 8.1E-2 (revised) and 8.1E-3 (revised).

Cancer Risk

As shown in **Public Health Table 2**, total worst-case individual cancer risk is calculated to be 0.26 in one million at a location approximately 0.19 miles northeast of the project boundary. As noted earlier, the existing nearest residence is a mobile home located about 800 feet to the southwest of the project, however SMUD and the property owner have agreed to move the mobile home to about 0.7 mile west of the CPP site (SMUD 2003c). The next closest residences are located about 1 mile to the west and southwest of the project.

The health risk assessment performed by the applicant has been reviewed by Energy Commission staff and was found to be in accordance with guidelines adopted by OEHHA (Office of Environmental Health Hazard Assessment), CARB, and CAPCOA with two exceptions. First, the risk assessment assumes that all chromium emitted is in the form of noncarcinogenic trivalent chromium. Emissions of trivalent and hexavalent chromium from the cooling tower should be included in order to accurately assess the risks from both forms of emitted chromium. Second, crop (fruits and vegetables) ingestion was not included as a potential exposure pathway in the risk assessment. In an agricultural area such as the project site, this exposure pathway should be evaluated. Energy Commission staff performed an independent analysis of risks posed

by operations of this proposed facility, conservatively assuming that all chromium emitted is in the hexavalent form and using standard Cal-EPA exposure assumptions for the crop ingestion pathway. The maximum theoretical cancer risk was determined by staff to be 0.67 in a million, a value higher than the 0.26 in one million value obtained by the applicant but still significantly lower than the significance level of 10 in a million. Therefore, staff concludes the maximum theoretical health risks and hazards posed by the toxic air contaminants emitted by the project are not significant.

Cooling Tower

In addition to toxic air contaminants, the possibility (however remote) exists for bacterial growth to occur in the cooling tower, including Legionella. Legionella is a type of bacteria that grows in water (optimal temperature of 37° C) and causes Legionellosis, otherwise known as Legionnaires' Disease. Untreated or inadequately treated cooling systems in the United States have been correlated with an outbreak of Legionellosis. These outbreaks are usually associated with building heating, ventilating, and air conditioning (HVAC) systems but it is possible for growth to occur in an industrial cooling tower. In fact, Legionella bacteria have been found in drift droplets. The U.S. Environmental Protection Agency (U.S. EPA) published an extensive review of Legionella in a human health criteria document (EPA 1999). The U.S. EPA noted that Legionella survival is enhanced by symbiotic relationships with other microorganisms, particularly in biofilms, and that aerosol-generating systems such as cooling towers can aid in the transmission of Legionella from water to air. Numerous outbreaks of Legionellosis have been linked to cooling towers and evaporative condensers in hospitals, hotels, and public buildings, clearly establishing these water sources as habitats for Legionella. Kool et al (2000) found that Legionella was isolated from water systems of 11 of 12 hospitals in San Antonio, TX. Interestingly, the number of legionnaires' disease cases in each hospital correlated better with the proportion of water-system sites that tested positive for Legionella ($p=0.07$) than with the concentration of Legionella bacteria in water systems ($p=0.23$). According to the U.S. EPA, in most cases, disease outbreaks resulting from Legionella aerosolizations have involved indoor exposure or outdoor exposure within 200 meters of the source. The U.S. EPA has inadequate quantitative data on the infectivity of Legionella in humans to prepare a dose-response evaluation. Therefore, sufficient information is not available to support a quantitative characterization of the threshold infective dose of Legionella. Thus, the presence of even small numbers of Legionella bacteria presents a risk – however small – of disease in humans. The victims of Legionella are those who are in some way immuno-compromised (hospital patients, drug users, alcoholics, some of the elderly, etc.). People with normally functioning immune systems would have antibodies to Legionella and would be able to defend against Legionella infection.

The U.S. EPA also published a Legionella Drinking Water Health Advisory (EPA 2001) that noted that there are several control methods for disinfecting water in cooling systems, including thermal (super heat and flush), hyperchlorination, copper-silver ionization, ultraviolet light sterilization, ozonation, and instantaneous steam heating systems.

One technical paper (Addiss, David, et al. 1989) describes cases of Legionnaires' Disease due to cooling tower drift in a town in Wisconsin in the summer of 1986. The

authors noted that of five cooling towers in the area, the tower associated with the Legionnaires' disease was the only one that did not use chemical biocides. Furthermore, the cooling tower was "old" (built before 1986), the water temperature was 41°C, which is in the middle of the "active growth" range of 25-55°C for Legionella. There was no problem caused by the other four cooling towers, which treated their cooling water. Another technical paper (Bhopal, R.S., et al. 1991) addressed the relative risk of contacting Legionnaires' Disease when living in the proximity to cooling towers. The relative risk of 3.0 within 0.3 mile (0.5 km) of the cooling tower drops to a risk of 1.19 at distances of 0.3-0.5 mile (0.5-0.75 km) of the cooling tower.

Placed into context of the proposed CPP project, the distance to the nearest existing residential receptor is 0.15-mile; although SMUD and the owner have agreed to relocate the residence 0.7-mile from the CPP site (SMUD 2003c). The next closest residence is 1 mile or 5,280 feet (1.6 km) and the nearest neighborhood is several miles away. Once again, the cooling towers investigated in this report were "old", built around 1978 to 1986. In conclusion, these two articles provide evidence that older cooling towers with untreated water can be a source of Legionella, but that if chemical biocides are used or residences are located further than 2475 feet away, the risks of contracting Legionnaires' Disease would be very low.

A paper presented at the 1978 annual meetings of The Cooling Technology Institute (CTI) notes that aerosol particles or droplets larger than 600 micrometers would be expected to fall to the surface within a few hundred meters of the cooling tower (Adams, Paul A. and Lewis, Barbara 1978). The drift eliminators will remove these larger aerosol particles down to a size of about 100 - 200 micrometers. These small particles may be expected to travel long distances downwind in the diffusing cooling tower plume. Bacterial aerosol concentrations in the vicinity of and downwind of cooling towers are affected by: quality of makeup water, type of biofouling control, effect of biological oxygen demand (BOD) in makeup water, wind speed, height of tower, speed and efficiency of the vent fans, stability of the atmosphere, and temperature differential between exit and ambient air. The potential public health hazard from microbial aerosols exiting in a cooling tower plume is difficult to estimate.

Another paper presented at the 1982 CTI annual meeting (Tyndall R.L. 1982) discussed the profiles and infectivity of Legionella bacteria populations in cooling towers. A survey of both industrial and air conditioning cooling-towers was conducted for the presence of this bacterium which showed that while the majority of cooling water tested contained more than 10,000 bacteria per liter of water, chlorine can be effective in controlling Legionella concentrations in some cooling towers. The authors concluded that generalizations concerning the content and serotypic profiles of Legionella in cooling towers at any given site cannot be made and that each cooling tower needs to be individually assessed. It also appears that some biocides routinely used to control bacteria in cooling tower waters are not always effective against Legionella.

In 2000, the CTI issued its own report and guidelines for the best practices for control of Legionella (CTI 2000). The CTI found that 40-60 percent of industrial cooling towers tested were found to contain Legionella. It estimated that more than 4,000 deaths per year are believed to occur from Legionellosis (from all sources, not limited to industrial

cooling towers), but only about 1,000 are reported. The CTI listed no reference or supportive data for this assertion, however. It also noted that continuous chlorine- or bromine-based biocide free residuals of 0.5 to 1.0 ppm in the cooling tower hot return water have been recommended by many agencies and that biodispersants and biodetergents may aid in the penetration, removal, and dispersion of the biofilm which often builds up on the inside of pipes. Furthermore, the use of these dispersants and detergents often increases the efficacy of the biocide.

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

Nalepa, et al (2002) researched the effectiveness of bromine-based biocides on microbial biofilms and biofilm-associated Legionella Pneumophila. Biofilms in cooling systems contribute to a reduction in heat transfer, increase in energy consumption, increase in corrosion, and an increase in health risk. The authors noted that world-wide, deadly outbreaks of Legionnaires' disease continue to take place with regularity despite a growing list of published guidelines and recommended practices by CTI and other industry groups and governmental agencies. The results of studies indicate that the bromine-based biocides may be more effective than chlorine-based biocides against aged, more-difficult to kill biofilms. However, the authors concluded that when properly applied, oxidizing biocides can be part of an overall water treatment program that incorporates effective microbiological control, scale, and corrosion inhibition strategies together with regular maintenance practices.

Some California county health departments or air districts regulate or give guidance on this matter. The County of San Diego Department of Environmental Health (2001) recommends that when using recycled water in cooling towers, drift eliminators should be used and a chorine or other biocide should be used to treat the cooling system water to minimize growth of Legionella and other microorganisms. Legionella is not regulated by the Sacramento Air Quality Management District nor by the Bay Area Air Quality Management District (BAAQMD), but the BAAQMD suggests that facilities follow guidelines and recommendations made by the Cooling Technology Institute in their February 2000 report titled "Legionellosis, Guideline: Best Practices for Control of Legionella" (CTI 2000).

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

In summary, the scientific and technical trade literature are replete with examples of Legionella bacterium present in industrial cooling towers, other building HVAC systems,

and indeed, surface waters throughout the world. Health experts have not found a concentration of this bacterium which would not present some risk of infection to the public, that is, a concentration in water below which would be deemed totally "safe". Evidence supports the fact that despite water temperature and biocide control, a thin "bio-film" can form on the inside walls of piping and serve to protect the bacteria from the biocide and temperature variations. Additional chemical additives, mechanical removal, and/or "back-flushing" of the system can be used to remove this bio-film. Despite these facts, it is clear than outbreaks of Legionnaire's Disease caused by Legionella bacteria are rare and are due most likely to sources other than modern industrial cooling towers that utilized biocides and that if biofilm formation is under control, Legionella will be restricted to negligible levels.

The following management strategies are directed at minimizing colonization, amplification within the equipment, or both (ASHRAE 1998 and 2000):

- Avoid piping that is capped and has no flow (dead legs).
- Control input water temperature to avoid temperature ranges where Legionella grow. Keep cold water below 25° C (77° F) and hot water above 55° C (131° F).
- Apply biocides in accordance with label dosages to control growth of other bacteria, algae, and protozoa that may contribute to nutritional needs of Legionella. Rotating biocides and using different control methods is recommended. These include thermal shock, oxidizing biocides, chlorine-based oxidants and ozone treatment.
- Conduct routine periodic "back-flushes" to remove bio-film buildup on the inside walls of the pipes.

In order to ensure that Legionella growth is kept to a minimum, thereby protecting both nearby workers as well as members of the public, staff has proposed Condition of Certification **Public Health-1**. The condition would require the project owner to prepare and implement a biocide and anti-biofilm agent monitoring program to ensure that proper levels of biocide and other agents are maintained within the cooling tower water at all times, that periodic measurements of Legionella levels are conducted, and that periodic cleaning is conducted to remove bio-film buildup. Staff believes that with the use of an aggressive antibacterial program coupled with routine monitoring and biofilm removal, the chances of Legionella growing and dispersing would be reduced to insignificance.

CUMULATIVE IMPACTS

The residential maximum cancer risk as calculated by staff for the CPP facility is 0.67 in one million, and occurs about 0.19 miles northeast of the proposed site where pollutant concentrations from CPP would theoretically be the highest. Even at this location, staff does not expect any significant change in lifetime risk to any person, and the increase does not represent any real contribution to the average lifetime cancer risk of 250,000 in one million. Modeled facility-related residential risks are lower at more distant locations, and actual risks are expected to be much lower, since worst-case estimates are based on conservative assumptions, and overstate the true magnitude of the risk expected.

Therefore, staff does not consider the incremental impact of the additional risk posed by the CPP project to be either significant or cumulatively considerable.

The worst-case long-term noncancer health impact from CPP (0.015 hazard index) is well below the significance level of 1.0 at the location of maximum impact. At this level, staff does not expect any cumulative health impacts to be significant. As with cancer risk, long-term hazard would be lower at all other locations, and cumulative impacts at other locations would also be less than significant.

Even in the unlikely event that worst-case emissions from an existing facility were to coincide both geographically and temporally with CPP emissions at the location of maximum impact, the overall long-term health outlook would not change for anyone. Thus, the CPP project would not result in any significant cumulative cancer or chronic noncancer health impacts.

ENVIRONMENTAL JUSTICE

Staff has reviewed Census 2000 information that shows the minority population is less than 50 percent within a 6-mile radius of the proposed Cosumnes Power Plant (please refer to **Socioeconomics Figure 1** in this Staff Assessment). However, as indicated in **Socioeconomics Figure 1**, there are multiple census blocks with greater than 50 percent minority persons within the 6-mile radius; staff considers these to be pockets or clusters. Staff also reviewed Census 2000 information that shows the low-income population is less than 50 percent within the same radius.

Since staff has concluded that there would be no significant direct or cumulative public health-related impacts and thus there would not be a significant impact to any minority or low-income populations. Therefore, from a public health perspective, there are no environmental justice issues.

COMPLIANCE WITH LORS

Staff concludes that construction and operation of the CPP project would be in compliance with all applicable LORS regarding long-term and short-term project impacts.

FACILITY CLOSURE

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 non-routine releases from either hazardous materials or wastes that may be onsite. These are discussed in the sections **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

adopted by the Energy Commission once a closure plan is received from the project owner.

RESPONSE TO PUBLIC AND AGENCY COMMENTS

PUBLIC COMMENTS

Joe Rominger and Sheri Tall, residents of Yolo County, asked if there would be any health risks to residents living close to the 4,000 horsepower compressor station proposed to be built by SMUD at the tap line into the PG&E natural gas line located on County Road 29 near Winters.

Response: The compressor that is proposed to be built near Winters would be electric-driven, and therefore, the operation of this compressor would not require any hazardous chemicals and there would be no toxic emissions. Impacts during the construction of a compressor station would be insignificant. It is staff's opinion that the construction and operation of the proposed compressor poses an insignificant risk to public. The risk of fire or explosion is discussed in the **Hazardous Materials Management** section of the staff assessment.

CONCLUSIONS

Staff has analyzed potential public health risks associated with construction and operation of the CPP project, and does not expect there to be any significant adverse cancer, or short- or long-term noncancer health effects from project emissions.

The health risk assessment performed by the applicant has been reviewed by Energy Commission staff and was found to be in accordance with guidelines adopted by OEHHA (Office of Environmental Health Hazard Assessment), CARB, and CAPCOA with the exceptions noted above. Energy Commission staff performed an independent analysis of risks posed by operations of this proposed facility and although staff found that the maximum theoretical risks and hazards posed by the toxic air contaminants emitted by the project would not create a significant public health risk.

Pursuant to the SMAQMD Risk Management Policy, the increased carcinogenic risk attributed to this project is considered to be not significant since it is less than 10 in one million. The chronic and acute hazard indices attributed to the emission of non-carcinogenic air contaminants are considered to be less than significant since they are less than 1.0. Therefore, the CPP facility is in compliance with the SMAQMD Toxic Risk Management Policy as described in Rule 904.

In order to ensure that Legionella growth is kept to a minimum, thereby protecting both nearby workers as well as members of the public, staff has proposed Condition of Certification **Public Health-1**.

PROPOSED CONDITIONS OF CERTIFICATION

Public Health-1 The project owner shall develop and implement a Cooling Water Management Plan to ensure that the potential for bacterial growth in cooling water is kept to an absolute minimum. The Plan shall include weekly monitoring of biocide and chemical biofilm prevention agents, periodic maintenance of the cooling water system to remove bio-film buildup, and testing to determine the concentrations of Legionella bacteria in the cooling water.

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

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SOCIOECONOMICS

Testimony of Negar Vahidi

INTRODUCTION

This socioeconomic impact analysis evaluates the potential short- and long-term project-induced impacts on local housing, employment and population, schools, medical, and protective services, as well as, the fiscal and physical capability of local agencies to meet the needs of any project-related population changes. The analysis includes demographic information, which is used in several technical areas, including this analysis, for a focused evaluation of Environmental Justice. The socioeconomic analysis also discusses the potential direct, secondary (indirect and induced) and cumulative impacts of the proposed Cosumnes Power Plant (CPP) on community resources and services.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

There are no applicable federal, State, or local socioeconomics laws, ordinances, regulations, and standards (LORS) for the proposed CPP.

SETTING

PROJECT LOCATION

The proposed project site for the CPP would be located on approximately 30 acres of 2,480 acres owned by the Sacramento Municipal Utility District (SMUD). The decommissioned Rancho Seco Power Plant is situated approximately ½ mile north of the proposed CPP site. The site is in Sacramento County, approximately 4 miles north of San Joaquin County, and 5 miles west of Amador County.

DEMOGRAPHIC CHARACTERISTICS

Within the project area, the County of Sacramento is considered the area that may be most affected by the proposed project. Data for nearby counties of Amador and San Joaquin is also presented. Historic and recent population figures for the counties of Sacramento, Amador, and San Joaquin are summarized in **Socioeconomics Table 1.**

Socioeconomics Table 1
Demographic Profile of the Study Area

Area	Year	
	1990 Population	**2000 Population**
County of Amador	30,039	35,100
County of Sacramento	1,041,219	1,223,499
County of San Joaquin	480,628	563,598
Source: U.S. Census, 1990 and 2000. http://factfinder.census.gov/servlet/BasicFactsServlet		

People of Color Population

For the purposes of this analysis, Census 2000 People of Color data set has been presented to characterize minority populations in the project area. **Socioeconomics Table 2** provides population percentages for People of Color for the State, County of Sacramento, City of Sacramento, and a 6-mile radius of the proposed project site. A 6-mile radius was chosen to be consistent with the distance used for staff's air quality cumulative impact analysis. The 6-mile radius largely encompasses a section of Sacramento County, but also includes parts of Amador and San Joaquin counties. The ethnic/racial profile for the project area is based on 2000 census data. Within the 6-mile radius, 83.5 percent of the population is white, not Hispanic, while the remaining 16.5 percent is comprised of non-white population. **Socioeconomics Figure 1** presents the census blocks within a 6-mile radius of the proposed project with 50 percent or more People of Color population.

As shown in **Socioeconomics Figure 1**, several census blocks within the 6-mile radius located within the County of Sacramento have a total People of Color population above 50 percent. Four census blocks in particular have 100 percent People of Color populations. These blocks, however, have total populations of nine, seven, five, and three, respectively.

Socioeconomics Table 2
Demographic Profile of Proposed Project Area, 2000

Area	Total Population	People of Color Population
State of California	33,871,648	18,054,858 (53.3%)
County of Sacramento	1,223,499	516,844 (42.2%)
City of Sacramento	407,018	242,044 (59.5%)
6-Mile Radius	2,009	331 (16.5%)[1]

Source: U.S. Census, 2000a. http://factfinder.census.gov/servlet/BasicFactsServlet
* People of Color definition derived from US Census Bureau by the California Energy Commission (CEC 2001)
[1] California Energy Commission, Systems Assessment and Facilities Siting Division, Cartography Unit.

Low-Income Population

For the purposes of this analysis, a household has been defined as *low-income* using the 2000 US Census method for defining poverty (U.S. Census, 2000b). The poverty status of families and unrelated individuals in 1999 was determined by the U.S. Census using 48 thresholds (income cutoffs) arranged in a two dimensional matrix. The poverty thresholds are the same for all parts of the Country. The matrix consists of family size (from 1 person to 9 or more people) cross-classified by presence and number of family members under 18 years old (from no children present to 8 or more children present). To determine a person's poverty status, one compares the person's total family income with the poverty threshold appropriate for that person's family size and composition. If the total income of that person's family is less than the threshold appropriate for that family, then the person is considered low income, together with every member of his or her family. If a person is not living with anyone related by birth, marriage, or adoption, then the person's own income is compared with his or her poverty threshold.

Socioeconomics Table 3 summarizes the low-income population from 2000 Census block groups within a 6-mile radius of the proposed project. According to 2000 Census

data, approximately 2.78 percent of the population within a 6-mile radius of the proposed power plant site is considered low-income, as shown in **Socioeconomics Figure 2**. This is well below the 50 percent threshold that staff uses to identify a low-income population of concern.

Socioeconomics Table 3
Low-Income Population Within 6-Mile Radius of Proposed Project, 2000

	6-Mile Radius
Total Population	**4,099**
Low-Income Population	**114 (2.78%)**
U.S. Census 2000b; CEC, 2002	

EMPLOYMENT CHARACTERISTICS

For the purposes of defining the affected socioeconomics project area for employment characteristics, it is assumed that most workers would be willing to make a 1 to 2 hour commute to the proposed project site. Counties within this 1 to 2 hour commute range include Sacramento, Placer, El Dorado, San Joaquin, Amador, Calaveras, Solano, and Yolo. **Socioeconomics Table 4** identifies labor force characteristics for this eight-county area for the year 1999. The statistics for Calaveras and San Joaquin counties indicate a civilian labor force with an unemployment rate above the State's unemployment rate of five percent (Employment Development Department, 2001b).

Nearby Sacramento, Placer, El Dorado, Amador, Solano, and Yolo counties show unemployment rates slightly below that of the entire State of California. The civilian labor force represents all residents between 18-55 years of age and currently employed.

Data presented in **Socioeconomics Table 4** indicates that for the total affected area, the services industry employs the highest number of people. In San Joaquin and Calaveras counties, agriculture employs the highest number of people, and in Yolo and Amador counties, government employs the greatest number of people. In all eight counties, the top four employers are services, trade, government, and agriculture.

HOUSING

Socioeconomics Table 5 summarizes the housing unit totals for the counties of Sacramento, San Joaquin, and Amador as of January 1, 2000. Housing data is provided for the counties within the immediate vicinity of the proposed CPP, as workers choosing not to commute would most likely relocate to areas nearby the project. As of January 2000, there were approximately 470,000 total housing units in Sacramento County, San Joaquin County had approximately 190,000 total housing units, and Amador County had approximately 15,000 total units. These totals include single-family, multi-family, and mobile home residences. Sacramento County had a vacancy rate of 6.1 percent, San Joaquin County had a vacancy rate of 5.0 percent, and Amador County had a vacancy rate of 18.0 percent. The vacancy rates of Sacramento and Amador counties are above the federal housing standard (for vacancy) of 5.0 percent.

Socioeconomics Table 4
Labor Force Characteristics of Eight-County Study Area, 1999

Labor Force	Sacramento/ Placer/ El Dorado Counties	San Joaquin County	Amador County	Calaveras County	Solano County	Yolo County
Civilian labor force	812,600	260,800	14,190*	15,190	196,800	93,700
Unemployment	29,700 (4.2%)	23,000 (8.8%)	620 (4.4%)	1,010 (6.7%)	8,400 (4.2%)	4,100 (4.3%)
Agriculture	71,000	51,000	240	6,070	16,400	2,300
Construction	47,700	11,800	420 (w/ mining)	860 (w/ mining)	13,900 (w/ mining)	4,300
Manufacturing	50,300	25,500	870	490	20,600	6,100
Transportation/ public utilities	27,500	13,500	420	400	5,800	6,300
Trade	153,000	43,500	2,430	1,800	42,400	21,800
Finance/insurance	48,000	8,400	370	360	7,300	4,600
Services	202,300	47,000	2,580	1,860	48,000	15,000
Government	182,900	37,000	3,820	2,340	34,000	29,000
Other	200	100	0	0	0	200

Source: California Employment Development Dept., March 1999 Benchmark.
* Discrepancies between the civilian labor force and the total of all industries and unemployed is due to the fact that civilian labor force is by place of residence and includes self-employed individuals, unpaid family workers, household domestic workers, and workers on strike, while the industry employment totals are calculated by place of work and excludes self-employed individuals, unpaid family workers, household domestic workers, and workers on strike.

Socioeconomics Table 5
Amador, Sacramento, and San Joaquin County Housing Units, 2000

		Single-Family		Multi-Family					
	Total	Detached	Attached	2-4	5+	Mobile Home	Occupied	% Vacant	Persons Per Household
County of Amador	15,113	12,076	289	466	680	1,602	12,395	18.0%	2.39
County of Sacramento	468,236	291,949	29,941	33,161	98,346	14,839	439,663	6.1%	2.70
County of San Joaquin	190,003	128,369	9,758	14,002	28,628	9,246	180,531	5.0%	3.05

Source: http://www.dof.ca.gov:8080/html/demograp/e%2D5.xls

FINANCIAL RESOURCES

Personal income earnings within the study area are summarized in **Socioeconomics Table 6.** As shown, personal income revenue by industry for Sacramento and San Joaquin counties is dominated by the industries of government and services. The services and government industries generate approximately one-half of non-farm personal income earnings in the project area. Construction activities also play an important income-producing role in the study area, cumulatively generating 6.35 percent of the total personal income.

Socioeconomics Table 6
Personal Income Earnings By Industry for the County Study Area, 1997

Industry	County of Sacramento*	County of San Joaquin*
Farming	53,190	518,052
Agricultural Services	116,131	137,955
Services	5,929,775	1,459,205
Wholesale Trade	918,144	359,186
Retail Trade	1,809,391	703,932
Manufacturing	1,696,872	943,510
Government	7,108,992	1,190,052
Transportation & Public Utilities	1,027,912	573,623
Construction	1,284,670	430,859
Finance, Insurance & Real Estate	1,893,305	522,245
Mining	9,126	7,886
Total Non-Farm Earnings	21,794,318	6,328,453

Source: U.S. Department of Commerce, Bureau of Economic Analysis: Regional Economic Information Systems. http://govinfo.library.orst.edu/reis-stateis.html. 2001.
N/A – Not Available
*In thousands of dollars.

Fiscal Revenue

Sacramento County has taxing authority for the property associated with the proposed project. **Socioeconomics Table 7** shows revenue collections and expenditures for Sacramento County broken out by revenue source for the 2000-2001 fiscal year. The total revenue for the 2000-2001 fiscal year was $1.8 billion. The majority of funding for Sacramento County comes from Aid-Other Government agencies.

Socioeconomics Table 7 also shows expenditures by Sacramento County. Total financing requirements approached $2 billion in the 2000-2001 fiscal year budget. Public assistance and public protection are the two largest function categories in the Sacramento County expenditure budget.

Taxes

In California, sales tax on purchases is collected by the seller and paid to the State. The sales and use tax rate in Sacramento County is 7.75 percent (BOE, 2002). This includes the total Statewide Base Sales Use Tax rate of 7.25 percent; plus 0.5 percent to the Sacramento Transportation Authority. Of the 7.25 percent Statewide Base Tax, 5 percent goes to the State General Fund, 0.5 percent to the State Local Revenue Fund, 0.5 percent to the State Local Public Safety Fund, and the remaining 1.25 percent goes to the local county or city (i.e., at place of sale) (BOE, 2002).

The proposed project site for the CPP would be located on a parcel owned by SMUD, a public agency, and is therefore not subject to property taxation by any local agency.

Socioeconomics Table 7
Sacramento County Budget

	2000-2001 Fiscal Year (Millions)
REVENUE	
Current Secured Property Tax	120.5
Current Unsecured Property Tax	6.7
Supplemental Property Tax	3.3
Taxes (Other than Current Property)	183.4
Licenses and Permits	30.6
Fines, Forfeitures, and Penalties	20.1
Use of Money and Property	27.9
Aid-Other Government Agencies	1,121.8
Charges for Current Services	77.3
Miscellaneous Revenues	70.5
Other Financing Sources	12.2
TOTAL REVENUES	**$1,834.4**
EXPENDITURES	
General	153.3
Public Protection	566.6
Public Ways & Facilities	143.6
Health & Sanitation	387.2
Public Assistance	606.3
Education	13.4
Recreational & Cultural	25.9
Debt Service	19.4
Total Specific Financing Uses	1,915.7
Appropriations for Contingencies	6.8
Provisions for Reserves	21.1
TOTAL FINANCING REQIREMENTS	**$1,943.6**
Source: SMUD 2001a, Table 8.8-10, 8.8-8.	

PUBLIC SERVICES

Police Protection

The Sacramento County Sheriff's Department, South Field Services provides law enforcement services for the project area. A Problem Oriented Police (POP) officer, whose responsibility is to provide proactive service and deal with specific local issues, is assigned to the area, but is not responsible for responding to service calls. The zone serving the proposed project site is staffed with one officer in a patrol car 24-hours a day, 7 days a week. Response time to a service call at the site varies depending on the officer's location at the time of the call (SMUD 2001a, p. 8.8-9).

Schools

The site is located within the boundaries of the Galt Joint Union High School District (HSD), and the Arcohe Union Elementary School District. **Socioeconomics Table 8** shows the enrollment data by grade for both districts. As indicated within **Socioeconomics Table 8**, the HSD is currently over the total capacity of 1,517

students (SMUD 2001a, p. 8.8-7), and the Arcohe Union Elementary School District is within capacity (Avalos, 2002).

Socioeconomics Table 8
Galt Joint Union High School and
Arcohe Union Elementary School Districts Enrollment, 2001

Schools	Arcohe Union ES	Galt Joint Union HSD
Elementary (K-5th)	352	-
Middle (6th-8th)	168	-
Senior High (9th-12th)	-	1,874
Total Enrollment	**520**	**1,874**
Stated Capacity	**633**	**1,517**

Source: SMUD 2001a, Table 8.8-11, p. 8.8-9; Avalos, 2002

Hospitals

Major hospitals serving the project site include Kaiser Permanente Hospital and Methodist Hospital in south Sacramento, Lodi Memorial Hospital in Lodi, and Dameron Hospital and St. Joseph's Immediate Care in Stockton. The Galt Fire District provides emergency medical service (i.e., ambulance service) to the project area (SMUD 2001a, p. 8.8-10).

Electricity

The project site is within SMUD's electricity service area. The Rancho Seco Plant 230-kV switchyard would be used for electricity supply during construction, and to deliver the power generated at the proposed project to the Northern California electric grid and the SMUD Transmission System (SMUD 2001a, p. 8.8-10).

Natural Gas

The project would be fueled by natural gas delivered to the site by a supply line to be constructed as part of the project. Natural gas would be obtained from Pacific Gas & Electric's (PG&E) transmission backbone pipelines 400 and 401 located near Winters, California, and transported through SMUD's 50-mile pipeline network. A 24-inch diameter pipeline would be constructed from the pipeline network tap point at Carson Ice-Generation Plant to the proposed project site (SMUD 2001a, p. 6-1).

Sewer

Domestic wastewater for the proposed project site would be treated with a package treatment system and leachfield for sanitary waste (SMUD 2001a, p. 8.13-8). To reduce the CPP's use of fresh inland water, the project is proposing to employ the use of zero liquid discharge (ZLD) technology as part of the project. The ZLD is designed to process all plant wastewater, returning a relatively high quality distillate stream for reuse in the plant, and producing a solid waste stream suitable for proper landfill disposal. The process water would not be discharged into Clay Creek as originally proposed (SMUD 2002ac, p. ii).

Water

Water supply for existing facilities at the project is provided by an on-site treatment facility using Folsom South Canal water (from the Lower American River) as a supply source. The point of delivery of the water supply is through a turnout from the canal located at a point on the canal approximately 700 feet upstream from the inlet transition of the Laguna Creek siphon. The water is pumped west through a 66-inch diameter pipeline to the Rancho Seco Nuclear Plant. Water for the proposed project would be diverted to a 12-inch diameter pipe to the proposed project site (SMUD 2001a, p. 7-2).

Fire Protection

The issue of fire protection is addressed in the **Worker Safety and Fire Protection** section of this Staff Assessment.

IMPACTS

CEQA GUIDELINES SIGNIFICANCE CRITERIA

Title 14 California Code of Regulations, Section 15131

- Economic or social effects of a project shall not be treated as significant effects on the environment.
- Economic or social factors of a project may be used to determine the significance of physical changes caused by the project.
- Economic, social, and particularly housing factors shall be considered by public agencies together with technological and environmental factors in deciding whether changes in a project are feasible to reduce and or avoid the significant effects on the environment.

POPULATION

Construction

For the purposes of defining the affected socioeconomics study area of the proposed project, staff has assumed that most, if not all, construction workers would be willing to make a 1 to 2 hour commute to the proposed project site. Staff reviewed the socioeconomics data for counties within that commute range, which includes Sacramento, Placer, El Dorado, San Joaquin, Amador, Calaveras, Solano, and Yolo counties.

Construction of Phase 1 and Phase 2 of the proposed project would be completed in two phases, 24 months and 18 months, respectively. **Socioeconomics Table 9** summarizes the total number of construction workers required for both phases of project construction. The employment estimates used in **Socioeconomics Table 9** were derived from the AFC, with the calculations verified by staff. While the project would require a peak number of 381 workers in month 12 and 9 of Phase 1 and 2, respectively

(SMUD 2001a, Tables 8.8-12 and 8.8-13,), the peak month for each worker-trade category differs from category to category. For example, the most sheetmetal workers would be employed in month 12 of Phase 1, while the greatest number of insulation workers would be employed between months 18-21. To view the total construction force by month and by task, please refer to the AFC. The following table lists the peak number of workers by worker-trade category that would be onsite for their respective peak month(s).

Socioeconomics Table 10 identifies historic and projected future availability of specific construction and operations trade workers for the combined Sacramento and San Joaquin county region. **Socioeconomics Table 10** indicates that in the year 2004, a total of 67,210 construction workers are projected to be available within the Sacramento and San Joaquin County area. With the assumed maximum need of 389 construction workers (expected peak labor for the project), that number would represent 0.6 percent of the total projected construction workforce within the project area. Because the number of construction workers required represents such a small portion of the local available labor force, it is assumed that almost no population in-migration would occur as a result of project-related construction activities. Therefore, no significant impacts are expected as a result of construction-related population increases.

Socioeconomics Table 9
CPP Peak Workforce Requirements

Trade	PEAK WORKERS PER PEAK MONTH PHASE 1	PEAK WORKERS PER PEAK MONTH PHASE 2
Insulation Workers	24	24
Boilermakers	42	42
Masons	3	3
Carpenters	14	14
Electricians	65	65
Ironworkers	30	30
Laborers	15	15
Millwrights	24	24
Operating Engineers	12	12
Painters	4	4
Pipefitters	86	86
Sheetmetal Workers	8	8
Surveyors	2	2
Teamsters (Site)	5	5
Surveyors	4	2
Foremen	4	4
Equipment Operators	18	18
Laborers	25	25
Teamsters (Linear)	4	4
TOTAL	389	387

SMUD 2001a, Tables 8.8-12 and 8.8-13.

Socioeconomics Table 10
Historic and Projected Future Employment for the Combined Sacramento and San Joaquin County Region, 1997 and 2004

Trade	1997	2004
Carpenters	4,210	5,100
Masons	1,660	1,960
Painters	1,470	1,790
Metal Workers	2,310	2,690
Electricians	2,600	3,160
Welders	1,310	1,570
Excavating	370	490
Grading	350	450
Truck Operators	2,590	3,060
Operating Engineers	600	700
Laborers	24,890	29,950
Plumbers	1,680	1,910
Administrative Staff	2,410	2,810
Mechanical Engineers	530	760
Electrical Engineers	1,880	2,560
Engineering General	6,380	7,500
All Other	630	750
TOTAL	**55,870**	**67,210**

Source: Data from the State of California, Employment Development Department, Labor Market Information, Table 6, Occupational Employment Projections 1997-2004. Total workers calculated from the 1995 EDD estimated workforce for the counties. (EDD, 2001b). Staff has assumed that Flagmen are grouped in with Laborers and the contractor or owner will supply Foremen Staff.

Operation

According to the AFC, it is estimated that 20 permanent employees would be required for operations of the proposed facility. SMUD anticipates that all 20 permanent employees would be hired from the existing local labor force, resulting in no operational employees coming from outside the local labor force (SMUD 2001a, p. 8.8-15). With year 2000's population of 1,787,097 in the Sacramento County and San Joaquin County areas, any potential permanent employees drawn from outside the region would result in a negligible increase to the total population. Therefore, any potential population in-migration impacts resulting from the operational workforce would be insignificant.

Housing

The proposed project site for the CPP would be located on approximately 30 acres of 2,480 acres owned by SMUD. The site contains no housing, and as such, no housing would be displaced as a result of the proposed project. As presented in **Socioeconomics Table 5**, there were 658,239 total housing units within Sacramento and San Joaquin counties with 38,045 vacant units, resulting in a 5.8 percent vacancy rate. During project construction, it is expected that most construction workers are within commuting distance of the proposed project site, and therefore would not need to move into the area for the duration of construction. However, in the event that construction workers temporarily relocate to the study area during peak construction periods, an ample number of housing units are available in the study area. In addition to the available housing units, there are over 12,000 motels and hotels within commuting distance of the proposed project site (SMUD 2001a, p. 8.8-14). Therefore, no construction-related impacts are expected on the local housing supply.

During the proposed project operations, only 20 full-time employees would be required to operate the plant, with all projected to come from within the Sacramento County and San Joaquin County area. As a result, the proposed project operations would not significantly impact current housing availability.

Employment and Economy

Based on data provided in **Socioeconomics Table 9**, during peak employment months, a maximum of 389 construction workers are projected to be employed. According to the AFC, the estimated construction payroll for both phases of the proposed project would be $60 million. Along with the construction payroll, it is expected that between $16 and $20 million would be spent within the Sacramento County and San Joaquin County economies on material and supplies over 2 years (SMUD 2001a, p. 8.8-14). In addition, construction activity would result in secondary economic impacts (i.e., indirect and induced employment due to the purchase of goods and services by firms involved with construction, and induced employment due to construction workers spending their income within the counties). The estimated indirect and induced employment within the two-county region would be 38 and 555 jobs, respectively. These additional jobs result from $5.6 million in local construction expenditures as well as $42 million in spending by local construction workers (SMUD 2001a, p. 8.8-14). The increase in workers and their wages would result in a positive fiscal and economic impact on the local area.

During operation, the proposed project is expected to employ approximately 20 people in full-time, onsite positions, which would generate an annual operation payroll of $1.25 million, resulting in a permanent increase in tax revenues and local and regional spending by the operations staff for the life of the project. Annual expenditures from CPP for supplies and materials are estimated to be approximately $8-10 million, of which approximately $5 million is anticipated to be spent locally (SMUD 2001a, p. 8.8-16). These expenditures are expected to help generate additional jobs within the area, and additional spending. The operation of the proposed project would result in the creation of 25 indirect and 18 induced permanent jobs that would occur within the two-county region. The indirect and induced impacts from the additional 43 jobs would result from annual expenditures on payroll of $1.25 million, as well as operations and maintenance budget of $5 million (SMUD 2001a, p. 8.8-16). Based on independent analysis of this data, staff agrees with the AFC's finding that the proposed CPP's operation would result in a positive fiscal and economic impact on the local area.

As shown in **Socioeconomics Table 4**, the recent unemployment rate within San Joaquin County is relatively high at 8.8 percent. According to the California Employment Development Department (EDD, 2002), the 2002 unemployment rate in California was 6.7 percent. Project construction and operation would result in a positive fiscal and economic impact on the local area. Therefore, no adverse employment impacts would occur.

FISCAL

The initial capital cost of both phases of the CPP is estimated to be $595 million. The estimated value of materials and supplies that will be purchased locally during

construction is $16-20 million. The local sales tax expected to be generated during construction is $1.2-1.5 million. Of that amount in expected sales tax receipts, the State will receive 5.75 percent or $920,000 to $1.15 million; the county would receive 1.25 percent or $200,000-250,000 (SMUD 2001a, p. 8.8-15). The sales tax revenue realized during construction would have a positive benefit to Sacramento County.

The estimated construction payroll for the proposed project is estimated to be $60 million (SMUD 2001a, p. 8.8-14). The proposed project is expected to employ approximately 20 people in full-time, onsite positions, resulting in an estimated annual operation payroll of $1.25 million (SMUD 2001a, p. 8.8-16). Revenues from the sale of power will be distributed to Sacramento County for purposes of debt service, and to cover operating expenses.

The annual operations and maintenance budget is expected to be $8-10 million, with approximately $5 million estimated to be spent locally (SMUD 2001a, p. 8.8-16). Based on these assumptions, estimated annual sales taxes would be approximately $375,000. Of this amount, the place of sale (assumed to be Sacramento County) will receive $63,000 in sales tax revenue (SMUD 2001a, p. 8.8-17). Based on the fiscal resource data for Sacramento County presented in **Socioeconomics Table 7**, the influx of additional fiscal revenue from CPP would help balance their revenue and expenditure budgets. Based on independent analysis of this data, staff agrees with the AFC's finding that the anticipated increase in sales tax revenue from the operation of the CPP would be beneficial, but not significant, because it would constitute such a small percent of total revenues for Sacramento County.

Since SMUD is a municipal entity, it does not pay property taxes, so Sacramento County would not derive any additional funds from property taxes.

PUBLIC SERVICES

Physical impacts to public services and facilities are usually associated with population in-migration and growth in an area, which increase the demand for a particular service leading to the need for expanded or new facilities. An increase in population in any given area may result in the need to develop new, or alter existing, government facilities in order to accommodate increased demand. As an electric generation project seeking to meet the current and future demand of customers, the proposed project is not expected to result in a significant increase in the population of the area (as described above).

Police Protection

Because the proposed CPP project would not induce any substantial population, and is located within land currently owned by SMUD, it is estimated that the proposed plant would not represent a significant increase in patrolling responsibilities of the Sacramento County Sheriff's Department, since they already monitor the existing Rancho Seco Power Plant within the project area. While the project would result in new site structures, the estimated emergency response time to the site is not estimated to be compromised. No impact to police protection practices would occur.

Schools

A sufficient labor pool exists within the study area and it is anticipated that construction and operations workers would commute to the project site rather than relocate. No project-induced population increase is expected. Therefore, no impacts to schools are expected from the project.

Other Public Services

The proposed project would not directly or indirectly induce substantial population growth in the area. Any short-term increase in population due to construction activities is considered to be minimal, with adequate numbers of construction workers currently residing within commuting distance to the project area. Therefore, no further constraints would be placed on any current public service providers as a result of the proposed project. No adverse physical impacts associated with the provision of public facilities (new or altered) would occur.

CUMULATIVE IMPACTS

Cumulative socioeconomic impacts were assessed by researching other large-scale construction projects in the study area, where overlapping construction schedules could create a demand for workers that could not be met by labor in the study area. Due to the large size of the study area and the large labor pool, staff assumed that only construction projects located near the proposed project site would need to be considered.

There are no known major construction projects in the vicinity of the project site or along the associated proposed pipelines. Therefore, staff has concluded no significant socioeconomics impacts would occur from the cumulative actions of CPP and other potential projects. Due to the large number of available workers within the study area (approximately 67,210 construction workers projected to be available in 2004 within the Sacramento County and San Joaquin County area), it is very unlikely that a significant number of construction or operations workers would relocate to the study area. Even if some workers did relocate to the study area, there would be adequate available housing units to accommodate them. Therefore, due to an available large labor pool of construction workers, the cumulative demand for workers resulting from any cumulative projects in combination with the CPP can be met without causing a significant influx of workers from outside the study area. No significant cumulative socioeconomic impacts would occur.

ENVIRONMENTAL JUSTICE

The purpose of the environmental justice screening analysis is to determine whether a low-income and/or minority (people of color) population exists within the potential affected area of the proposed site. Staff conducted the screening analysis in accordance with the “Final Guidance for Incorporating Environmental Justice Concerns” contained in EPA’s NEPA Compliance Analysis (Guidance Document) (EPA 1998).

Minority (people of color) populations, as defined by this Guidance Document, are identified where either:

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

In 1997, the President's Council on Environmental Quality issued Environmental Justice Guidance that defines minorities as individuals who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black not of Hispanic origin; or Hispanic. Low-income populations are identified with the annual statistical poverty thresholds from the Census Bureau's Current Population Reports, Series P-60 on Income and Poverty (OMB 1978).

Consistent with the distance used for staff's air quality cumulative impact analysis, Energy Commission staff has determined the potential affected area as a 6-mile radius of the proposed CPP site. In addition, there may be one or more census blocks, referred to as "clusters" or "pockets," that have a minority (people of color) or low-income population greater than 50 percent.

The total minority (people of color) population within a 6-mile radius of the proposed project site is 16.5 percent (refer to **Socioeconomics Figure 1**), far below the EPA threshold of 50 percent. However, as indicated in **Socioeconomics Figure 1**, some census blocks within the 6-mile radius located within the County of Sacramento have a total minority (people of color) population above 50 percent; staff considers these to be pockets or clusters. Four census blocks in particular have 100 percent minority (people of color) populations. However, these blocks have total populations of nine, seven, five, and three, respectively. Therefore, although these clusters of minority (people of color) populations are greater than fifty percent within the 6-mile radius, they have very low population densities.

As shown in **Socioeconomics Table 3** and **Socioeconomics Figure 2**, Census 2000 data show that 2.78 percent of residents within the 6-mile radius of the proposed project site were living under low-income conditions. The percentage of residents currently living under low-income conditions within the 6-mile radius of the proposed project site is well below the 50 percent threshold that staff uses to identify a low-income population Environmental Justice impact. In addition, there are no individual census blocks within the 6-mile radius where the low-income population is greater than 50 percent.

Staff has conducted a focused environmental justice analysis in eleven technical areas of this Staff Assessment due to the existence of four small pockets or clusters of minority (people of color) population within the 6-mile radius. The steps involved in conducting a focused environmental justice include: 1) Identification of the location of high concentrations of minority and/or low-income populations; 2) consideration of the

location of any project-related potentially significant impacts and associated mitigation; and 3) evaluation of those project impacts in relation to the identified populations. Based on the socioeconomics analysis, staff has not identified any significant adverse direct or cumulative socioeconomics impacts resulting from the construction or operation of the project. Therefore, there are no environmental justice issues related to socioeconomics for this project.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

No specific laws, ordinances, regulations, or standards apply to socioeconomics impacts. California State Planning Law (Government Code Sections 65302 et seq.) requires that each city and county adopt a General Plan consisting of seven mandatory elements to guide planning and development within the jurisdiction. Most jurisdictions do not have laws, ordinances, or regulations specifically affecting the socioeconomics aspects of a project.

FACILITY CLOSURE

Should the plant be permanently closed, the beneficial socioeconomic impacts such as worker payroll, project expenditures and local economic stimulus would no longer occur. The planned lifetime of the proposed power plant is 30 years; however, given unforeseen circumstances the plant may be retired prematurely for a variety of reasons. This could include the determination that the plant is no longer economically viable. Should the plant be temporarily shutdown or closed, there would not be any significant socioeconomic impacts. In the event that the decision is made to permanently close the facility, SMUD would develop a plan for decommissioning that would be submitted to the Energy Commission for approval.

MITIGATION

Energy Commission staff has identified positive economic impacts as well as fiscal benefits to the project area due to employment, project expenditures, and sales tax revenues. There are no significant adverse socioeconomic impacts that require mitigation.

CONCLUSIONS

Staff believes that CPP would not cause a significant adverse direct or cumulative impact on population, housing, employment, public finance, or public services. The project would have a benefit to the area and the local project vicinity in terms of an increase in local jobs and commercial activity during construction and operation of the facility. Staff conclusions include:

1. The $60 million construction payroll and up to $20 million in local purchases of materials and supplies would have a positive effect on the local and regional economy.
2. Project construction would result in indirect and induced employment of 38 and 555 jobs, respectively, within the two-county region resulting from $5.6 million in local construction expenditures as well as $42 million in spending by local construction workers
3. Operational employment of approximately 20 full-time employees onsite would generate an annual operation payroll of $1.25 million, resulting in a permanent increase in tax revenues and local and regional spending by the operations staff for the life of the project.
4. Estimated annual project expenditures of approximately $5 million from supplies and materials are estimated to help generate 25 indirect and 18 induced permanent jobs that would occur within the Sacramento County and San Joaquin County region, and additional spending.
5. Estimated annual sales taxes associated with the CPP would be approximately $375,000. Of this amount, the place of sale (Sacramento County) would receive $63,000 in sales tax revenue, which would help Sacramento County balance their revenue and expenditure budgets.
6. Four small clusters of minority (people of color) populations within the 6-mile radius of the proposed project site exceed 50 percent of the total population, thereby triggering a focused environmental justice analysis by several technical disciplines in this Staff Assessment. Staff has determined that the proposed project would not result in any significant adverse socioeconomic impacts on any low-income populations and/or minority (people of color) populations.

No significant adverse socioeconomics impacts would occur as result of the construction or operation of CPP.

PROPOSED CONDITIONS OF CERTIFICATION

No conditions of certification are proposed, since there are no significant adverse project-related socioeconomic impacts.

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INSERT *SOCIOECONOMICS FIGURES 1 – 6-MILE RADIUS DEMOGRAPHIC DATA – MINORITY*

INSERT *SOCIOECONOMICS FIGURES 2 – 6-MILE RADIUS DEMOGRAPHIC DATA – LOW INCOME*

TRAFFIC AND TRANSPORTATION

Testimony of James Fore and Eileen Allen

INTRODUCTION

In this section staff addressed the extent to which the project may affect the transportation system within the vicinity of the Sacramento Municipal Utility District (SMUD) proposed Cosumnes Power Plant (CPP). This analysis applies to both Phase 1 and Phase 2 of the CPP. Staff addressed a number of roadway and traffic issues including: 1) the roads and routings that are proposed to be used; 2) potential traffic related impacts associated with these routes; 3) the anticipated number of vehicle trips for the workforce and the delivery of equipment and supplies; 4) the anticipated encroachment upon public right-of-ways; 5) the frequency of trips and probable routes associated with the delivery of hazardous materials; and 6) the availability of alternative transportation methods such as rail.

This information has been used to determine if the project would have any significant traffic and transportation impacts and to assess the availability of mitigation measures that could reduce or eliminate any significant impacts. Conditions of certification are included in this analysis to identify the appropriate mitigation measures, to ensure the compliance with and effectiveness of the mitigation measures, and to ensure that the project complies with the applicable laws, ordinances, regulations, and standards (LORS).

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

FEDERAL

- 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, address safety considerations for the transport of goods, materials, and substances over public highways.
- Title 14, Code of Federal Regulations, Part 77 requires that a Notice of Construction be filed with the Federal Aviation Administration (FAA), if the project includes a structure that is equal to or greater than 200 feet (500 feet in an uncongested area) above the average ground level for the site. A notice would also be required if the structure protrudes above an imaginary surface extending from the end of any runway, at a slope of 50:1 for 10,000 feet if the runway length is 3,200 feet or less. If the runway is 3,200 feet or longer the structure would have to penetrate an imaginary surface extending from the end of the runway at a slope of 100:1 for a distance of 20,000 feet, approximately 3.3 miles.

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.

- California Vehicle Code, section 353 defines hazardous materials. California Vehicle Code, sections 31303-31309 regulate the highway transportation of hazardous materials, the routes used, and restrictions thereon;
- California Vehicle Code, sections 31600-31620 regulate the transportation of explosive materials;
- California Vehicle Code, sections 32000-32053 regulate the licensing of carriers of hazardous materials and includes noticing requirements;
- California Vehicle Code, sections 32100-32109 establish special requirements for the transportation of inhalation hazards and poisonous gases;
- California Vehicle Code, sections 34000-34121 establish 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 regulate 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., address the safe transport of hazardous materials;
- California Vehicle Code, sections 2500-2505 authorize the issuance of licenses by the Commissioner of the California Highway Patrol for the transportation of hazardous materials including explosives;
- California Vehicle Code, sections 13369, 15275, and 15278 address the licensing of drivers and the classifications of licenses required for the operation of particular types of vehicles. In addition, it requires the possession of certificates permitting the operation of vehicles transporting hazardous materials;
- California Vehicle Code sections 35780 et seq., require permits for the transportation of oversized loads on county roads; and
- California Street and Highways Code, sections 660, 670, and 1450 et seq., regulate right-of-way encroachment and the granting of permits for encroachments on state and county roads.

LOCAL

Sacramento County

The Circulation Element of the Sacramento County General Plan and the Metropolitan Transportation Plan contain policies applicable to the CPP. The Circulation Element sets up goals and guiding policies about building transportation improvements. It introduces planning tools essential for achieving the local transportation goals and policies. The Metropolitan Transportation Plan establishes regional transportation goals, policies, objectives, and action for various modes of transportation.

Relevant circulation and implementation goals and policies in Section V of the Circulation Element of the County of Sacramento General Plan, (Sacramento County Planning Department, 1993) include the following:

CI-9 Sacramento County will assess fees on new development sufficient to cover the fair share portion of that development's impacts to the regional transportation system that is not covered by other funding sources.

CI-14 Sacramento County will utilize design and development standards that support travel by transit, walking, bicycling, and clean alternatives fuel and low emission vehicles.

CI-18 Sacramento County will develop a broad range of demand reduction measures designed to induce efficient use of existing roads, bridges, and parking facilities. Implementation measures may include congestion pricing for roads, bridge tolls, revised parking fees, and other user charges.

CI-22 Sacramento County shall apply the following level of service (LOS) standards for planning roads in the unincorporated area: 1. Rural collectors: LOS D; 2. Urban area roads: LOS E. The county may proceed with additional capacity projects within the scope of the adopted Transportation Plan when the Board of Supervisors has determined that implementation of all feasible measures that will reduce travel demand in the affected corridor will not provide the target level of service.

CI-23 New developments that result in levels of service for roads in unincorporated areas that are worst than a LOS D for rural collectors or a LOS E for urban area roads or the 1993 LOS, whichever is worse, will not be approved unless traffic impacts are mitigated. Such mitigation may be in the form of (1) capacity improvements to either the roadway system, the transit system, or both, or (2) demand reduction measures included in the project design, or operation, or both.

CI-25 Sacramento County will regulate truck travel as appropriate for the transport of goods, consistent with circulation, air quality, congestion management, and land use goals.

CI-26 Sacramento County will support the development of multi-modal centers with passenger facilities for heavy rail, light rail, and bus.

CI-27 Sacramento County will integrate railroad freight services into regional transportation and economic strategies.

Yolo County

The Circulation Element of the Yolo County General Plan contains policies applicable to the CPP. The Circulation Element sets up goals and guiding policies about building transportation improvements. It introduces planning tools essential for achieving the local transportation goals and policies. Relevant goals and policies in the General Plan include the following:

- Yolo County shall require a service level of "C" for all County roads.
- Yolo County shall discourage truck traffic on residential streets and shall apply traffic controls, speed limits, and load limits on residential street truck routes where assignment to truck traffic is unavoidable.

City of Elk Grove

The City of Elk Grove now has jurisdiction over the East Franklin area that was previously unincorporated in Sacramento County. The CPP's proposed gas pipeline route is proposed to go through the East Franklin area of Elk Grove, as well as the unincorporated area in the County. The City adopted the tenets of Sacramento County's East Franklin Specific Plan, which include the Sacramento County General Plan's LOS standards for rural and urban roads.

PROJECT FEATURES

The CPP facility is a proposed 1,000-megawatt natural gas fired electric generating facility located south of the existing SMUD Rancho Seco facility. The CPP facility would be constructed in two phases. Phase 1 is anticipated to take 24 months and Phase 2, 18 months. The CPP facility would occupy approximately 30 acres of SMUD's 2,480-acre property.

Phase 1 of the project would also require the construction of a 26-mile natural gas fuel pipeline, originating at SMUD's Carson Ice-Gen cogeneration facility located about 26 miles northwest of the project site. Phase 2 would require the installation of two compressor stations to ensure sufficient delivery of natural gas to the project. One of the natural gas compressor stations would be installed near the community of Winters in Yolo County, adjacent to an existing PG&E – SMUD inter-tie natural gas station. The other gas compressor station would be built at the existing SMUD gas pipeline Valve Station 190 located in Elk Grove.

Phase 1 of the project also requires three valve stations located along the gas line for emergency shut-off capability (SMUD 2002p). These 50-foot square stations would be located at the intersections of Core and Bruceville roads, Arno and Valensin roads, and Valensin and Alta Mesa roads.

SETTING

REGIONAL DESCRIPTION

The CPP site is located in the southern portion of Sacramento County, approximately 25 miles southeast of the city of Sacramento. The primary access to the site would be off of State Route 99 (SR 99) or Interstate 5 (I-5) by way of Twin Cities Road (also known as State Route 104 (SR 104)) and Clay East Road.

Freeways, Highways, and Local Roadways

The primary roadways that would be affected by the construction and operation of the CPP would be SR 99, I-5, SR104/Twin Cities Road, and Clay East Road, see **Project Description Figure 4**.

Freeways and Highways

SR 99 and I-5 are major north-south highways that provides access to the San Joaquin Valley and southern California and Marysville/Yuba City to the north. They are located approximately 10 and 17 miles west of the site, respectively. SR 99 provides access to the local roadways that serve the plant site.

Local Roadways

The project site can be accessed from SR 99 by traveling east on SR 104/Twin Cities Road, a two-lane roadway. The California Department of Transportation has designated SR 104/Twin Cities Road as a truck route. It passes north of the project site and continues east to the community of Ione. Clay East Road is a two-lane roadway south of the plant site serving local traffic and residences in the area. Clay East Road intersects SR 104/Twin Cities Road west of the proposed site.

The Winters natural gas compressor station would be located in an agricultural area in Yolo County north of County Road 29 (CR 29) and west of CR 89. CR 29 and CR 89 are two-lane rural roads serving local traffic and residences in the area.

The gas pipeline route would affect numerous rural roads in southern Sacramento County. The affected roads and proposed pipeline route are listed in **Traffic and Transportation Table 5** under the Linear Facilities heading in the Project Specific Impacts section.

Airports

Several airports and landing strips are located in the region. The major airports are the Sacramento International Airport, Mather Airport, and Sacramento Executive Airport. Mather Airport is located 12 miles east of Sacramento and 16 miles north of the CPP. Sacramento International Airport is located 40 miles northwest from the CPP site. Sacramento Executive Airport is located south of downtown Sacramento and approximately 24 miles northwest of the project site.

Rancho Murieta and Sunset Skyranch are two private airports that are open to general aviation. These airports are located approximately six miles north and northwest of the proposed CPP.

Railroads

Union Pacific Railroad has an active main line that borders Twin Cities Road on the north. There is a functional rail spur from this rail line that enters the Rancho Seco site. The applicant intends to use this rail spur for the delivery of heavy equipment (e.g. steam turbines, combustion turbine, heat recovery steam generators). The heavy equipment would be unloaded near the Rancho Seco plant site and transferred to lowboy trailers pulled by trucks for transport to the CPP site. This equipment would be transported over internal roads within the SMUD property and through a gate to the CPP site. No access to public roadways will be required for truck movement of rail deliveries to the CPP (SMUD 2002o).

The natural gas fuel pipeline from SMUD's Carson Ice-Cogeneration facility to the CPP facility would be adjacent to the Union Pacific Railroad right-of-way for part of the natural gas pipeline route. This would be a distance of approximately six miles from the Carson Ice-Cogeneration facility to Core Road. The advantage of following the railroad right-of way is that with the exception of a few intersection crosses, it greatly reduces roadway construction activity.

Public Transportation

There are no public transportation routes or facilities (e.g. Regional Transit bus, or light rail lines, and/or stops in the vicinity of the project or the linear features. No public transportation routes or facilities would be affected by the project.

Bicycle Facilities

The Circulation Element of the County of Sacramento General Plan does not indicate any bicycle routes in the vicinity of the proposed CPP or along the natural gas fuel pipeline route.

PLANNED ROADWAY AND TRANSIT IMPROVEMENTS

The regional transportation system in the area of the CPP site has several long-range improvements planned. These improvements include:

State Route 99 – Caltrans plans to construct a new maintenance facility near Elk Grove. Staff will work with Caltrans to determine the location and timing of this project, and the implications, if any, for CPP construction traffic.

SR 104/Twin Cities Road – Caltrans has long term plans (i.e., in 2015) to widen the Twin Cities Road overpass from two lanes to four lanes at SR-99, and to add a bicycle lane that would fit into an existing wide section of SR 104/Twin Cities Road. This long-term project would not be affected by the CPP schedule. In addition, the City of Elk Grove plans to eventually widen Franklin Blvd from two to four lanes.

CURRENT ROADWAY OPERATING CONDITONS

Traffic Profile

In assessing the impact that a project would have on the local roadway system, level of service (LOS) measurements are used. LOS is a tool used to describe the operating characteristics of the roadway system in terms of the level of congestion or delay experienced by traffic. When evaluating the potential impact of a project on the local traffic and transportation system, staff uses LOS measurements as the foundation on which to base the analysis. LOS measurements represent the flow of traffic. LOS will range from A, free flowing to F, which represents heavy congestion and stoppage of traffic flow. LOS can be determined through two related measurements: intersection capacity utilization and roadway segment vehicle to capacity (V/C) ratios. **Traffic and Transportation Table 1, Level of Service Classifications**, provides a description of the traffic flow conditions associated with the LOS classifications.

Traffic and Transportation Table 1
Level of Service Classifications

Level of Service	Type of Flow	Delay	Maneuver Ability	V/C Ratio
A	Stable Flow	Very slight or no delay	Turning movements are easily made, and nearly all drivers find freedom of operation	0.00-0.60
B	Stable Flow	Slight Delay	Vehicle platoons are formed. Many drivers begin to feel somewhat restricted within groups of vehicles	0.61-0.70
C	Stable Flow	Acceptable delays	Back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted	0.71-0.80
D	Approaching Unstable Flow	Tolerable delay	Maneuverability is severely limited during short periods due to temporary back-ups.	0.81-0.90
E	Unstable Flow	Intolerable delay	There are typically long queues of vehicles waiting upstream of the intersection.	0.91-1.00
F	Forced Flow	Excessive delay	Jammed conditions. Back ups from other locations restrict or prevent movement. Volumes may vary widely, depending principally on the downstream back-up conditions	Greater than 1.00
Source: HCM, 1994				

Staff prefers to use both measurements but in many cases only one of the two types of data is available. Because of the rural location of this project and the lack of intersection data, staff used the LOS classifications based on the amount of traffic and roadway capacity. The LOS for the various roadways was derived by dividing peak hour traffic volumes by roadway capacity (V/C ratio).

Traffic and Transportation Table 2, Local Roadway Characteristics, provides the annual average daily traffic (AADT), the annual average peak hour traffic, annual average daily truck traffic, and the current LOS in the vicinity of the CPP. The AADT is the total traffic volume for the year divided by 365 days. Peak hour traffic volume is a useful indicator to show how near to capacity the roadway is operating. Traffic flow on

SR 99 at SR 104/Twin Cities Road is operating at LOS of C. The two local roadways, SR 104/Twin Cities and Clay East roads, are operating at a LOS of A.

AADT and LOS data was not readily available for the local roads that would be affected by the CPP pipeline and compressor stations. Staffs' field observations of these rural roads indicated that the traffic volumes appeared to be very low with no congestion. All roadways are narrow with little or no shoulder.

Traffic and Transportation Table 2
Local Roadway Characteristics

Highway/ Milepost	Location	Annual Average Daily Traffic (a)	Annual Average Peak hour Traffic (a)	Annual Average Daily Truck Traffic (b)	Percent Truck Traffic	LOS
State Route 99						
3.53	SR 104/Twin Cities, Jct. Route 104 East	55,000	4,700	8,820	18	C
State Route 104						
0	Twin Cities, Jct. Route 99	8,000	860	520	8	A
9.22	Clay East Road	3,800	460	N/A	N/A	A

Source: SMUD 2001a, Table 8.10-3, page 4.10-7.
(a) Caltrans 2000
(b) Caltrans 1998
N/A not available

PLANNED ROADWAY AND TRANSIT IMPROVEMENTS

The regional transportation system in the area of the CPP site has several long-range improvements planned. These improvements include:

State Route 99 – Caltrans plans to construct a new maintenance facility near Elk Grove. Staff will work with Caltrans to determine the location and timing of this project, and the implications, if any, for CPP construction traffic.

SR 104/Twin Cities Road – Caltrans has long term plans (i.e., in 2015) to widen the Twin Cities Road overpass from two lanes to four lanes at SR-99, and to add a bicycle lane that would fit into an existing section of SR 104/Twin Cities Road. In addition, the City of Elk Grove plans to eventually widen Franklin Blvd from two to four lanes. These long-term projects would not be affected by the CPP schedule.

IMPACTS

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

- cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections);

- exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways;
- result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- result in inadequate emergency access;
- result in inadequate parking capacity; or
- conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

In the Construction Impacts section of this analysis, staff discusses the above items. Although not specified in Appendix G, staff also discusses the potential traffic and transportation impacts of oversize and overweight loads. Emergency access and parking capacity are discussed primarily in the Construction Impacts section, since potential impacts in those areas are most applicable to the Construction phases. Hazards to the public or the environment through the routine transportation of hazardous material, and changes to air traffic patterns are discussed in the Operations section since potential impacts in those areas more commonly occur when the generating facility is operating.

CONSTRUCTION IMPACTS

Construction Workforce and Truck Traffic

This section discusses the potential for increased traffic associated with construction of each feature of the CPP project.

Plant Site

Construction Workforce

Construction of the first phase of the CPP is expected to take 24 months, while the second phase would take 18 months. SMUD construction plans call for a minimum two to three month or longer idle period between the two phases, although SMUD would decide sometime in 2003 whether to proceed with Phase 2 construction or defer construction to a future date.

The project would require an average workforce at the site of 159 workers per month over the 24 months to construct Phase 1. During Phase 1's peak construction month (Month 12) the workforce would reach an estimated 328 workers at the plant site.

The Phase 2 workforce would average 196 workers, compared with 159 for Phase 1, because of the shorter construction time of 18 months. (SMUD 2001a, Table 8.8-13, pages 8.8 –12 and 8.8-13. The peak work force would be 328 workers.
This traffic analysis assumes a worst-case scenario in which each construction worker drives a separate vehicle to the project site and arrives during the peak traffic hour.

Each worker would make two trips per day (one round trip from home to the site and back). Assuming the average of 196 workers, this would result in the construction workforce generating approximately 392 (i.e., 2 times 196) vehicle trips per day on average and 656 (i.e., 2 times 328) vehicle trips per day during the peak construction period, as shown in **Traffic and Transportation Table 3** below.

Construction Truck Traffic

In addition to the workforce traffic, truck traffic would be generated by CPP construction through the delivery of equipment and construction material such as concrete, wire, pipe, cable, and steel. Deliveries would also include hazardous materials to be used during construction such as gasoline, diesel fuel, oil, and lubricants. Safeguards for delivery of hazardous materials are discussed under the Transportation of Hazardous Materials heading later in this section.

Truck deliveries would average 10 round trips per day with the peak being 20 round trips per day. Truck deliveries were assumed to occur during the normal construction hours for the workforce between 7:00 a.m. and 3:30 p.m., Monday through Friday. To evaluate the worst case scenario, it was assumed that the delivery trucks would arrive and depart during peak traffic hours, as shown below in **Traffic and Transportation Table 3**.

Workforce Travel Routes and Level of Service

The majority of the workforce for this project is expected to come from the greater Sacramento area, including San Joaquin County. The traffic route would most likely be north and south on SR 99 and I-5 from the Sacramento area and San Joaquin County. This traffic would exit on to Twin Cities Road.

Traffic and Transportation Table 3
Summary of Construction Trips Generated

	Vehicle Daily One Way Trips		**Vehicle Daily Round Trips**		**PCE* Daily One Way Trips**		**PCE Peak Hour**	
Traffic Source	Average	Peak	Average	Peak	Average	Peak	Average	Peak
Workforce	196	328	392	656	392	656	196	328
Construction Trucks	10	20	40	80	80	160	40	80
Total	206	408	432	736	472	816	236	408

* PCE - Passenger Car Equivalent. This is a method to convert Truck traffic to an equivalent traffic flow for cars, with one truck considered equivalent to four passenger cars, in order to determine the total construction traffic impact on the roadways and related LOS.
Source: Calculated from the AFC estimate of the construction workforce and truck deliveries, (SMUD 2001a, Section 8.10.4.2, Page 8-10.10)

Local homeowners have raised concerns that construction traffic on SR104/Twin Cities Road and Clay East Road would conflict with school buses also traveling on those roads, and students walking to and from bus stops. These students are traveling to and from the Arcohe Elementary School on SR104/Twin Cities Road in the unincorporated community of Herald. On an average basis, the applicant expects construction workers to make over 390 trips per day, with 40 truck trips, on these two roads. During the peak period, over 650 worker trips and 160 trucks are expected. Given the number of construction workers' vehicles and trucks that are expected on these two roads, and the

erratic attention that many children give to traffic safety, staff has concluded that there is a potentially significant impact.

In response to the Clay East Road concerns, SMUD has proposed a new construction access road that would establish an alternate travel route that would avoid the use of Clay East Road between Twin Cities Road and Kirkwood Street. The alternate route would require construction traffic to travel east on Twin Cities Road to the intersection of Twin Cities Road and the entrance to the Rancho Seco Park. This park is part of the Rancho Seco facility. Traffic would then turn at the entrance to the Rancho Seco Park and proceed on the road for a short distance. SMUD proposes to construct an access road that would go south and intersect with Clay East Road. At Clay East Road traffic would turn west and travel approximately one-half mile to the CPP site. Parking for the workforce and all related traffic would be provided in the proposed laydown/parking area located both north and south of Clay East Road.

To ensure that the construction access road is built during the early phase of project construction, staff is recommending Condition of Certification **TRANS-5**. This condition requires that prior to the construction workforce reaching a level greater than 100 workers, the project owner shall complete the access road. In addition, the workforce schedule would be set so that construction traffic (no more than 100 workers) avoids the use of Clay East Road during the hours in which school buses would be operating on the roadway (see **TRANS-5**). **TRANS-5** addresses the potential traffic impacts to school buses and children walking on SR104/Twin Cities Road through its requirement that avoids the use of SR 104/Twin Cities Road and Clay East Road during local school bus travel times. Staff is also proposing **TRANS-8**, which establishes a traffic complaint mechanism related to safety for school bus travel and school children walking on SR104/Twin Cities and Clay East roads (see **Exhibit 1**).

Construction traffic would travel on Twin Cities Road and the eastern portion of Clay East Road. These roadways are presently operating at a LOS of A. The effects of construction traffic using Twin Cities Road and the east portion of Clay East Road would not be significant. The LOS for these roadways would still be maintained at acceptable LOS of A and B, as shown in **Traffic and Transportation Table 4, Peak Hour Level of Service**.

Traffic and Transportation Table 4
Peak Hour Level of Service

Intersection Location	Peak Hour Capacity	Annual Average Peak Hour Traffic	V/C* (LOS)	Construction Traffic		Construction and Local Traffic	
				Average	Peak	V/C (LOS)	V/C (LOS)
SR-99/Twin Cities Road	2,100	860	0.41 (A)	236	408	0.52 (A)	0.61 (B)
Twin Cities Road/ Clay East Road	2,000	460	0.23 (A)	236	408	0.35 (A)	0.43 (A)
*V/C = Volume / Capacity							

Although the increase in construction traffic would not significantly affect the LOS for the local roadways and is therefore not seen as a significant impact on traffic, staff has

proposed mitigation measures and conditions of certification to ensure that project related traffic affects are minimized.

Railroad

The applicant intends to use the existing rail spur at the Rancho Seco plant for the delivery of heavy equipment (e.g. steam turbines, combustion turbine, heat recovery steam generators). The heavy equipment would be unloaded near the Rancho Seco plant site and transferred to lowboy trailers pulled by trucks for transport to the CPP site. This equipment would be transported over internal roads within the SMUD property and through a gate to the CPP site. No access to public roadways would be required for truck movement of rail deliveries to the CPP (SMUD 2002o, Data Response 224).

Linear Facilities

Staff's impact analysis of the entire project includes all of the linear facilities. The route for the gas pipeline route is described in detail in the Gas Pipeline section below. The routes for the other linear facilities (e.g., a transmission line and a plant access road) have not been included in this Linear Facilities section, because they are very short, and would be within the confines of the SMUD property.

Gas Pipeline

CPP Phase 1 requires construction of a 26-mile gas fuel pipeline. The pipeline would require approximately seven months to construct. The workforce would average 50 with a peak workforce of 55 during the second and fourth month. This workforce would be traveling to designated locations along the pipeline route where they would park and then be transported to the work site, (SMUD 2001a, Section 6.4). Because of the small workforce associated with the pipeline construction and the fact that they would not be parking in the roadways along the route, there would not be a significant effect on traffic. **Traffic and Transportation Table 5** below lists the proposed route segments, while **Project Description Figures 4** and **5** provides a graphic depiction.

The natural gas fuel pipeline construction activity would consist of normal trenching operations, the use of horizontal directional drilling for water crossings, and jack-and-bore for the crossing of roads and railroad tracks.

Staff believes that there would be some minor impact on traffic along Franklin Boulevard and other roadways, but this can be mitigated with appropriate consultation and coordination with the City of Elk Grove, Sacramento County, and Caltrans, as required by **TRANS-6** and **TRANS-7**.

Use of the railroad right-of-way allows construction activity to occur out of the local roadway system, and it greatly reduces the number of roadway intersections along the route. The two major roadways that intersect the Union Pacific right-of-way are Elk Grove Boulevard and Laguna Boulevard. These roadways were built with overpasses over the railroad tracks, eliminating conflicts with those roadways. This places the remaining construction activity in more rural areas with light traffic.

Traffic and Transportation Table 5
CPP Proposed Natural Gas Pipeline Route

(a) From the Carson Ice-Cogeneration facility the pipeline route would follow the tracks of the Union Pacific Railroad to just south of Elk Grove Boulevard (2.5 miles). It then goes east approximately 0.25 miles to Franklin Boulevard where it turns southwest and proceeds to USGS Benchmark 21and rejoins the railroad right-of-way (1 mile).
(b) At Core Road the route proceeds east to the intersection of Core Road and Ed Rau Road (0.68 miles).
(c) The route then crosses Ed Rau Road and continues east along the existing electric power line corridor for the Rancho Seco plant to a farm road between Carroll and Eschinger roads (3.5 miles).
(d) The route turns south on the farm road to Eschinger Road (0.5 miles).
(e) The pipeline then proceeds east along Eschinger Road until Eschinger Road turn north (0.5 miles).
(f) The pipeline then turns south on the north side of an unimproved farm road to the intersection with another unimproved farm road that turns in a south southeast direction before turning in an easterly direction to the Cosumnes River (2.5 miles).
(g) After crossing under the Cosumnes River the pipeline enters the Cosumnes River Preserve where it continues in a southeast direction. The route intercepts an unimproved maintenance road that parallels electric power lines. It follows the power line maintenance road east to the Union Pacific Railroad tracks (0.9 miles).
(h) The route then runs parallel to the railroad tracks until it connects with a road south of Badger Creek and east of the railroad tracks. After the pipeline crosses the railroad tracks, the route follows the maintenance road southeast and crosses SR 99 where it intersects Arno Road (1.1 miles).
(i) The route then follows Arno Road. When Arno Road turns north the route continues east on Valensin Road crossing Colony Road to Alta Mesa Road. At Alta Mesa Road, it continues east until it reaches an unimproved extension of Laguna Road. The pipeline then follows the unimproved extension of Laguna Road to SR104/Twin Cities Road (6.2 miles).
(j) The pipeline then continues east, north of SR104/Twin Cities Road to the intersection of Clay East Road and SR104/Twin Cities Road (2.4 miles).
(k) At the intersection of Clay East Road and SR104/Twin Cities Road the pipeline proceeds east along Clay East Road to the CPP site (2.2 miles).
Source: SMUD 2001a, § 6 and SMUD 2002ax.

When state highways and regional or local roads would be affected by pipeline construction, the CPP would be required to ensure that the construction contractors obtain all of the necessary roadway encroachment permits. Therefore, staff has proposed **TRANS-2** which would require the applicant to ensure that the construction contractors follow all traffic safety requirements for working in the roadways and that all highway, road, railroad and waterway crossings are installed in compliance with encroachment permitting requirements. This can be accomplished by working with Caltrans, the city of Elk Grove, and Sacramento and Yolo counties.

When possible, the pipeline would be installed out of the roadway in a separate right-of-way. If this were not possible the pipeline would be placed in the roadway which could have an impact on traffic. The exact locations where the pipeline would put in the roadway have yet to be determined and will be included in the traffic control plan (TCP) as required in Condition of Certification **TRANS-5**. It is anticipated that the pipeline would be jack-and-bored underneath the state route and railroad crossings. Condition of Certification **TRANS-5** requires SMUD to develop a TCP to ensure minimal disruption to traffic and allow for its safe passage through the construction zone. If SMUD follows the traffic control measures suggested in the Manual of Traffic Controls for Construction

and Maintenance Work Zones (Caltrans 1998) impacts on traffic would be mitigated to a less than significant level. The TCP would cover such things as lane closures, construction lay down areas, workforce parking, detours, maintaining access over both public and private roads, maintaining access to businesses and residents during construction, and a flag person if required.

Staff does not expect the gas pipeline construction activity to significantly affect the level of service or overall traffic conditions on the roads listed in **Traffic and Transportation Table 5** because the impact on each section of road would be of relatively short duration, and the amount of traffic on most of the roads is minimal. This issue would be addressed in the traffic control plan pursuant to Condition of Certification **TRANS-5**.

Plant Access Road

The applicant has proposed that construction workers and equipment access the CPP site by traveling east along Twin Cities Road, and then by turning south into the joint entrance of the Rancho Seco Park and the Rancho Seco Plant. The workers would then follow the road to the Park for a short distance. Once past the Park's gates, the workers would turn south and follow a new access road that would be built from the gate-house going south to Clay East Road. This new road would be designed to handle the large and heavy loads needed for construction of the CPP. At the intersection of the access road with Clay East Road, traffic would then travel west on Clay East Road to the plant entrance road. Since this section of Clay East Road comes to a dead end to the east, current traffic consists of residents and their visitors, delivery trucks, and local farming and cattle operations located along Clay East Road. This route would keep construction traffic from traveling by the residences located on Clay East Road, see staff's proposed condition of certification **TRANS-8**.

Construction traffic leaving the plant site would turn east on Clay East Road proceeding to the new plant access road. The traffic would exit SMUD property the same way it entered the Rancho Seco Plant entrance at SR 104/Twin Cities Road. SMUD has stated that during construction it would require that all contractors and workforce personnel associated with the construction activity use this route. As appropriate, this requirement would be enforced by having a flagperson at the intersection of Clay East Road and the plant entrance road (see Condition of Certification **TRANS-5**).

Compressor Stations

To ensure that a sufficient supply of natural gas fuel is available for Phase II, SMUD would install one natural gas compressor station in western Yolo County and another in southern Sacramento County. Since the construction activity for the two compressor stations would not be at the CPP site this workforce would not have a traffic impact on SR 104/Twin Cities or Clay East roads.

Yolo County Site

Construction of the proposed gas compressor station in Yolo County would be at the existing SMUD and Pacific Gas & Electric (PG&E) facility. After site preparation and foundations are set, the installation of a compressor at the Yolo County site is expected to take less than two weeks (SMUD 2002p, Section 2.10, Page 2-16).

The expected construction route travel route to this location would be Interstate 505 to County Road 29A (CR 29A) exit. Construction traffic would then travel west on CR 29A to County Road 89 (CR 89). Traffic would then go north on CR 89 to County Road 29 (CR 29). Construction traffic would then take CR 29 west to the compressor site. CR 29 borders the south side of the compressor station.

The construction work should not require construction activity in the local roadways. But construction activity could result in truck traffic temporary blocking traffic in the westbound lane. If this should occur, SMUD would need to consult with Yolo County and prepare a traffic control plan, as required in staff's proposed Condition of Certification **TRANS-5**. Because of the light traffic conditions and short duration of construction activity at this location, the effect on local traffic would not be significant.

Sacramento County Site

The second compressor would be located adjacent to SMUD's existing Valve Station number 190 located north of the Carson Ice-Cogeneration facility on Sacramento Regional Wastewater Treatment Plant property. This location can be accessed from Franklin Road by way of a private access road. In this area, Franklin Road is a four-lane divided road. The construction activity would not take place in any of the area roadways and would take approximately two weeks. Therefore, the effects on traffic would be insignificant.

Hazard Due to a Design Feature or Incompatible Use (e.g., School Buses)

The CPP's level of construction traffic has raised safety concerns for school buses that operate along SR 104/Twin Cities Road and Clay East Road. Both of these rural roads are relatively narrow, with minimal shoulders. Construction traffic traveling on these roads presents a potentially significant impact and safety hazard for children waiting for a school bus, and when children are getting on and off buses.

The school hours for the Arcohe Union Elementary School District are 8:10 a.m. and 2:45 p.m. The District school buses leave the bus storage yard at 6:45 a.m. with student pick-up starting after 7:00 a.m. The school buses pick students up at the school between 2:50 and 2:55 p.m. and are back to the school bus yard between 3:55 and 4:10 p.m. (AUESD 2002a).

The major portion of the construction workforce traffic would be scheduled to arrive at the plant site between 5:30 a.m. and 7:00 a.m. and leave between 3:30 p.m. and 5:30 p.m. (SMUD 2001a, page 8.10-11). Some children may be dropped off at or after 3:30. To mitigate any possible traffic safety concerns about construction traffic affecting safety for the school children, staff has proposed **TRANS-5**. This condition would require SMUD to work with the school district on construction workforce scheduling to avoid having the workers' shifts starting and ending during the school bus route times, including the interval after 3:30 p.m. when students may be walking from the bus stops. Furthermore, staff's proposed **TRANS-8** establishes a mechanism for the public to register complaints (see **Exhibit 1**) regarding school bus or child safety on SR104/Twin Cities Road and Clay East Road.

Emergency Access

The applicant's traffic control plan would address emergency access to the plant site during construction and operation.

Depending on the type of incident, emergency service could come from the Herald Fire Department, the City of Elk Grove, or the City of Sacramento. The Herald Fire Department has an estimated response time of 10 minutes (SMUD 2001a, Section 8.7.4.5). The nearest hospitals to the project site are Kaiser Permanente and Methodist Hospital in south Sacramento, Lodi Memorial Hospital in Lodi, and Dameron and St. Joseph's Immediate Care in Stockton. Proposed Condition of Certification **TRANS-5** would ensure that an acceptable plan for emergency service has been submitted prior to the start of any construction activities.

Emergency vehicles from the Sacramento or Lodi area would likely travel on I-5 or SR-99 to reach Twin Cities and Clay East roads. Construction activity is not expected to impair traffic on these roadways. Condition of Certification **TRANS-5** would require SMUD to address the need for the workforce to travel at off-peak times. This condition takes into account the need to minimize the potential for construction traffic impairing emergency access. I-5 and SR-99 often have significant congestion during the morning and late afternoon commute hours, which could affect emergency access to the CPP site. However, staff observations are that the worst congestion on these freeways occurs north of Mack Road on SR-99 and Meadowview Road on I-5, whereas traffic flow is adequate with an LOS of C in the vicinity of SR 104/Twin Cities Road.

Parking and Laydown Area

Both Phase 1 and 2 of the project would have a combined parking and equipment laydown area for equipment and supplies located directly south of the site on Clay East Road. This 20-acre area would provide adequate parking for the construction workforce, which has a worst case estimate of 328 workers and vehicles. There would be no parking along the roadways by construction workers or trucks delivering materials and supplies to the site. Therefore, traffic flow would not be affected by vehicles parking along the roadways.

Vehicles accessing the laydown area would use the plant access route described above. Condition of Certification **TRANS-8** prohibits all construction traffic from using that portion of Clay East Road that passes the local residents. Traffic from the laydown area to the construction site must cross Clay East Road but would not affect the residential area located along the western portion of Clay East Road. The location of the laydown area would not result in a significant effect on traffic.

Oversize and Overweight loads

Transportation of equipment such as the turbines, which exceeds the roadway load and size limits, would require special permits from the County and/or Caltrans. Caltrans (Caltrans 2002c) and the Herald Fire Protection District (Stigelmayer 2001) reviewed the Traffic and Transportation section (SMUD 2001a, Section 8.10) in the CPP AFC. They were concerned that Twin Cities and Clay East roads may not be able to carry the heavy loads associated with the construction activity without being damaged.

The applicant has agreed to limit the movement of heavy equipment such that no vehicle exceeds the appropriate weight standards based on California Vehicle Code Section 35550 to 35559. For those loads that would exceed the weight limits, the applicant has agreed to use the existing Rancho Seco rail spur to deliver these loads to the CPP site, (SMUD 2002o, Data Response 224). Therefore, equipment that exceeds roadway standards would not be transported on Twin Cities or Clay East roads.

To ensure that the roadways are maintained, staff proposed **TRANS-6** which requires the applicant to repair all roadway damage caused by construction activity. Staff proposed **TRANS-7** requires the applicant to coordinate construction and roadway repair activities with Caltrans.

Construction Traffic Compatibility with Rancho Seco Park

The traffic associated with CPP construction would be compatible with ongoing use of the Rancho Seco Park. The park hours are 7:00 a.m. to 6:00 p.m. with a limited amount of overnight camping, (18 recreational vehicle and 20 camp sites) permitted. The park hours would allow construction traffic to arrive at the CPP site before the park opens. Day visitors to the park would be expected to leave throughout the late afternoon. This could result in construction traffic leaving the plant site at the same time (i.e. between 3:30 and 5:30 p.m. depending on overtime work needs) as visitors are leaving the park area. To ensure traffic safety for those using the park, warning signs about construction traffic and hours should be installed as part of the traffic control plan, (see staff's proposed Condition of Certification **TRANS-5)** to alert local and park traffic about the construction activity. This signage should conform to Caltrans and County standards.

OPERATIONAL PHASE

PERMANENT WORKFORCE TRAFFIC

Operation of the generating plant would require a labor force of approximately 20 full-time employees when both phases of the facility are completed. Assuming that each employee would drive a separate vehicle to work and that they would make one round trip from home to work per day, operation of the plant would generate 40 vehicle trips per day. It has been assumed by staff that the majority of the permanent workforce would reside in the Sacramento area. The likely preferred route for employees coming from the Sacramento area would be south on SR-99 or I-5, east to Twin Cities Road to Clay East Road, then east on Clay East Road to the plant site. The anticipated travel route would accommodate the operations related traffic without any significant traffic impact, and LOS would remain the same.

TRUCK TRAFFIC

Hazardous and non-hazardous materials as described in the AFC Hazardous Materials Handling section would be delivered by truck to the plant site on an incidental basis. The anticipated travel routes for hazardous and non-hazardous materials delivered to the Facility would be south from Sacramento on SR- 99, and then east on Twin Cities Road and Clay East Road to the plant access road. The AFC indicated that all LORS would be followed for the transportation and handling of hazardous material. To ensure

that the transportation of hazardous material for the facility should result in insignificant traffic impacts staff proposes condition of certification **TRANS-3**.

CHANGE IN AIR TRAFFIC PATTERNS

The CPP's stacks at 165 feet in height do not penetrate airspace under the FAA regulation Title 14, Code of Federal Regulations, Part 77.

EMERGENCY ACCESS

The nearest fire station to the CPP is at 11620 Clay Station Road in Herald, which has an estimated response time to the site of approximately 15 minutes. The nearest hospitals to the project site are in south Sacramento (i.e., Kaiser Permanente Hospital and Methodist Hospital), Lodi Memorial Hospital, and Dameron Hospital and St. Joseph's Immediate Care in Stockton.

All roadways are currently and are expected to operate at or above an allowable LOS, with no significant decrease expected from construction or operation of the CPP facility. Staff has concluded that the CPP would not impede or affect first responder emergency access; therefore, no impact is expected.

PARKING

Adequate parking would be made available for the operational workforce at the 30-acre plant site. To ensure that the project provides adequate onsite parking, staff proposes condition of certification **TRANS-4**.

TRANSPORTATION OF HAZARDOUS MATERIAL

The AFC indicates that the operation of the CPP will require approximately two to three 6,000-gallon tanker truck deliveries of aqueous ammonia per week. Transportation and handling of hazardous substances associated with the project can increase the potential for roadway hazards. The handling and disposal of hazardous substances are addressed in the **Waste Management** section and the **Hazardous Materials** section of this document. 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. To ensure that the transportation of hazardous material is insignificant, staff has proposed condition of certification **TRANS-3**. Staff has also proposed related Conditions of Certification in the **Hazardous Materials** section of this Final Staff Assessment.

The California Department of Motor Vehicles specifically licenses all drivers who carry hazardous materials. Drivers are required to carry a manifest, available for inspection by the California Highway Patrol at inspection stations along major highways and interstates. Drivers are also required to check for weight limits and conduct periodic brake inspections. Commercial truck operators handling hazardous materials are also required to take instruction in first aid and procedures on handling hazardous waste spills.

The California Vehicle Code and the Streets and Highways Code (Sections 31600 through 34510) are equally important to ensure that the transportation and handling of

hazardous materials are done in a manner that protects public safety. Enforcement of these statutes is under the jurisdiction of the California Highway Patrol.

CUMULATIVE IMPACTS

The CPP site is located in a rural area of Sacramento County that does not experience heavy traffic flow. At this time there are no proposed projects that would result in additional construction traffic traveling the same routes (SMUD 2001a, Section 8.10.5). Based on the current traffic characteristics (i.e., LOS, AADT, highway capacities) of the area, traffic associated with the CPP operation of the facility would not have a significant traffic impact.

ENVIRONMENTAL JUSTICE

Staff has reviewed Census 2000 information that shows the minority population is less than 50 percent within a six-mile radius of the proposed Cosumnes Power Plant (please refer to **Socioeconomics Figure 1** in this Final Staff Assessment). However, as indicated in **Socioeconomics Figure 1**, there are multiple census blocks with greater than 50 percent minority persons within the six-mile radius; staff considers these to be pockets or clusters. Staff also reviewed Census 2000 information that shows the low-income population is less than fifty percent within the same radius.

Based on the Traffic and Transportation analysis, staff has not identified unmitigated significant direct or cumulative impacts resulting from the construction or operation of the project, and therefore there are no Traffic and Transportation environmental justice issues related to this project.

The majority of workers and trucks traveling to the site are expected to use SR-99, I-5, SR104/Twin Cities Road and Clay East Road. This route would result in the construction traffic avoiding direct movement through any residential or commercial areas with significant traffic.

FACILITY CLOSURE

The planned operational life of the facility is 30 years. At the end of 30 years if the facility is economically viable it could continue to operate. Facility closure could be either temporary or permanent. Temporary closure would be of an unexpected nature and could be caused by disruption in the fuel supply, natural disaster or an emergency. In the event of a temporary closure, the effects on traffic and transportation would be similar to those for normal operation of the facility.

At the end of the project life the facility would be closed in an orderly manner. At that time facility closure and decommissioning would be completed in a manner that: (1) protects the health and safety of the public, and (2) is environmentally acceptable. One-year prior to a planned closure, the applicant would submit a specific decommissioning plan to the Energy Commission for approval.

At the time of closure all then applicable LORS would be identified and the closure plan would address how these LORS would be complied with. The effects of project closure on traffic and transportation would be similar to those discussed for the project construction phase. Closure would involve a peak work period with commute traffic. The removal of waste and other materials would produce impacts from truck traffic. At this time no conclusions can be drawn on the effects of project closure on traffic and transportation.

COMPLIANCE WITH LORS

The applicant has stated its intention to comply with all federal, state, and local LORS. Several proposed conditions of certification have been made to ensure compliance with the LORS. Therefore, the project is considered consistent with identified LORS.

MITIGATION

The applicant needs to comply with all LORS relating to:

- The transport of hazardous materials,
- The transport of oversized loads,
- Necessary encroachment and transportation permits are obtained and complied with for any construction activity within public right-of-way,

The applicant should also implement the following traffic and transportation mitigation measures:

- Use proper signs and traffic control measures in accordance with Caltrans, Sacramento and Yolo counties, and the City of Elk Grove requirements for linear construction projects and work occurring during peak traffic hours;
- Coordinate construction activities with appropriate state, city, and county departments and the Union Pacific Railroad in order to maintain traffic flow and safety;
- Coordinate the construction workforce arrival and departure times to avoid coincidence with the AUESD school bus travel times and the intervals that children would be walking to and from bus stops
- Establish a traffic safety complaint mechanism related to construction traffic on SR104/Twin Cities and Clay East Roads.
- Enforce a policy that all project-related parking for plant construction or linears occurs in designated parking areas;
- Repair any roadway damage associated with the construction of the linears and the plant. Any repair work required shall be coordinated with the appropriate city and county planning department and Caltrans; and
- Prepare a Traffic Control Plan subject to review by the Counties of Sacramento and Yolo, City of Elk Grove, and Caltrans. The Traffic Control

Plan (TCP) would need to address traffic associated with plant construction, the associated linears, the three valve stations, and two gas compressor stations.

RESPONSE TO PUBLIC AND AGENCY COMMENTS

California Department of Transportation

The California Department of Transportation (Caltrans) submitted comments, dated September 17, 2002, on the CPP Preliminary Staff Assessment which noted that installations on right-of-way for freeways and highways are allowed but are subject to the conditions of an encroachment permit review. Typical conditions include restrictions on open trenching, the need for casings, and the appropriate configuration for transverse crossings (Caltrans 2002c).

Two previous sets of comments were attached to the September 17, 2002 submittal. In a letter dated February 13, 2002, Caltrans raised several issues: 1) A traffic management plan should be submitted to Caltrans for review; 2) substructure upgrades may be necessary on SR 104/Twin Cities Road between SR 99 and Clay East Road; 3) any work conducted within State right-of-way would require an encroachment permit; 4) if a new "public owned" sign is proposed along SR99 or SR104/Twin Cities Road it would be built to State standards; and 5) if proposed gas pipelines or electrical transmission lines cross a state highway an encroachment permit would be required.

Comments dated June 11,2002 raised a number of issues related to the placement of the proposed gas pipeline underneath state road crossings including the use of bore and jack, directional drilling, or another method approved by Caltrans. An entry within the right-of-way may be appropriate as long as it would not adversely affect highway operations, and would be below the base of current and future embankments. Caltrans would want to review information related to the minimum depth for boring and jacking, the angle of boring, coordination with roadway maintenance activities, the location of new and out of service pipes, and the precise location of the pipeline crossing locations in relation to state highway and freeway right-of-way.

Staff has proposed several conditions of certification that address Caltrans' concerns and other issues. **TRANS-1** requires the project owner to comply with Caltrans' and other relevant jurisdictions' limitations on vehicle sizes and weights as well as all appropriate transportation permits. **TRANS-2** requires encroachment permits for entry into public rights-of-way. **TRANS-3** would ensure permits and/or licenses are secured from Caltrans for the transport of hazardous materials. **TRANS-5** requires the preparation of a construction traffic control plan after consultation with Caltrans and other relevant jurisdictions. It also requires that all of Caltrans' comments in the September 17, 2002 and previous letters be addressed and implemented during the construction and operation of the CPP. **TRANS-6** requires that the project owner repair any damage to area roadways including those maintained by Caltrans.

CONCLUSIONS AND RECOMMENDATIONS

Staff has analyzed the available capacity for regional roadways and determined that the potentially affected roadways have the capacity to accommodate project-related traffic for the construction and operation of the project. Staff has concluded that during the construction phase, increased roadway demand resulting from the daily movement of workers and materials would not significantly increase congestion and delay, and the level of service on each of the roadways segments would be at acceptable levels.

The potential impact of construction traffic affecting school bus pick-up/drop-off activity on Twin Cities and Clay East roads would be mitigated through proposed condition of certification **TRANS-5**, which requires the applicant to work with the local school district to avoid the school bus travel times. Proposed Condition of Certification **TRANS-8** establishes a public complaint mechanism relating to school bus safety, and safety concerns for school children that are walking from bus stops.

The operational phase for the plant would result in only a slight increase in the daily movement of workers and materials such that the impact would be negligible. The transportation and handling of hazardous substances can be mitigated to insignificance by compliance with federal, state, and local standards; permits established to regulate the transportation of hazardous substances; and staff proposed conditions of certification. The traffic and transportation impacts resulting from construction can be mitigated to a level of insignificance by implementing the following recommendations incorporated in staff's proposed Conditions of Certification.

CONDITIONS OF CERTIFICATION

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

Verification: In the Monthly Compliance Reports, the project owner shall submit copies of any 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 Caltrans and other relevant jurisdictions' limitations for encroachment into public rights-of-way and shall obtain necessary encroachment permits from Caltrans and all relevant jurisdictions. Compliance with this condition shall encompass the items noted in Caltrans' September 17, 2002 letter to the Energy Commission regarding encroachment permits.

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

TRANS-3 The project owner shall ensure that permits and/or licenses are secured from the California Highway Patrol and Caltrans for the transport of hazardous materials.

Verification: The project owner shall include in its Monthly Compliance Reports, copies of all permits/licenses acquired by the project owner and/or subcontractors concerning the transport of hazardous substances.

TRANS-4 During construction of the power plant and all related facilities, the project shall develop a parking and staging plan for all phases of project construction to enforce a policy that all project-related parking occurs on-site or in designated off-site parking areas.

Verification: At least 60 days prior to start of site mobilization, the project owner shall submit the plan to the (City and/or County) for review and comment, and to the CPM for review and approval.

TRANS-5 The project owner shall consult with Caltrans, Sacramento and Yolo counties, and the City of Elk Grove and prepare and submit to the CPM for approval, a construction traffic control plan (TCP) and implementation program (TCP). Staff believes that all of the activities identified by Caltrans in their September 17, 2002 and supporting letters are appropriate, and should be implemented during the construction and operation of the CPP. The TCP should address the following issues:

- Timing of heavy equipment and building materials deliveries;
- Redirecting construction traffic with a flagperson;
- Signing, lighting, and traffic control device placement if required;
- Need for turning restrictions;
- Need for construction work hours and arrival/departure times outside of peak traffic periods, local school bus travel times on SR 104/Twin Cities Road and Clay East Road, and the intervals that children would be walking to and from bus stops;
- Ensure access for emergency vehicles to the project site;
- Temporary travel lane closure;
- Access to adjacent residential and commercial property during the construction of all linears;
- Installation of the gas pipeline, compressor and valve stations;
- Completion of the construction access road as early in the construction phase as possible. Restrict the use of Clay East Road to no more than 100-day shift workers per day until the access road is complete. Require all construction traffic to use Twin Cities Road and the access road to enter and exit the CPP site and laydown area.

Verification: At least 30 days prior to site mobilization, the project owner shall provide to the CPM a copy of the TCP for review and approval.

TRANS-6 Following completion of CPP construction Phase 1 and 2, the project owner shall repair any damage to area roadways incurred during construction of the project to pre-project construction conditions. If there is a multi-year gap (i.e., more than 12 months) between the phases, the project owner must make the repairs after each phase is completed.

Protocol:

Prior to start of construction, the project owner shall photograph, videotape or digitally record images of roadways that would be impacted by the linears and plant construction traffic. For the plant construction, this would include Twin Cities Road between SR-99 and the Rancho Seco facility and Clay East Road between the access road and the entrance to the CPP site. For the natural gas pipeline, this would include those roadways to be impacted by the construction traffic and the laying of the pipelines. The project owner shall provide the CPM, the County of Sacramento, the City of Elk Grove, and Caltrans (as necessary) with a copy of the images for their respective roadway system.

Verification: Within 30 days after completion of the CPP construction, the project owner shall meet with the CPM, the City of Elk Grove, the County of Sacramento, and Caltrans (as needed) to determine the actions necessary and schedule to complete the repair of identified sections of public roadways to original or as near original condition as possible. Following completion of any regional road repair, the project owner shall provide to the CPM a letter from the City of Elk Grove, County of Sacramento, and Caltrans if work occurred within their jurisdiction stating their satisfaction with the repairs.

TRANS-7 Prior to start of construction of Phase 1 and 2, the project owner shall also notify the City of Elk Grove, County of Sacramento, and Caltrans about the schedule for project construction. The purpose of this notification is to postpone any planned roadway resurfacing and/or improvement projects until after the project construction has taken place and to coordinate construction related activities associated with other projects.

Verification: 60 days prior to the start of construction, the project owner shall provide to the CPM a copy of the transmittal notifying the City of Elk Grove, County of Sacramento, and Caltrans of the construction schedule.

TRANS-8 Throughout construction of the project, the project owner shall document, investigate, evaluate, and attempt to resolve all complaints related to construction traffic affecting school bus safety or children walking to and from school bus stops. The project owner or authorized agent shall:

- Use the Traffic Safety Complaint Resolution Form (below, **Exhibit 1**), or functionally equivalent procedure acceptable to the CPM, to document and respond to each traffic safety complaint;
- Attempt to contact the person(s) making the traffic safety complaint within 24 hours;

- Conduct an investigation to determine the source of the traffic safety problem related to the complaint;
- If the traffic safety issue is project related, take all feasible measures to reduce the safety problem 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 traffic safety improvement efforts; and if obtainable, a signed statement by the complainant stating that the traffic safety problem is resolved to the complainant's satisfaction.
- The project owner shall establish a telephone number for use by the public to report any project-related traffic safety issues. 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 project construction is complete.

Verification: Prior to ground disturbance, the project owner shall transmit to the CPM a statement, signed by the project manager, stating that a telephone number has been established and posted at the site, giving the telephone number.

Within 5 days of receiving a traffic safety complaint, the project owner shall file a copy of the Traffic Safety Complaint Resolution Form, with the CPM, documenting the resolution of the complaint. If mitigation is required to resolve a complaint, and the complaint is not resolved within a 3-day period, the project owner shall submit an updated Traffic Safety Complaint Resolution Form when the mitigation is implemented.

REFERENCES

AUESD (Arcohe Union Elementary School District). 2002a. Chris Marciel, telephone conversation with James Fore, (California Energy Commission), March 13, 2002.

Caltrans 2002c. Letter from Jeffrey Pulverman, Chief, Office of Regional Planning, Caltrans, to James Fore, CEC, regarding review of the Cosumnes Power Plant Project. September 17, 2002. Docketed September 18, 2002.

Sacramento County Planning Department, Sacramento County General Plan Circulation Element. December 15, 1993 Revised as of May 2, 1997State of California Department of Transportation. Traffic and Vehicles Data Systems Unit. 1999 All Traffic Volumes on the California State Highway System.

HCM (Highway Capacity Manual), Special Report 209, Third Edition, Transportation Research Board, Washington D.C., 1994.

SMUD (Sacramento Municipal Utility District) 2001a. Application for Certification, Volumes 1 and 2 (01-AFC-19). Submitted to the California Energy Commission on September 13, 2001. Docket date September 13, 2001.

SMUD (Sacramento Municipal Utility District) 2002p. AFC Supplement B. April 15, 2002. Docket date April 15, 2002.

SMUD (Sacramento Municipal Utility District) 2002o. Data Responses, Set 3A. April 15, 2002. Docket date April 15, 2002.

SMUD (Sacramento Municipal Utility District) 2002ax. AFC Supplement D – Pipeline Alignment and Construction Laydown Modifications. November 1, 2002. Docket date November 1, 2002.

Stigelmayer 2001. Letter from Stephen Stigelmayer, Chairman, Herald Fire Protection District, dated November 21, 2001 to Sandra Fromm, Energy Commission , regarding SMUD Cosumnes Power Project. November 21, 2001. Docket date December 7, 2001.

Yolo County Planning Department, Yolo County General Plan Circulation Element. Adopted by Board of supervisors. July 17, 1983.

EXHIBIT 1 – TRAFFIC SAFETY COMPLAINT RESOLUTION FORM

Cosumnes Power Plant Project (01-AFC-19)	
TRAFFIC SAFETY COMPLAINT LOG NUMBER: _____ Complainant's name and address: Phone number: _____	
Date complaint received: _____	Time complaint received: _____
Nature of Traffic safety complaint:	
Definition of problem after investigation by plant personnel: Date complainant first contacted: _____	
Description of corrective measures taken: Complainant's signature: _____ Date: _____	
Date first letter sent to complainant: _____ (copy attached) Date final letter sent to complainant: _____(copy attached)	
This information is certified to be correct: Plant Manager's Signature: _____ Date: _____	

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

TRANSMISSION LINE SAFETY AND NUISANCE

Testimony of Obed Odoemelam, Ph.D.

INTRODUCTION

The energy from both phases (1 and 2) of the proposed Cosumnes Power Plant (CPP) would be delivered to the Sacramento Municipal Utility District (SMUD) transmission system through a new double-circuit 230 kV, overhead transmission line running 0.4 miles from the plant's 230 kV switchyard to the main switchyard at SMUD's decommissioned nuclear-powered Rancho Seco Plant to the north. This Rancho Seco Switchyard serves as a major energy distribution hub for the SMUD system and would be used to distribute the CPP-generated energy into both this and the Pacific Gas and Electric (PG&E) northern California power grid. The proposed CPP site was chosen for land availability and its proximity to this major SMUD distribution hub (SMUD 2001a, page 5-1). Since the proposed interconnection line would be owned and operated by SMUD (SMUD 2001a, pages 1-3 and 5-1), it would be designed and built according to standard SMUD practices that ensure compliance with existing health and safety laws, ordinances, regulations, and standards (LORS), as discussed below.

The purpose of this staff analysis is to assess the proposed transmission line construction and operational plan for incorporation of the measures necessary for compliance with these health and safety LORS. If such compliance is established, staff will not recommend further mitigation measures with respect to the field and non-field issues of concern in this analysis; if not, staff would recommend revisions to the project as appropriate. Staff's analysis focuses on the following issues:

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

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Discussed below by subject area are design-related LORS applicable to the physical impacts of the overhead transmission lines as proposed for CPP. The potential for these impacts will depend on the project's compliance with these LORS, which are specific federal or state regulations or established industry standards and practices. There presently are no local laws or regulations specifically aimed at those aspects of the structure or dimensions of electric power lines that influence the magnitude of the impacts noted above. The only such regulations are those requiring such lines to be located underground because of the potential for visual impacts on the landscape.

AVIATION SAFETY

Any hazard to area aircraft would relate to the potential for collision in the navigable air space. The applicable federal LORS discussed below are intended to ensure the distance and visibility necessary to prevent such collisions.

Federal

- Title 14, Part 77 of the Federal Code of Regulations (CFR), "Objects Affecting the Navigation Space." Provisions of these regulations specify the criteria used by the Federal Aviation Administration (FAA) for determining whether a "Notice of Proposed Construction or Alteration" is required for potential obstruction hazards. The need for such a notice depends on factors related to the height of a structure, the slope of an imaginary surface from the end of nearby runways to the top of the structure, and the length of the runway involved. Such notification allows the FAA to ensure that all structures are located to avoid the aviation hazards of concern.
- FAA Advisory Circular (AC) No. 70/460-2H, "Proposed Construction and or Alteration of Objects that May Affect the Navigation Space." This circular informs each proponent of a project that could pose an aviation hazard of the need to file the "Notice of Proposed Construction or Alteration" (Form 7640) with the FAA.
- FAA AC No. 70/460-1G, "Obstruction Marking and Lighting." This circular describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.

INTERFERENCE WITH RADIO-FREQUENCY COMMUNICATION

Transmission line-related radio-frequency interference is one of the indirect effects of line operation produced by the physical interactions of line electric fields. Since electric fields are unable to penetrate most materials, including the ground, such interference and other electric field effects are not associated with underground lines. The level of any such interference usually depends on the magnitude of the electric fields involved. Because of this, the potential for such impacts can be assessed from field strength estimates obtained for the line. The interference is due to the radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as corona discharge but is referred to as spark gap electric discharge when it occurs within gaps between the conductor and insulators or metal fittings. When generated, such noise manifests itself as perceivable interference with radio or television signal reception or interference with other forms of radio-frequency communication. Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration and weather conditions, maximum interference levels are not specified as design criteria for modern transmission lines. The following regulations are intended to ensure that such lines are located away from areas of potential interference and that any interference is mitigated whenever it occurs.

Federal

- Federal Communications Commission (FCC) regulations in Title 47 CFR, Section 15.25. Provisions of these regulations prohibit operation of any devices producing

force fields, which interfere with radio communications, even if (as with transmission lines) such devices are not intentionally designed to produce radio-frequency energy. For such lines, such interference is minimized from the use of specific low-corona cables as conductors. The FCC requires each line operator to address all complaints about interference on a case-specific basis.

State

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

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

AUDIBLE NOISE

Industry Standards

There are no design-specific federal regulations that limit the audible noise from transmission lines. As with radio noise, such noise is limited instead through design, construction, or maintenance practices established from industry research and experience. These practices are effective but do not significantly impact line safety, efficiency, maintainability, and reliability. All modern overhead high-voltage lines are designed to assure compliance. As with radio-frequency noise, such audible noise usually results from the action of the electric field at the surface of the line conductor and could be perceived as a characteristic crackling, frying or hissing sound, or hum, especially in wet weather. Since the noise level depends on the strength of the line electric field, the potential for perception can be assessed from estimates of the field strengths expected during operation. Such noise is usually generated during rainfall, but mainly from overhead lines of 345 kV or higher. Research by the Electric Power Research Institute (EPRI 1982) has validated this by showing the fair-weather audible noise from modern transmission lines to be generally indistinguishable from background noise at the edge of a 100-foot right-of-way.

NUISANCE SHOCKS

Industry Standards

There are no design-specific federal regulations to limit nuisance shocks in the transmission line environment. For modern overhead high-voltage lines, such shocks are effectively minimized through grounding procedures specified in the National Electrical Safety Code (NESC) and the joint guidelines of the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE). Nuisance shocks are caused by current flow at levels generally incapable of causing significant physiological harm. They result mostly from direct contact with metal objects electrically charged by fields from the energized line. Such electric charges are

induced in different ways by the line electric and magnetic fields. As with the proposed overhead line, the applicant is responsible in all cases for ensuring compliance with these grounding-related practices within the right-of-way.

FIRE HAZARDS

The fire hazards addressed through the following regulations are those that could be caused by sparks from conductors of overhead lines, or that could result from direct contact between the line and nearby trees and other combustible objects.

State

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

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

HAZARDOUS SHOCKS

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

State

- GO-95, CPUC, "Rules for Overhead Line Construction." These rules specify uniform statewide requirements for overhead line construction regarding ground clearance, grounding, maintenance, and inspection. Implementing these requirements ensures the safety of the general public and line workers.

- Title 8, California Code of Regulations, Sections 2700 through 2974. "High Voltage Electric Safety Orders." These safety orders establish essential requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment

Industrial Standards

No design-specific federal regulations have been established to prevent hazardous shocks from overhead power lines. Safety is assured within the industry from compliance with the requirements in the National Electrical Safety Code, Part 2: Safety Rules for Overhead Lines. These provisions specify the minimum national safe operating clearances applicable in areas where the line might be accessible to the public. They are intended to minimize the potential for direct or indirect contact with the energized line.

ELECTRIC AND MAGNETIC FIELD (EMF) EXPOSURE

The possibility of deleterious health effects from electric and magnetic field exposure has increased public concern in recent years about living near high-voltage lines. Both fields occur together whenever electricity flows, hence the general practice of describing exposure to them together as EMF exposure. The available evidence as evaluated by CPUC, other regulatory agencies, and staff, has not established that such fields pose a significant health hazard to exposed humans. However, staff considers it important, as does the CPUC, to note that while such a hazard has not been established from the available evidence, the same evidence does not serve as proof of a definite lack of a hazard. Staff, therefore, considers it appropriate, in light of present uncertainty, to recommend feasible reduction of such fields without affecting safety, efficiency, reliability, and maintainability.

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

- Any exposure-related health risk to the exposed individual will likely be small.
- The most biologically significant patterns (e.g., high-level, short-term versus low-level, long-term) of exposures have not been established.
- Most health concerns are about the magnetic field.
- The measures employed for such field reduction can affect line safety, reliability, efficiency, and maintainability, depending on the type and extent of such measures.

State

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

In keeping with this CPUC policy, staff requires each applicant to show how each proposed overhead line would be designed to comply with the EMF-reducing design guidelines applicable to the utility service area involved. These field-reducing measures can impact line operation if applied without appropriate regard for environmental and other local issues bearing on safety, reliability, efficiency, and maintainability. Therefore, it is up to each applicant to ensure that such measures are applied to an extent that does not significantly affect line operation and safety. The extent of such

applications would be reflected by the ground-level field strengths as measured during operation. When estimated or measured for lines of similar voltage and current-carrying capacity, such field strength values can be used by staff and other regulatory agencies to assess each line design for effectiveness at field strength reduction. These field strengths can be estimated for any given design using established procedures. Estimates are specified for a height of one meter above the ground, in units of kilovolts per meter (kV/m), for the electric field, and milligauss (mG) for the companion magnetic field. Their magnitude depends on line voltage (in the case of electric fields), the geometry of the structures, degree of cancellation from nearby conductors, distance between conductors and, in the case of magnetic fields, amount of current in the line.

Since each new line in California is currently required to be designed according to the EMF-reducing guidelines of the utility in the service area involved, its fields are required under existing CPUC policies to be similar to fields from similar lines in that service area.

Industrial Standards

There are no health-based federal regulations or industry codes specifying limits on the strengths of fields from power lines. However, the federal government continues to conduct and encourage research necessary for an appropriate policy on the EMF health issue.

In the face of the present uncertainty, several states have opted for design-driven regulations ensuring that fields from new lines are generally similar to those from existing lines. Some states (such as Florida, Minnesota, New Jersey, New York, and Montana) have set specific environmental limits on one or both fields in this regard. These limits are, however, not based on any specific health effects. Most regulatory agencies believe, as does staff, that health-based limits are inappropriate at this time and that the present knowledge of the issue does not justify any retrofit of existing lines.

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

SETTING

According to information from SMUD (SMUD 2001a, pages 1-1, 2-2, 5-1, 8.4-5, 8.5-7, 8.6-4, and 8.8-2), the proposed CPP and related switchyard would be located on approximately 30 acres within a 2,480-acre area owned by SMUD. The site is located in southeastern Sacramento County, approximately 25 miles southwest of the City of Sacramento, 4 miles north of the San Joaquin County line, and 5 miles west of the Amador County line. The site, as previously noted, was chosen partly because of its close proximity to the existing Rancho Seco Switchyard, through which the generated energy would be distributed (SMUD 2001a, page 5-1). Such proximity would allow for electrical interconnection with the relatively short (0.4-mile) transmission line proposed.

The proposed site is within an undeveloped portion of SMUD's property surrounded by undeveloped open spaces, the Rancho Seco Power Plant and Reservoir, and a few permanent rural residences, the nearest of which is 800 feet to the southwest. As more fully discussed by SMUD (SMUD 2001a, pages 8.4-5 through 8.4-7, 8.8-18, and 8.11-2), the site is currently used only for cattle grazing for weed control and is part of 2,480 acres purchased by SMUD for locating the Rancho Seco Plant that operated between 1975 and 1989. A portion of the proposed project site was intended for construction of Unit 2 of the Rancho Seco Plant. A 40-acre portion is used for a solar farm that currently produces electricity. The Rancho Seco Plant and related facilities are immediately to the north of the CPP site.

The route of the project's transmission line will be located entirely within SMUD's property lines and will run parallel to the 230 kV double-circuit PG&E line that extends from the Rancho Seco Switchyard to the Bellota Substation to the south. Since the line would traverse grazing land without nearby residences, the residential field exposure of the present concern would be insignificant for this project. The only project-related EMF exposures of potential significance are the short-term exposures to plant workers, regulatory inspectors, maintenance personnel, approved guests, or individuals in transit across the project's lines. These types of exposures are short term and well understood as not significantly related to the present health concern.

PROJECT DESCRIPTION

The proposed CPP transmission line would consist of the segments listed below:

- A new double-circuit and single-circuit 230 kV overhead line within a 0.4-mile route extending from the project's on-site, 230 kV switchyard to the existing Rancho Seco 230 kV Switchyard to the north;
- The new CPP 230 kV Switchyard; and
- Relatively minor project-related modifications at the Rancho Seco Switchyard to be interconnected.

As more fully discussed in the information from the applicant (SMUD 2001a, page 5-8, and 2002p, pages 1-3), the proposed project line would be carried on double-circuit and single-circuit steel poles of between 85 feet and 125 feet in height as it is routed within SMUD-owned property. The typical structures and dimensions of these support poles were provided by SMUD as relevant to line safety and field reduction effectiveness. Six

such towers would be used. Details of the proposed tower structure and conductor placement schemes were also provided. The reason for designing the proposed line according to the previously-noted standard SMUD practice, is the current PUC requirement to incorporate the field-reduction guidelines of the area's electric utility as a standardized way of dealing with the concern about line EMF and health. The service utility in this case is SMUD whose field-reducing guidelines were established accordingly. Staff's only requirement for this CPP project is SMUD's verification of its intention to implement the specific measures involved. Any non-SMUD line that is proposed for this SMUD service area would have to be designed to incorporate these same EMF-reducing measures. Effective incorporation would later be verified through operational-phase field strength measurements whose results would be used for comparison with fields from SMUD lines of the same voltage and current-carrying capacity.

IMPACTS

GENERAL IMPACTS

GO-95, and Title 8, CCR Section 2700 et seq., as noted in the LORS section, ensure the minimum regulatory requirements necessary to prevent the direct or indirect contact previously discussed in connection with hazardous shocks or aviation hazards. Of secondary concern are the noted field impacts manifesting themselves as nuisance shocks, radio noise, communications interference, and magnetic field exposure. The relative magnitude of such impacts would be reflected in the field strengths characteristic of a given line design. Since applied field-reducing measures can affect line operations and safety, the extent of their implementation and resulting field strengths will vary according to environmental and other local conditions bearing on line safety, efficiency, reliability, and maintainability. SMUD established its own design guidelines as best applicable to its utility service area. Given the present CPUC requirement to maintain the noted impacts within the levels associated with existing lines, compliance with applicable LORS would be achieved by showing the project-specific fields to be within the range associated with SMUD lines of the same voltage and current-carrying capacity.

PROJECT SPECIFIC IMPACTS

Aviation Safety

As noted by the applicant (SMUD 2001a, page 5-13), the proposed transmission line would not pose a collision hazard to any area aircraft when judged according to current FAA criteria regarding distance and direction from the primary runway. Furthermore, the line's support towers would (at a maximum height of 125 feet) not be tall enough to pose a potential collision hazard to area aircraft as defined using the criteria in the previously noted FAA regulations. The same lack of a collision hazard has been true for the 230 kV PG&E Rancho Seco-Bellotta line running alongside the proposed line. While an FAA "Notice of Construction or Alteration" would not be required for the proposed line, SMUD would contact the FAA about the current proposal, as is standard industry practice.

Audible Noise and Interference with Radio-Frequency Communication

The previously noted corona-related communications interference is most commonly caused by irregularities (such as nicks and scrapes on the conductor surface), sharp edges on suspension hardware, and other discontinuities around the conductor surface. The proposed lines would be built and maintained according to SMUD practices that minimize such surface irregularities and discontinuities. Moreover, the potential for such corona-related audible noise and interference is usually of concern for lines of 345 kV and above and not the proposed and similar SMUD lines of 230 kV. The low-corona design for the proposed project line would be the same as used for other SMUD lines of the same voltage (SMUD 2001a, page 5-11) in compliance with the previously noted FCC (Title 47, CFR §15.25) and GO-52 prohibitions against interference with radio communication. Since (a) the edge of the right-of-way would mark the beginning of the areas of possible human habitation around a high-voltage line, and (b) the nearest permanent human residence is about 800 feet from the proposed route, staff does not expect the proposed line to generate any complaints about operational noise, or interference with residential radio or television use. In the unlikely event of specific complaints, SMUD would be responsible (as with other SMUD lines) for the necessary mitigation as required by the FCC. Staff recommends a specific condition of certification (**TLSN-3**) in this regard. For an assessment of noise from all aspects of the project construction and operation, please see staff's analysis in the **Noise and Vibration** section.

Fire Hazards

Standard fire prevention and suppression measures for all SMUD lines would be implemented for the proposed line. SMUD's intended compliance with the clearance-related aspects of GO-95 would be an important part of this compliance approach (SMUD 2001a, pages 5-9 through 5-14). Moreover, the route for the proposed interconnection line would mostly be undeveloped land with no trees or brush that would pose a significant hazard of contact-related line fires. SMUD's fire prevention practices for high-voltage lines would be implemented in compliance with Title 14, Section 1250 of the California Code of Regulations.

Hazardous Shocks

SMUD's noted intention to implement the GO-95- related measures together with requirements in specific sections of Title 8, California Code of Regulations, §2700 et seq. against direct contact with the energized line, as is normal SMUD practice (SMUD 2001a, pages 5-9 through 5-14), would serve to minimize the risk of hazardous shocks. Staff recommends condition of certification **TLSN-1** to ensure implementation of the necessary mitigation measures.

Nuisance Shocks

The potential for nuisance shocks around the proposed lines would be minimized through standard grounding practices (SMUD 2001a, page 5-13). Staff recommends condition for certification **TLSN-2** to ensure such grounding.

Electric and magnetic field exposure

Since (a) the proposed CPP is of similar generating capacity as the decommissioned Rancho Seco Plant (SMUD 2001a, page 5-11) and (b) the power from CPP would be

transmitted using the same electrical distribution infrastructure as the Rancho Seco Plant, staff concludes that the electric and magnetic fields generated by the CPP lines would be the same as those generated by the Rancho Seco Plant in the past. (The present CPUC policy against any EMF-related retrofit of existing infrastructure means that EMF related compliance would be achieved by maintaining field intensities within levels associated with existing designs). The only area of potential change during CPP operation would be along the 0.4-mile transmission line connecting CPP to the Rancho Seco Switchyard (within SMUD's property lines). This change would derive directly from the line's contributions to existing field levels. The environmental acceptability of these contributed fields (as compared with fields from SMUD lines of similar voltage and current-carrying capacity) would depend on SMUD's implementation of the field strength-reducing measures required under current CPUC policy. SMUD has identified these field-reducing approaches in their current guidelines SMUD (SMUD 2001a, page 5-12). It is the effective incorporation of the related field reduction measures that constitutes compliance with the field and non-field health and safety LORS of concern to staff.

Details of the field reduction approaches in SMUD's guidelines were provided to staff with respect to the following:

- Distance between the conductors and the ground;
- Spacing between conductors on the same line;
- Distance between conductors in nearby lines;
- Line current levels; and
- Current flow alignment for effective field cancellation.

Since these field reducing measures have been incorporated into the proposed line design to the extent SMUD considers to be without impacts on line safety, efficiency, reliability, and maintainability, staff considers further mitigation as presently unnecessary but recommends a specific condition of certification (**TLSN-4**) to allow for validation of the reduction efficiency attributable to the proposed line design. The need for further mitigation would be assessed by comparing the measured field strengths with fields from SMUD lines of the same voltage and current-carrying capacity.

CUMULATIVE IMPACTS

Since the proposed CPP line would be designed according to the applicable SMUD design guidelines (as currently required for effective field management), staff expects the field strengths and any contribution to cumulative area exposures to be at the same level as with existing SMUD lines of the same voltage and current-carrying capacity. This similarity in generated and contributed fields would reflect compliance with current CPUC requirements on line field management. The actual contribution from this proposed line design would be assessed from field the strength measurements specified in **TLSN-4**.

ENVIRONMENTAL JUSTICE

Staff has reviewed Census 2000 information, which indicates that while there are specific census blocks with a minority population of greater than 50 percent within a 6-mile radius of the proposed project, the average percentage for the area is 16.5 percent. As shown in **Socioeconomics Figure 1**, these blocks in question have relatively few individuals that live within them. Since these locations are far removed from the proposed transmission line corridor, the fields from the proposed lines would not contribute significantly to the total EMF exposure, thereby minimizing the potential for the disproportional impacts at the root of the concern over environmental justice.

Staff has reviewed Census 2000 data (as presented in **Socioeconomics Figure 2**), which shows that 7.6 percent of the residents within a 6-mile radius could be considered low-income. This percentage composition is much below the environmental justice threshold of 50 percent.

COMPLIANCE WITH LORS

Current CPUC policy on safe EMF management requires that each service utility incorporate specific field reduction measures into the design for new or upgraded high-voltage lines, as previously noted. Staff recommends compliance with this requirement for all the lines that are permitted by the Energy Commission. Since SMUD proposes to apply the necessary measures to the design for the proposed CPP line in ways that minimize the field and non-field impacts of concern to staff, staff considers the proposed design and operational plan to be in compliance with all applicable health and safety LORS.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Since electric or magnetic field health effects have neither been established nor ruled out for overhead or underground lines, the public health significance of any CPP-related field exposures cannot be characterized with certainty. The long-term, mostly residential, magnetic exposure at the root of the present health concern would be insignificant for the proposed 0.4-mile interconnection line given the general absence of residences along the proposed route. On-site worker or public exposures would be short-term and at levels associated with SMUD lines of similar designs and current-carrying capacity. Such exposures are well understood and have not been established as posing a health hazard to humans.

The potential for nuisance shocks would be minimized through grounding and other field-reducing measures to be implemented by SMUD in keeping with current SMUD guidelines reflecting common industry practices. The proposed line support structures are neither tall enough nor close enough to pose a significant collision hazard to area aircraft, according to FAA criteria. The use of low-corona line design together with appropriate corona-minimizing construction practices would minimize the potential for

corona noise and its related interference with radio-frequency communication anywhere in the project area.

RECOMMENDATIONS

Since the project's 230 kV lines would be designed to minimize the safety and nuisance impacts of specific concern to staff and routed within SMUD's property boundaries away from residential areas, staff does not recommend any changes to the proposed construction and operational plan. If the proposed power plant is approved, staff recommends adoption of the conditions of certification specified below to ensure implementation of the measures necessary to achieve the field reduction and safety assumed by SMUD for its proposed transmission line.

CONDITIONS OF CERTIFICATION

TLSN-1 SMUD, the project owner, shall construct the proposed project transmission line according to the requirements of CPUC's GO-95, GO-52, Title 8, Section 2700 et seq. of the California Code of Regulations, and PG&E's EMF reduction guidelines arising from CPUC Decision 93-11-013.

Verification: 30 days before starting construction of the CPP 's transmission line or related structures and facilities, SMUD shall submit to the Energy Commission's Compliance Project Manager (CPM) notification that the overhead section will be constructed according to the requirements GO-95, GO 52, Title 8, Section 2700 et seq. of the California Code of Regulations, and SMUD's EMF-reduction guidelines arising from CPUC Decision 93-11-013.

TLSN-2 SMUD shall ensure that all metallic objects along the route of the overhead section are grounded according to industry standards.

Verification: At least 30 days before the lines are energized, SMUD shall transmit to the CPM a letter confirming its intention to comply with this condition.

TLSN-3 SMUD shall take reasonable steps to resolve any complaints of interference with radio or television signals from operation of the proposed line.

Verification: Any reports of line-related complaints shall be summarized only for the first year along with related mitigation measures, and provided to the CPM in the Annual Compliance Report.

TLSN-4 SMUD shall measure the strengths of the line electric and magnetic fields from the proposed 0.4-mile line before and after it is energized. Measurements shall be made at representative points (on-site and along the line route as defined by IEEE protocols) as necessary to identify the maximum field exposures possible during operations. Staff would assess the need to recommend further mitigation through comparison with fields from SMUD lines of the same voltage and current-carrying capacity.

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

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VISIBLE PLUMES

Testimony of Dale Edwards

SUMMARY

Energy Commission staff analyzed the potential visual impacts of the proposed Cosumnes Power Plant (CPP) project's (both Phase 1 and Phase 2) cooling tower visible water vapor plume and the compliance of the project's plume with applicable laws, ordinances, regulations, and standards (LORS).

Staff has concluded that the project's cooling tower water vapor plumes would be somewhat frequent and vary in size from small to large, but due to the existing Rancho Seco Power Plant which is adjacent to the proposed project, the overall short duration that plumes are predicted to occur on clear days, and the generally moderate level of visual change plumes would cause to the view when present, their direct visual impact would be adverse but less than significant to close-in and more distant viewing locations. The project's cooling tower water vapor plume would also result in adverse but less than significant cumulative visual impacts, considering the existing Rancho Seco Power Plant and most notably the parabolic cooling towers, because the plume would be visible typically for a short period of time on some days during approximately half the year.

INTRODUCTION

This analysis focuses on whether water vapor plumes from the proposed CPP would cause significant adverse visual impacts.

ORGANIZATION OF ANALYSIS

This analysis is organized as follows:

- Description of analysis methodology;
- Description of applicable laws, ordinances, regulations and standards;
- Description of the project's plumes that may have the potential for significant visual impacts;
- Assessment of the visual setting of the proposed power plant site;
- Evaluation of the visual impacts of the proposed project's plumes on the existing setting;
- Evaluation of compliance of the project with applicable laws, ordinances, regulations, and standards;
- Identification of measures needed to mitigate any potential significant adverse impacts of the proposed project's plumes and to achieve compliance with applicable laws, ordinances, regulations, and standards;
- Conclusions and Recommendations; and
- Proposed Conditions of Certification.

METHODOLOGY

Visible plume analysis is inherently subjective. However, the use of generally accepted criteria for determining impact significance and a clearly described analytical approach aid in developing an analysis that can be readily understood.

Significance Criteria

Energy Commission staff considered the following criteria in determining whether a visual impact from visible plumes would be significant. There are no federal significance criteria for visual impacts.

State

The CEQA Guidelines define a "significant effect" on the environment as a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including...objects of historic or aesthetic significance." (Cal. Code Regs., tit.14, § 15382).

Appendix G of the Guidelines, under Aesthetics, lists the following questions to be addressed in evaluating whether the potential impacts of a project are significant:

1. Would the project have a substantial adverse effect on a scenic vista?
2. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?
3. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?
4. Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

Local

Energy Commission staff considers any local goals, policies, or designations regarding visual resources. Conflicts with such laws, ordinances, regulations, and standards may constitute significant visual impacts. See the following Laws, Ordinances, Regulations, and Standards section, beginning on page 4.11-4.

Evaluation Process

The proposed project's plumes would be visible from a number of areas in the project region. Energy Commission staff evaluated the visual impact of the plumes from two key observation points (KOP 2 and KOP 3) which represent the views from areas, in general, at a distance of approximately one mile and two miles and beyond. For each KOP, staff considered the existing visual setting and the visual changes that the project's plumes would cause to determine impact significance. Existing condition photographs and plume photo-simulations from each KOP are included in this analysis (see **Visible Plumes Figure 1** through **4**). To assess the existing visual setting, staff consider the elements of visual quality, viewer expectation, and viewer exposure. These are combined in one element called Overall Visual Sensitivity. Each of these elements is described below.

Overall Visual Sensitivity

The overall visual sensitivity is derived from the values assigned to visual quality, viewer expectation, and viewer exposure. The values for each of these elements can range from high to low.

Visual Quality

Visual quality is an expression of the visual impression or appeal of a given landscape and the associated public value attributed to the visual resource. This analysis evaluates visual quality as ranging from high to low. High visual quality is a rating reserved for landscapes that would be what a viewer might think of as “picture postcard” landscapes. Low visual quality describes landscapes that are often dominated by visually discordant human alterations, and do not provide views that people would find inviting or interesting (Buhyoff et al. 1994).

Viewer Expectation

Viewer expectation is a measurement of the level of viewer interest regarding the visual resources in an area. Land use is an important indicator of viewer expectation, because it dictates the types of development that may occur. Uses associated with 1) designated parks, monuments, and wilderness areas, 2) scenic highways and corridors, and 3) recreational areas are generally considered to have high viewer expectation. Existing landscape character may temper viewer expectation on some State and locally designated scenic highways and corridors, and on other highways and roads. Residential uses can have a variety of viewer expectation levels based on their surroundings. Commercial uses, including business parks, typically have low-to-moderate viewer expectation, though some commercial developments have specific requirements related to visual quality, with respect to landscaping, building height limitations, building design, and prohibition of above-ground utility lines. Industrial uses typically have the lowest viewer expectation because workers are focused on their work, and generally are working in surroundings with relatively low visual value.

Viewer Exposure

The visibility of a landscape feature (which includes the viewing distance to the landscape feature), the number of viewers, and the duration of the view all affect the exposure of viewers to a given landscape feature. Visibility is highly dependent on screening and angle of view. The smaller the degree of screening and/or the closer the feature is to the center of the view area, the greater its visibility. Increasing distance reduces visibility. Viewer exposure can range from low values for all factors, such as a partially obscured and brief background view for a few motorists, to high values for all factors, such as an unobstructed foreground view from a large number of residences.

Overall Visual Change

The overall level of visual change is derived from the values assigned primarily to the dominance that the plumes would have in the landscape in relation to the viewer, but contrast and view disruption are also factors that are considered. The values for each of these elements can range from high to low.

Dominance

Dominance is a measure of a feature's apparent size relative to other visible landscape features and the total field of view (scale dominance). A feature's dominance is also affected by its relative location in the field of view (spatial dominance), and the distance between the viewer and the feature. The level of dominance may be: subordinate (low), co-dominant (moderate), or dominant (high).

Contrast

Visual contrast describes the degree to which a project's visual characteristics or elements (consisting of form, line, color, and texture) differ from the same visual elements established in the existing landscape. The degree of contrast can range from high to low.

View Disruption

View disruption includes view blockage, which considers the extent to which any previously visible landscape features are blocked from view by the project, and also the breaking up of a view of large landforms such as mountain ranges. Blockage of higher quality landscape features by lower quality project features causes adverse visual impacts. The degree of view disruption can range from high to none.

Impact Significance

Staff determines impact significance by evaluating the Overall Visual Sensitivity for each KOP and the Overall Visual Change as viewed for each KOP.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following discussion of federal, state, and local laws, ordinances, regulations, and standards is based on Section 8.11.2 (LORS) of the Application for Certification (SMUD 2001a, pp. 8.11-1 and 8.11-14 through 9.11-21) and an independent review of the Sacramento County General Plan and Zoning Ordinance.

FEDERAL

No federal LORS pertaining to visual resources apply to the proposed project.

STATE

In the project vicinity, there are no state designated or eligible scenic highways (Caltrans 2002).

LOCAL

The proposed generating facility site is located in Sacramento County and would be subject to any county laws, ordinances, regulations, and standards (LORS) pertaining to the protection and maintenance of visual resources in Sacramento County.

Two applicable LORS from Sacramento County are found in the Public Facilities element of the Sacramento County General Plan. The relevant local LORS and an

assessment of the project's LORS consistency are presented in a later section of this analysis.

SETTING

REGIONAL LANDSCAPE

The proposed project would be located in a sparsely developed region of southeast Sacramento County in a landscape characterized by rolling hills, vineyards, cattle grazing land, open space, rural residences, and energy production and transmission infrastructure. The most prominent features in the regional landscape are the Rancho Seco Power Plant's twin 426-foot-high parabolic cooling towers, which will remain standing following the decommissioning of Rancho Seco Power Plant (SMUD 2001a, pp. 8.11-1 and 2). In the distance to the east are the Sierra Nevada Mountains, which are visible on days when they are not obscured by haze and air pollution. Other noticeable features in the primarily rural landscape are the electric transmission lines that converge on the Rancho Seco substation; and utility lines along Twin Cities Road, the principal east-west roadway in the project vicinity that passes north of the project site. The principal recreation facility in the region is Rancho Seco Park, located approximately 1.6 miles east of the project site. The park offers day use swimming, picnicking, fishing, and overnight camping.

PLUME VIEWSHED

The distance zones used within this analysis are defined as *foreground* (0-to ½-mile), *middleground* (1/2 to 2 miles), and *background* (beyond 2 miles). Within these zones there are many viewing opportunities. Most viewing opportunities are from the west and south of the project site and some available views are unobstructed and panoramic, encompassing broad vistas of agricultural lands and expansive distances of sky. Many views from the south and west are screened by the rolling terrain and/or mature trees (a substantial number of which are eucalyptus). Views from Twin Cities Road in the immediate project vicinity are partially screened by the intervening rolling terrain. Foreground to middleground views of the proposed project are available from (a) Clay East Road, south of Twin Cities Road (immediately adjacent to the south side of the site), (b) the nearest residences on Clay East Road (0.2 mile southwest of the site), (c) about 50 residences within approximately two miles southwest of the site, and (d) the recreational use areas of Rancho Seco Park approximately 1.6 miles east of the site. A middleground to background view of the site is available from several hilltop residences west of the project site including one on Clay Station Road, approximately 2 miles northwest of the project site.

The cooling tower plumes' dimensions and frequency are described in the **Visual Impacts of Vapor Plumes** section of this analysis. Because the plumes would be similar in height to the existing Rancho Seco cooling towers, the viewshed for the plumes would be similar to that of the existing structures. As noted in the AFC, (SMUD 2001a, pp. 8.11-2 and 3), the 426-foot tall cooling towers of the Rancho Seco Power Plant are visible at least five miles to the west along Twin Cities Road and at least seven miles to the northeast along Twin Cities Road. The towers are intermittently visible from locations extending out more than 12 miles in most directions from the

power plant, including from northbound State Route 99. The cooling towers are also visible from elevated vantage points at substantially greater distances, such as briefly for westbound U.S. Highway 50 motorists as they descend the Sierra Nevada mountains into the Sacramento Valley.

IMMEDIATE POWER PLANT VICINITY

Similar to the project region, the immediate power plant vicinity presents a mosaic of uses comprised primarily of rural residential intermixed with vineyards, cattle grazing, undeveloped open space, and energy production. The visual character of the immediate project vicinity, while decidedly rural, is dominated by the industrial character and structural prominence of the Rancho Seco Power Plant and the transmission lines converging on the power plant. The 30-acre project site is characterized by level terrain supporting primarily annual grassland, which is used as pasture.

KOP 2 – Intersection of Clay East Road and Kirkwood Street (Same as Visual Resources KOP 2)

KOP 2 is located approximately one mile west of the proposed CPP site, at the intersection of Kirkwood Street with Clay East Road. This viewpoint was selected to represent residents' views from the foreground to middleground distance (0-to-2 miles) to the west and south of the CPP project site. This view is somewhat similar to views experienced by approximately 50 residences to the south and west of the proposed site. **Visible Plumes Figure 1** shows the existing view to the east from KOP 2 toward the project site.

View for Travelers on Twin Cities Road

Staff also evaluated the view from Twin Cities Road at an approximate one-mile distance from the proposed CPP site and has used this KOP 2 to describe the impacts from that viewpoint as well. This viewpoint is northwest of the existing parabolic cooling towers.

Visual Quality

KOP 2 and the Twin Cities Road viewpoint afford panoramic views to the north and east and a foreground to middleground agricultural landscape with a prominent presence of energy and electric transmission infrastructure in the middleground. Aside from the foreground agricultural fields, the most prominent features in the landscape are the twin parabolic cooling towers at Rancho Seco Power Plant and the substantial north/south running transmission lines and towers extending from the Rancho Seco Plant site. Overall visual quality is moderate.

Viewer Expectation

The residential viewers represented by KOP 2 and the eastbound motorists along Twin Cities Road anticipate a foreground to middleground rural agricultural landscape with a prominent energy infrastructure presence in the middleground. Viewers would also expect to see open panoramic vistas across the flat-to-rolling agricultural fields to the north and east. However, looking in the direction of the Rancho Seco Plant, viewers would expect to see industrial elements. Therefore, viewer expectation is moderate, consistent with the visual quality.

Viewer Exposure

Visibility is high in that the view of the site and sky from residents represented by KOP 2 is unobstructed. The view duration for residents at this distance would potentially be high for a moderate number of home-sites. Overall viewer exposure for residents, at an approximate one-mile distance, considering high visibility, high view duration and the moderate number of viewers is moderate-to-high.

At this one-mile distance, a low-to-moderate number of motorists on Twin Cities Road (approximately 20 percent of the 3,800 vehicles per day (SMUD 2001a, Section 8.10) would have brief views of the plumes due to the limited plume hours, rolling terrain that periodically blocks views to the southeast and south, and the approximate 75-degree angle off the direction of travel. Therefore, motorists in the area of this viewpoint would have a low duration of view and low-to-moderate visibility. Overall viewer exposure for motorists, at an approximate one-mile distance, is moderate.

Overall Visual Sensitivity

The moderate visual quality, moderate viewer expectation, and moderate-to-high resident viewer exposure result in an overall moderate visual sensitivity for KOP 2.

KOP 3 – Clay Station Road (same as Visual Resources KOP 3)

KOP 3 is located at 11540 Clay Station Road, approximately two miles west/northwest of the project site. This viewpoint represents the elevated perspective available to approximately two hilltop residences, and other viewpoints at a distance of approximately two miles or more, including several other residences to the south with views toward the proposed project site. **Visible Plumes Figure 3** shows the existing view from KOP 3 to the southeast toward the proposed project site.

View for Travelers on Twin Cities Road

Staff also evaluated the view from Twin Cities Road at an approximate two-mile distance west of the proposed CPP site, at the intersection with Clay East Road, and has used KOP 3 to describe the impacts from that viewpoint as well.

Visual Quality

KOP 3 and the viewpoint on Twin Cities Road, at the intersection with Clay East Road, afford panoramic views of a foreground to background (beyond 2 miles) flat agricultural landscape with a prominent presence of energy and electric transmission infrastructure, backdropped by the distant Sierra Nevada mountain range. Aside from the foreground to middleground flat agricultural fields, the most prominent features in the landscape are the twin parabolic cooling towers at Rancho Seco Power Plant with its complex industrial character on the middleground to background margin. Other noticeable features in the middleground landscape include electric transmission lines converging on the power plant. Overall visual quality looking in the direction of the proposed CPP site is moderate.

Viewer Expectation

The residential viewers represented by KOP 3 and the motorists traveling eastbound on Twin Cities Road anticipate a foreground to background rural agricultural landscape with a prominent energy infrastructure presence. However, viewers' expectations also include open panoramic vistas across the flat to rolling agricultural landscape to the distant Sierra Nevada Mountains. Viewer expectation is moderate-to-high.

Viewer Exposure

During clear conditions many residential viewers would potentially have uninterrupted sightlines to the plume airspace, however because of the distance of the viewer from the plume, the visibility rating is moderate-to-high. Although the duration of view is potentially high for many residents to the southwest, it is low for many others due to the mature growth of a substantial number of trees that surround or otherwise block views toward the Rancho Seco Plant site. The number of viewers is considered moderate. Overall viewer exposure for residents is moderate-to-high.

From the area represented by the intersection of Twin Cities and Clay East roads, a low-to-moderate number of eastbound motorists would have interrupted sightlines to the plume airspace, resulting in a range of low to moderate-to-high visibility, with a low-to-moderate duration of view. Overall viewer exposure for motorists is low-to-moderate. Therefore, the overall viewer exposure, based on residents, is moderate-to-high.

Overall Visual Sensitivity

The moderate-to-high viewer expectation combined with the moderate-to-high viewer exposure and moderate visual quality results in an overall visual sensitivity of moderate-to-high from the area represented by KOP 3.

VISIBLE PLUMES

Vapor Plume Modeling Results

Staff performed an independent psychrometric analysis and dispersion modeling analysis to predict the frequency and dimensions of visible plumes from the project's proposed wet cooling towers and heat recovery steam generator (HRSG) stacks (CEC/Walters 2002, attached as an appendix to this analysis).

Staff uses a frequency threshold to determine whether to perform a more detailed analysis of plume impacts. That threshold is a 10 percent or greater frequency of plume occurrence during seasonal[1] daylight no rain/no fog (SDNRNF) "clear" hours. Staff typically eliminates from consideration plumes that occur at night or during rain or fog conditions because plume visibility, and overall visual quality, is typically low during those conditions. In addition, plumes that occur during specific cloudy conditions (see definition of "clear" below) are also eliminated because under these conditions, plumes

[1] "Seasonal" is defined as the six consecutive months per year when the potential for plume formation is greatest. The months considered for a particular project are determined by the meteorological data used for that project. Usually the months are November through April, as is the case for this project.

have less contrast with the background sky. Plumes that occur less than 10 percent of the SDNRNF "clear" hours are considered to have a less than significant frequency of occurrence, and when this is the case, a more detailed plume impact analysis is not conducted.

Staff's analysis determined that HRSG plumes for this project would occur less than 10 percent of SDNRNF hours. Therefore, no further visual analysis of HRSG plumes was conducted. The projects' cooling tower plumes are predicted to occur approximately 18.5 percent of SDNRNF "clear" hours (293 hours per year, or approximately 1.6 hours per day, typically during the early morning hours of November through April), which exceeds staff's 10 percent frequency threshold (see **Visible Plumes Table 1**). Therefore, staff conducted a more detailed analysis of the visual impacts of the proposed project's cooling tower plumes.

Visible Plumes Table 1
Predicted Cooling Tower Steam Plumes
During Seasonal Daylight No Rain/No Fog Hours
Sacramento 1990-1993 Meteorological Data

Measurement Period	Total SDNRNF Hours	Total SDNRNF Hours with Cooling Tower Plumes		Cooling Tower Plumes During Clear Weather Conditions	
		Hours	Percent	Hours	Percent
Seasonal Daylight No Rain/Fog (SDNRNF) Hours	6,339 (1585)	2,781 (695)	43.9%	1,172 (293)	18.5%
Hours are shown for four years (1990-1993). Hour in parentheses are for one year					

Staff has determined that plumes that occur under "clear" meteorological conditions have the greatest potential to cause adverse visual impacts. For projects such as the CPP for which the available meteorological data set categorizes sky cover in 10 percent increments[2], staff includes in the "clear" category a) all hours with total sky cover equal to or less than 10 percent plus b) half of the remaining hours with total sky cover of 20-100 percent and opacity equal to or less than 50 percent. The rationale for including these two components in this category is as follows: a) plumes typically contrast most with sky under clear conditions, and when total sky cover is equal to or less than 10 percent, clouds either do not exist or they make up such a small proportion of the sky that conditions appear to be virtually clear; and b) for a substantial portion of the time when total sky cover is 20-100 percent and the opacity of sky cover is relatively low (equal to or less than 50 percent), clouds do not substantially reduce contrast with plumes; staff estimates this time as approximately half of these hours.

Of all the plumes that are predicted to occur during "clear" SDNRNF hours, staff produces visual simulations based on the plume size for the primary dimension (length in this case) predicted to occur at the 10th percentile of the "clear" SDNRNF hours, and an average of the predicted plume dimensions for the "clear" SDNRNF hours for the

[2] These are typically Hourly U.S. Weather Observations (HUSWO) data sets).

other two dimensions (height and width in this case). This "average" secondary dimension is determined by taking the median of the dimensions predicted by the model for 5th to 15th percentile plumes as sorted by the primary dimension. The 10th percentile plume is the smallest of the plumes that are predicted to occur zero to 10 percent of the time, and it is the largest of the plumes that are predicted to occur greater than 10 percent of the time. Staff considers the 10th percentile plume to be a reasonable worst case for its analysis.

As shown in **Visible Plumes Table 2**, the 10th percentile cooling tower plumes from the 18-cell cooling tower during "clear" SDNRNF hours would achieve substantial size: approximately 380 feet in height, 272 feet in length (not including the length of the cooling tower), and 154 feet in width. These dimensions are the basis for staff's plume photo-simulations (see Visible Plumes Figure 2 and 4). Although staff has analyzed plumes from an 18-cell cooling tower, construction of the CPP initially will be for Phase 1 only, with a 9-cell cooling tower. As noted in **Visible Plumes Table 2** below, predicted plumes sizes for a 9-cell tower for the various plume frequencies are substantially smaller than those predicted for an 18-cell cooling tower. The 18-cell cooling tower would be 43 feet high and 864 feet long. Plume drift would generally follow an up- or down-valley pattern with the north-northwest up-valley direction being more sharply defined than the less defined but more persistent south-southeast down-valley direction.

Visible Plumes Table 2
Staff Predicted "Clear" SDNRNF Cooling Tower Plume Dimensions
Sacramento 1990-1993 Meteorological Data

	18 Cell Cooling Tower (Phases 1 and 2)			**9 Cell Cooling Tower (Phase 1 Only)**		
Percentile	Length (ft)	Height (ft)	Width (ft)	Length (ft)	Height (ft)	Width (ft)
1%	3,992	5,080	620	2,683	3,405	440
5%	699	748	227	479	489	161
10%	272	384	154	187	253	108
15%	85	171	95	56	121	66

SDNRNF – Seasonal Daylight No Rain No Fog

The modeling results also show that during the "clear" SDNRNF hours when cooling tower water vapor plumes are predicted to occur, they would exceed 426 feet in height (the height of the Rancho Seco Plant cooling towers) 52 percent of the time (on average, approximately 50 minutes on clear days, typically during the early morning hours, November through April). Plumes would be less than 426 feet tall 48 percent of the time (on average, approximately 45 minutes on clear days, typically during the early morning hours, November through April). Overall, "clear" weather plumes are predicted to occur on average approximately 95 minutes on clear days, typically during the early morning hours, primarily from November through April.

Visible Plumes Table 2 also provides the sizes of plumes that are predicted to occur at the one, five, and 15th percentile of predicted plumes. Although the one and five percentile frequency plumes are much larger than the 10th percentile plume analyzed by staff, they occur relatively so infrequently (i.e., five or less percent of the total 1,585

SDNRNF hours) that they are not used to determine the significance of the plume impacts.

Visible Plumes Table 3 provides information from staff's plume modeling that shows the chances of visible seasonal clear hour plumes of various duration occurring continuously on a given seasonal day. **Visible Plumes Table 4** provides information from staff's plume modeling that shows the chances of a given total number of visible seasonal clear hour plumes of occurring on a given seasonal day.

Visible Plumes Table 3
Predicted Continuous Plume Hours

Continuous Hours	Plume Events*	Total Plume Hours
1	84	84
2	33	66
3	21	63
4	9	36
5 or more	7	44

***** Events are occurrences. Based on specific meteorological conditions, there could be more than one occurrence of plumes on a single day.

Visible Plumes Table 4
Predicted Total Plume Hours During Clear Conditions on a Given SDNRNF Day

Daily Plume Hours	Days	Total Plume Hours	Daily Frequency
0	65	0	36%
1	41	41	23%
2	28	56	15%
3	21	63	12%
4	13	52	7%
5 or more	13	81	7%
Totals	181	293	100%

Visible Plumes Table 5 provides information from staff's plume modeling that shows the number of hours associated with the zero-to-five, five-to-ten, and ten-to-18.5 percentile plumes, the temperature and relative humidity ranges associated with these plumes, and the size range for each of these plume percentiles.

Visible Plumes Table 5
Plume Frequency Data Table

Predicted Plume Hours (293 total hours)	Average Plume Hours Per Day*	Predicted Days with Plume	Average Hours for Days with Plume	Temperature	Relative Humidity	Plume Size Length, Height, Width
79 Hours (27%)	0.44	60	1.3	19-62 degrees F	42-100%	L 699' – 16,404' H 748' – 14,052' W 227' – 4,839'
79 Hours (27%)	0.44	59	1.3	24-62 degrees F	28-87%	L 272' – 699' H 384' – 748' W 154' – 227'
135 Hours (46%)	0.75	84	1.6	32-68 degrees F	26-84%	L 3' – 272' H 46' – 384' W 3' – 154'
* There are 181 days per seasonal period (November through April)						

There will be some daily overlap in the "Average Hours for Days with Plume" values provided for each percentile of plume shown in **Table 5**, but these values are not strictly additive. Table 4 provides the statistics showing the predicted number days that will have multiple plume hours.

VISUAL IMPACTS OF VAPOR PLUMES

Due to the openness of the project site and surrounding area, the frequency and large sizes of visible plumes that would occur at the project site would cause a noticeable but intermittent change in the landscape character when viewed from both near and more distant vantage points. For an average of one hour per day, normally during the early morning hours from November through April, the plume's regional viewshed would exceed that of the existing Rancho Seco Plant cooling towers (over 12 miles for some viewers, depending on intervening screening). Viewing locations would include numerous rural residences, Rancho Seco Park, and local roadways. Although few swimming or picnic area users at Rancho Seco Park are likely to be present during the cool morning periods when plumes primarily occur, overnight campers and people fishing may observe early morning plumes. The water vapor plumes would appear as prominent, billowing linear-to-irregular forms with irregular and changing outlines. The plumes would be unique moving forms, originating near ground level and rising vertically and then diagonally across a background consisting of Sierra Nevada foothills and/or sky depending on viewing location. The movement of the plume would be noticeable from foreground viewing locations, and less noticeable from middleground to background viewing locations.

IMPACTS FROM NEARBY VIEWING LOCATIONS (KOP 2)

KOP 2 was selected to characterize vapor plume impacts on foreground to middleground viewing locations (up to two miles). The plumes would be prominently visible to residents in the project vicinity and travelers on Clay East Road, and intermittently prominent to travelers on Twin Cities Road. Overall, plumes would be visible for approximately 1.6 hours a day during clear conditions, typically during the early morning hours, from November through April.

Under clear conditions when viewed from nearby viewing locations such as KOP 2, the vapor plume would have high color contrast with the background blue sky. The vertical and diagonal, irregular and changing form of the plume, substantial plume mass, and plume motion would distinguish the plume from the broad, horizontal, natural landforms; the generally uniform appearance of sky; and well defined forms of the existing Rancho Seco Power Plant. The resulting visual contrast on clear days would be high.

Under clear conditions, the plume would be spatially prominent and co-dominant with other built structures and natural landscape features. Spatial dominance would be moderate because the plume would be partially elevated in the view. Therefore, under clear conditions, the plume would be co-dominant.

Under clear conditions, the project plume as viewed from KOP 2 and other locations at a similar distance would block from view a low-to-moderate portion of sky and the Sierra Nevada foothills and mountains. The vertical portion of the plume would cause a noticeable but small break in the overall view of the Sierra Nevada foothills and mountains from KOP 2 and other locations at a distance as viewed from the northwest to southwest. The resulting view disruption under clear conditions would be low-to-moderate.

When viewed from KOP 2 (and similar other vantage points in the project area), the plumes' high visual contrast, co-dominance, and low-to-moderate view disruption taken together constitute a moderate degree of visual change under clear conditions.

As previously discussed, the overall visual sensitivity for KOP 2 is moderate and is the result of moderate visual quality of the existing landscape, moderate viewer expectation, and moderate-to-high degree of viewer exposure. These values are characteristic of many vantage points less than two miles from the project. When the anticipated project plumes are considered within the context of the moderate visual sensitivity, the moderate degree of visual change under clear conditions would cause an adverse but less than significant visual impact at KOP 2 and other locations of similar distance. See **Visible Plumes Figure 2** for a simulation of the plume from KOP 2.

IMPACTS FROM MORE DISTANT VIEWING LOCATIONS (KOP 3)

Project plumes and their resulting visual impacts would also be apparent from more distant regional vantage points. **Visible Plumes Figure 4** is a visual simulation of the plume as seen from a distance of approximately two miles (KOP 3). It is representative of the numerous rural residences scattered throughout the landscape at two or more miles northwest to southwest of the project site. These more distant residents in some cases have panoramic views that encompass open, rural, agricultural landscapes

dotted with rural residences and farm buildings. For those residents with panoramic views, built features appear very small in the broad pastoral context of the valley floor and few features (with the exception of the Rancho Seco Plant cooling towers) break the low horizontal horizon line, which is uninterrupted in a 360 degree viewing arc from many vantage points.

Plumes, under the "clear" SDNRNF hours that staff uses for its analysis, would be taller than the existing cooling towers 52 percent of the time (approximately 50 minutes a day typically during the early morning hours, November through April). During the 48 percent of the time (approximately 45 minutes a day typically during the early morning hours, November through April) that the plumes are not predicted to exceed the height of the existing parabolic cooling towers, many regional viewers would see a substantial, but less than significant change to their view. The existing parabolic cooling towers would partially block views of the CPP water vapor plumes for the few residences north/northwest of the proposed CPP site. Views of the existing parabolic cooling towers would be partially blocked by water vapor plumes for short periods on clear days between November and April for the few viewers south/southeast of the proposed CPP site.

Under clear conditions, the white color of the plume would exhibit a high degree of color contrast with the darker blue background of the sky and earthtones of the Sierra Nevada foothills. Also, the well-defined vertical and curvilinear form of the plume would cause the plume to stand out from the broad, low-horizontal, natural landform of the valley floor; the generally uniform appearance of clear sky and well defined parabolic forms of the existing Rancho Seco Plant cooling towers. The resulting visual contrast under clear conditions would be high.

From the more distant viewing locations represented by KOP 3, under clear conditions the plume would appear prominent above the low horizon line established by the landform and vegetation of the valley floor. When the Sierra Nevada foothills are visible in the distant background, the brighter color of the plume would cause it to stand out from the more subdued earthtones of the foothills. As a result, under clear conditions the plumes' scale dominance would be subordinate to co-dominant, depending on distance, in relation to the broad landform of the valley floor (or Sierra Nevada foothills) and non-distinct expanse of blue sky. Spatial dominance would be moderate because the plume would be partially elevated in the view, but the viewer's attention would not be focused or directed toward the plume by natural features. Overall, the plume as viewed from KOP 3 under clear conditions would be co-dominant.

Under clear conditions, project plumes as viewed from KOP 3 and other locations at the same and greater distance, would block from view a small portion of sky and the Sierra Nevada foothills and mountains as viewed from the northwest to southwest. The vertical portion of the plume would cause a noticeable but small break in the overall view of the Sierra Nevada foothills and mountains from KOP 3 and other locations at the same and greater distance as viewed from the northwest to southwest. The resulting view disruption would be low-to-moderate.

From vantage points two miles and greater from the proposed CPP site, the plumes' high visual contrast, co-dominance, and low-to-moderate view disruption taken together constitute a moderate degree of visual change under clear conditions.

As previously discussed, the overall visual sensitivity from the more regional vantage point is moderate-to-high and is the result of the moderate visual quality of the existing landscape, moderate-to-high viewer expectation, and moderate-to-high viewer exposure. When the project plumes are considered within the context of the moderate-to-high overall visual sensitivity, the moderate degree of visual change on clear days would cause an adverse but less than significant visual impact for viewers from KOP 3 and other vantage points that are more than two miles from the plumes. See **Visible Plumes Figure 4** for a simulation of how the plume would appear from this viewpoint.

PLUME ABATEMENT – GENERAL INFORMATION

Staff is not recommending plume abatement to reduce visual effects for the proposed CPP, but offers the following information. A wet/dry plume abatement system for the proposed CPP would cost approximately $2.5 million (for Phase 1 only) or $5 million (for Phase 1 and 2) in addition to the cost of the proposed non-abated cooling tower. Abatement could reduce the current non-abated, overall plume frequency of 43.9 percent (seasonal daylight no rain/no fog hours) to less than 23 percent, assuming an abatement design point of 52°F and 73 percent relative humidity that roughly corresponds to the abatement system design cost of $2.5 million. This level of abatement is near the minimum practical abatement design and for all practical purposes represents the technology conversion cost from a conventional wet tower to a wet/dry plume abated tower. Additional plume abatement can be obtained by altering the plume abatement design point (temperature and relative humidity) for a wet/dry-cooling tower. The abated plumes would be smaller and at times less opaque than the non-abated plumes during those ambient conditions when both non-abated and abated plumes would be expected to occur. The estimated effectiveness of specific plume abatement design points is provided in Table 9 of the **Visible Plumes Appendix**.

CONSIDERATION OF IMPACTS IN RELATION TO CEQA SIGNIFICANCE CRITERIA

This analysis considered the potential impacts of the proposed project vapor plumes in relation to the four significance criteria for visual resource impacts listed in Appendix G of the CEQA Guidelines, under Aesthetics, specified below.

1. Would the project have a substantial adverse effect on a scenic vista?

From the west and south of the project site some views are unobstructed and panoramic, encompassing broad vistas of agricultural lands and expansive distances of sky. In the distance to the east are the Sierra Nevada Mountains, which are visible on days when they are not obscured by haze or air pollution. The project's visible plumes would occur typically during the early morning hours of the months of November through April, when weather conditions are favorable for generally short periods of time and at varying sizes. Because of their limited duration and seasonal nature, the plumes would not result in significant visual impacts under this criterion.

2. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No scenic highways are in the vicinity of the proposed project. Therefore, the proposed project's cooling tower vapor plumes would not compromise views from a state scenic highway and would not result in significant visual impacts under this criterion.

3. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

The frequency and relatively large sizes of visible cooling tower plumes would cause the plumes, during clear weather conditions primarily from November through April, to be prominent features in the views from nearby and more distant roads and residences. However, due to the generally short-duration, changing and seasonal nature of plumes, the resulting visual impact would be adverse but less than significant under this criterion.

4. Would the project create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?

The project's visible cooling tower plumes have the potential to create a new source of glare for viewers on the eastside of the project site during the early morning hours. There are few residences to the east of the proposed project site, and the number of vehicles that are likely to be traveling from east to west during the short period plumes are of any substantial size would be few (approximately 350 per day – see **Viewer Exposure,** p. 4.11-7 of this analysis). Because of these factors, views of the plumes would result in an adverse but not significant visual impact under this criterion.

CUMULATIVE IMPACTS

Cumulative impacts to visual resources could occur where project facilities or activities (such as construction) occupy the same field of view as other built facilities or impacted landscapes. It is also possible that a cumulative impact could occur if a viewer's perception is that the general visual quality of an area is diminished by the proliferation of visible structures, even if the new structures are not within the same field of view as the existing structures. The significance of the cumulative impact would depend on the degree to which (1) the viewshed is altered; (2) visual access to scenic resources is impaired; (3) visual quality is diminished; or (4) the project's visual contrast is increased.

Sacramento County identified one other approved project that is considered in staff's cumulative analysis. The project is a proposed biosolids storage facility that would be located within one mile northwest of the proposed power plant site, on the north side of Twin Cities Road. Depending on where the biosolids storage facility is located on the candidate parcels, it may be visible in the same field of view of westbound motorists on Twin Cities Road, when approaching the project region east of the proposed power plant site. However, to the extent that both the proposed power plant and biosolids storage facility are visible in the same field of view, it would only be for a very brief viewing period due to the intermittent screening of the power plant site by intervening terrain.

The cooling tower water vapor plumes would occur generally for a short-duration on any given day, would vary in size (height, length, and width), and would be primarily seasonal in nature. As such, they would not contribute substantially to an adverse significant cumulative visual impact, considering the proposed CPP with staff's proposed mitigation (see **Visual Resources** section of this Staff Assessment), and the existing Rancho Seco Power Plant and associated transmission system. The plumes, under the "clear" SDNRNF hours staff uses for its analysis, would be taller than the existing Ranco Seco Plant cooling towers slightly more than half of the time (on average, approximately 50 minutes on clear days, typically during the early morning hours, November through April). Staff does not consider the CPP projects' visible plume incremental effects to be cumulatively considerable.

ENVIRONMENTAL JUSTICE

Staff has reviewed Census 2000 information that shows the population of people of color is less than 50 percent within a six-mile radius of the proposed project (please refer to **Socioeconomics Figure 1** in this Staff Assessment). However, as indicated in **Socioeconomics Figure 1**, there are multiple census blocks with greater than 50 percent people of color within the six-mile radius; staff considers these to be pockets or clusters. Staff also reviewed Census 2000 information that shows the low-income population is less than fifty percent within the same radius.

Based on this visible plume analysis, staff has concluded that project plumes would not cause direct or cumulative significant visual impacts. Therefore, there are no visible plume environmental justice issues.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

LOCAL

Visible Plumes Table 6 provides a listing of the applicable LORS for the County of Sacramento. Two LORS were found to pertain to visible plumes and the enhancement and/or maintenance of visual quality and the protection of views. Of the two pertinent LORS, both are from the Sacramento County General Plan. Based on staff's analysis, it appears that the proposed project would be consistent with both of the local policies referenced in **Visible Plumes Table 6.**

Visible Plumes Table 6
Proposed Project's Consistency with
Local LORS Applicable to Visible Plumes

LORS		Consistency Determination Before Mitigation/ Conditions	Basis for Consistency
Source	**Description of Relevant Principles, Objectives, or Policies**		
Sacramento County General Plan Public Facilities Element	Objective: Minimize the health, safety, aesthetic, cultural and biological impacts of energy facilities in Sacramento County.	YES	The unabated cooling tower vapor plume would not result in a direct or cumulative significant visual impact.
Public Facilities Element	Policy PF-71: Locate and design production and distribution facilities so as to minimize visual intrusion problems in urban areas and areas of scenic and/or cultural value including: recreation and historic areas; scenic highways; landscape corridors; state or federal designated wild and scenic rivers; visually prominent locations such as ridges, designated scenic corridors, and open viewsheds; and Native American sacred sites.	YES	The proposed project plumes would not be located in an urban area, an area of identified scenic and/or cultural value, or a visually prominent area. The County of Sacramento, Board of Supervisors determined the proposed project to be consistent with the General Plan Map and Policies on September 25, 2002. (SCBOS 2002a) Staff agrees with this determination.

MITIGATION

MITIGATION OF IMPACTS OF VISIBLE PLUMES

The somewhat frequent, generally short duration and varying size cooling tower plumes during clear weather conditions would cause less than significant direct and cumulative visual impacts when viewed from nearby and regional vantage points. The proposed project's vapor plumes would degrade, but not to a substantial level, the existing visual character and quality of the site and its surroundings. Therefore, staff is not recommending that mitigation for CPP cooling tower water vapor plumes be required as a condition of certification. However, staff notes that project impacts from visible plumes would be reduced if the Commission were to require a plume abatement system for the project. As discussed earlier, a wet/dry plume abatement system would cost approximately $2.5 million for Phase 1 of the CPP. Based upon total project costs of $361 million, adding a wet/dry plume abatement system would increase projects costs less than seven-tenths of one percent.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

KF-5: One of the measures of importance of visual impact appears to be the number of people who will see the plumes, structure, light, etc. This is a Catch-22, in that the

very lack of people is the reason most of us have chosen to live in the greater Cosumnes basin.

Response: The Visible Plume impact analysis considers the number of viewers as one of eight factors to arrive at a significance determination. The number of viewers alone, whether high or low, is not a determinant for significance.

KF-8: Disagrees with the low-moderate visual quality assessment by visible plume analysis staff. Early morning is when residents are performing farm chores or driving on the highway. People are aware of the horizon at this time. The Sierra Nevada is the most visible and magnificent in the early morning. Does not understand staff's conclusion that plumes would not cause a significant and adverse or cumulative impact. The size of the plumes would make them visible to everyone who travels on HW 104, 116, 88, and residents within 10 miles of the plant, including most of Wilton. Staff fails to note that the existing RSP creates a cumulative impact when combined with the plume.

Response: This Visible Plume impact analysis describes the visual quality as moderate from both KOP 2 (approximately one-mile from the proposed CPP) and KOP 3 (approximately two miles from the proposed CPP). From a distance of two miles or more (as represented by KOP 3), staff has determined that the 10th percentile plume would be co-dominant to subordinate with its surroundings. Staff's plume analysis methodology has consistently been based on the 10th percentile plume as the reasonable worst-case plume. Drivers on area roads, in particular Twin Cities Road, are as likely to be traveling away from the proposed CPP as toward it, and the plumes would, in general, block a limited portion of the overall view of the Sierra Nevada Mountains for a short period of time.

Plume generation is based on operating conditions of the power plant and the meteorological conditions at the time. Because each of these conditions would change throughout the day, and from day to day, plume sizes would vary widely. Nearby and more distant residents would not see any particular plume size for very long on a given day. See staff's discussion of various frequency plume sizes in this Visible Plume impact analysis.

Staff's cumulative impact analysis does consider the existing Rancho Seco Power Plant and associated transmission towers and lines, as well as the proposed CPP, and has determined that the plumes do not contribute to the cumulative impact in a manner that results in a significant cumulative impact.

KF-12: Believes the construction of this project will result in adverse effects on this rural environment. Staff should carefully assess alternatives, in light of the inadequate information on rare and endangered species. The destruction of wildlife habitat cannot be mitigated adequately. The CEC should require real mitigation, e.g., installation of plume abatement technology; remove/recycle some of the fencing, lighting, reactor, rail line, cooling towers, etc.; and restore land at RSP before being allowed to destroy additional habitat and build more industrial structures.

Response: Staff did not find a significant visual impact, direct or cumulative, from the proposed CPP plumes, therefore no plume abatement recommendation has been made.

RK-1: Is concerned about the visible plumes conclusions. 1,172 hours of plumes during clear, daytime weather conditions and 10th percentile plumes of 380 feet high and 272 feet long are significant since the view of the Sierra Nevada mountains would be obscured.

Response: The 1,172 hours cited is the total seasonal daylight, no rain, no fog (SDNRNF), clear hours for four years (1990 through 1993). The total SDNRNF clear hours for a single year is 293. The amount of time on clear seasonal days that plumes would exist would vary from day to day, and depending on distance from the plume, the viewer would experience varying levels of view blockage caused by the plume. Based on the 10th percentile plume, staff has determined that the view disruption caused by the plume would be low-to-moderate.

RK-2: What would the plume length at the 5th percentile level? How often would the plume exceed 1 km in length?

Response: As noted in this Final Staff Assessment, the five-percentile plume length would be approximately 699 feet. The plume length would exceed one kilometer (1,000 meters or 3,280 feet) approximately 20 hours of the 293 SDNRNF clear hours.

RK-3: Believes that visible plumes that may exceed 1,000 meters in length is a substantial impact.

Response: As described in this Visible Plume impact analysis, staff's plume methodology considers several factors to arrive at an impact conclusion. Because plumes vary in size during the course of a day, from large to small, with any particular size not lasting long, staff has chosen the 10th percentile plume as the basis for analysis. Staff considers the 10th percentile plume to be a reasonable worst-case based on the amount of time that it occurs, and 10 percent is also the frequency threshold staff uses to determine if an impact analysis is required or not for a project. For frequencies of less than 10 percent, no visible plume impact analysis is conducted because staff has determined that plumes that do not occur 10 percent or greater of the SDNRNF clear hours do not occur frequently enough to cause a significant impact.

RK-4: Suggests that the applicant be required to mitigate the visible plume impacts to the maximum degree possible.

Response: When staff determines there to be a significant impact from plumes, mitigation in the form of plume abatement or other method of plume size/frequency reduction is recommended. In this case, staff has not found the potential plume impacts to be significant.

SK-1: Is worried about air pollution and visual pollution from future smoke stacks and cooling towers. Take every effort to minimize pollution and vapor plumes from the plant.

Response: Please see responses to RK-3 and RK-4 above.

MC-1: RSP's huge plume was out of character to the rural area of rolling hills, oaks, farmhouses, crops, and rangeland. Based on the visual simulations, the CPP will introduce large steam plumes to the skyline. The plumes will create a significant impact. Does not want to see the plumes in the spring and winter months. The analysis states the plumes would be higher than the existing RSP towers and spew for 50 minutes in the morning on clear days between November through April. Believes that this is a significant impact to their views.

Response: Please see responses to KF-8 and RK-3 above.

MC-2: How are the grading terms (low, moderate, moderate-high, and high) derived? Is there a mathematical equation to determine moderate or moderate-high expectation? How are the various scales determined? The methodology used is confusing and not understandable to the public.

Response: The Visible Plume impact analysis contains a description of staff's methodology and evaluation process that provides the reader with information on how the different values are selected. Any visual analysis is to some extent subjective by nature. Staff has attempted to remove the subjectivity or otherwise make the methodology as transparent as possible.

MC-3: There is no discussion of the combined visual impacts of the existing RSP, the new power plant, and the plumes from the CPP. It is all treated separately. Why are plumes and structures analyzed separately if they are all part of the same project?

Response: In an effort to improve the visual resources impact methodology, to reduce the subjectivity, and to more appropriately consider the existing visual setting of a proposed project site, staff initiated a process to revise the methodology. To date, the revised methodology has only been used for the plume analysis of three power plant projects currently under review by the Commission. Staff's intention is to apply this revised methodology for the visual resources analysis of all projects in the near future.

MC-4: Does not agree that the visual impacts of the project are insignificant. Large industrial plumes are out of character for the area. RSP was built before the environmental review process and is an eyesore. Because an eyesore is there now doesn't justify adding to the eyesore. Why not require technology to reduce the plumes?

Response: Staff's plume analysis includes an evaluation of the proposed CPP cooling tower water vapor plumes from KOP 3, approximately two miles from the proposed CPP site. At KOP 3, the 10th percentile plume was determined to be co-dominate with its surroundings. As stated in this analysis, for viewers at distances greater than two miles the plumes will appear subordinate in the overall view. The community of Sloughhouse, being approximately six miles from the proposed CPP site, would experience the plumes as subordinate in the overall view. Regarding technology that can reduce plumes, please see staff's response to RK-4, and the **Plume Abatement – General Information** section above.

CONCLUSIONS AND RECOMMENDATIONS

Because of the generally short duration and varying size of plumes that are normally limited to the early morning hours of the November through April period, the moderate overall visual sensitivity of viewers represented by the two KOPs, and the moderate overall visual change determined for the two KOPs, staff finds that the proposed project's vapor plumes would not cause significant adverse direct or cumulative visual impacts. A summary table showing the results of staff's direct impact analysis is attached to this analysis as **Visible Plumes Appendix A**. To ensure that the cooling tower is designed and operated in a manner that matches the profile evaluated in this analysis, resulting in a less than significant plume impact, staff proposes one condition of certification.

The CPP project is consistent with the two identified relevant laws, ordinances, regulations, and standards.

The cumulative visual impact of the proposed CPP, for structures and plume, when considered with the existing Rancho Seco Power Plant and associated transmission lines, is significant based on the conclusion of the **Visual Resources** analysis for the impact of the structures alone. However, the **Visual Resources** analysis also concludes that the significant adverse cumulative impact caused by the structures can be reduced to less than significant by landscaping with the planting of trees near the western boundary of SMUD's property. Therefore, there are no unmitigated significant cumulative impacts for **Visual Resources** and **Visible Plumes**.

PROPOSED CONDITIONS OF CERTIFICATION

PLUME-1 The project owner shall ensure that the Cosumnes Power Plant cooling tower is designed and operated so that the plume frequency will not increase from the design as certified.

Verification: At least 30 days prior to ordering the cooling towers, the project owner shall provide to the CPM for review the final design specifications of the cooling tower related to plume formation. The project owner shall not order the cooling tower until notified by the CPM that the two design requirements above have been satisfied.

The cooling tower shall be designed and operated so that the exhaust air flow rate per heat rejection rate (1) will not be less than 21.0 kilograms per second per megawatt when the ambient temperatures are at or less than 61 degrees F; and (2) will not be less than 19.0 kilograms per second per megawatt when the ambient temperatures are more than 61 degrees F.

The project owner shall provide a written certification in each Annual Compliance Report, to include cooling tower operation recording data, to demonstrate that the cooling towers have consistently been operated within the above-specified design parameters. If determined to be necessary to ensure operational compliance, based on legitimate complaints received or other physical evidence of potential non-compliant operation, the project owner shall monitor the cooling tower operating parameters in a

manner and for a period as specified by the CPM. For each period that the cooling tower operation monitoring is required, the project owner shall provide to the CPM the cooling tower operating data within 30 days of the end of the monitoring period. The project owner shall include with this operating data an analysis of compliance and shall provide proposed remedial actions if compliance cannot be demonstrated.

REFERENCES

Buhyoff, G. J., P.A. Miller, J. W. Roach, D. Zhour, and L. G. Fuller. 1994. An AI Methodology for Landscape Visual Assessments. AI Applications. Vol. 8, No. 1.

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Placeholder for Appendix 1: **Cosumnes Power Plant Project Visible Plumes Staff Assessment - Summary of Analysis**

Placeholder for Appendix 2: **Visible Plumes Figures 1 through 4**

Placeholder for Appendix 3: **Plume Modeling Analysis**

VISIBLE PLUMES APPENDIX B

William Walters and Lisa Blewitt

INTRODUCTION

The following provides staff's assessment of the Cosumnes Power Plant (CPP) Project cooling tower and heat recovery steam generator (HRSG) exhaust stack visible plumes. Staff completed a modeling analysis for the applicant's proposed unabated cooling tower and HRSG designs.

PROJECT DESCRIPTION

The applicant has proposed two linear 9-cell conventional mechanical-draft wet cooling towers. These two cooling towers are proposed to be placed in-line creating a virtual linear 18-cell cooling tower. The applicant has not proposed to use any methods to abate visible plumes from the cooling towers.

The project includes four separate turbine/heat recovery steam generator systems, each with separate exhaust stacks. No duct firing will be used. The applicant has not proposed to use any methods to abate visible plumes from the HRSG exhausts.

COOLING TOWER VISIBLE PLUME MODELING ANALYSIS

EXISTING CONDITIONS

The applicant verified in Data Response (DR) #106 (SMUD 2002a, p. 50) that no other plume sources have been identified within the vicinity of the CPP project site.

COOLING TOWER DESIGN PARAMETERS

Staff evaluated the applicant's AFC (SMUD 2001a, AFC Section 8.11.5.3.3), Data Response #108 (SMUD 2002a, p 51), DR #107 and DR #108 (SMUD 2002e, pp. 19-20), and DR #109 (SMUD 2002g, Attachment VR-109), and performed an independent psychrometric analysis and dispersion modeling analysis to predict the frequency and dimensions of visible plumes from the project's proposed unabated wet cooling towers.

The cooling tower design characteristics, presented below in **Table 1**, were determined through a review of the applicant's AFC and Data Request Responses, and through additional engineering calculations.

Table 1 – New Cooling Tower Operating and Exhaust Parameters

Parameter		**New Cooling Tower Design Parameters**	
Number of Cells		18 (2 @ 1 x 9)	
Stack Height		12.2 meters	
Cell Stack Diameter		10.97 meters	
Equivalent Stack Diameter		43.89 meters (1)	
Maximum Design Inlet Air Flow Rate (kg/s)		**14,400** (2)	
Maximum Heat Rejection Rate (MW)		**671.2** (2)	
Design Liquid to Gas (L/G) Mass Ratio		1.10	
Case (3)	**Ambient Condition**	**Exhaust Flow Rate (lbs/s/cell)**	**Exhaust Temperature (°F)**
1	104 °F, 17% RH	1775.8	91
2	61 °F, 59% RH	1907.0	79
3	34 °F, 90% RH	2006.9	68

Source: AFC (SMUD 2001a) and Data Request Response #107 and DRR #108 (SMUD 2002e, page 19-20),
DRR #108 (SMUD 2002a, page 51,Table VR-108), DRR #109 (SMUD 2002g, page VR109-3, Table 1), and AFC Supplement (SMUD 2002j, Figure 2.2-2R).

Notes:

(1) This is based on 8 cells operating (16 cells total) in each 9-cell cooling tower.

(2) Bold numbers reflect having both cooling towers in operation and are the basis for SACTI modeling.

(3) For CSVP modeling, values were extrapolated or interpolated between data points as necessary.

The exhaust temperature and exhaust mass flow rate values were calculated for the hourly ambient conditions modeled through linear interpolation and extrapolation of the data provided by the applicant for the three cases presented in **Table 1**. The exhaust moisture content was determined by assuming saturated conditions at the calculated exhaust temperature.

COOLING TOWER VISIBLE PLUME MODELING ANALYSIS

Staff modeled the cooling tower plumes using both the Combustion Stack Visible Plume (CSVP) model and the Seasonal/Annual Cooling Tower Impact (SACTI) model. The SACTI model is designed to model multiple cell cooling towers, and for the CSVP modeling analysis uses an equivalent stack diameter approach in order to model the entire exhaust water emissions of the tower. **Table 2** provides the CSVP model visible plume frequency results using a four-year (1990-1993) meteorological data set, obtained from the National Climatic Data Center, from Sacramento.

Table 2 – Staff Predicted Hours with Cooling Tower Steam Plumes Sacramento 1990-1993 Meteorological Data

	Available (hr)	Plume (hr)	Percent
All Hours	34,980	19,595	56.0%
Daylight Hours	17,865	5,871	32.9%
Nighttime Hours	17,115	13,724	80.2%
Daylight No Rain/Fog Hours	16,028	4,070	25.4%
Seasonal Daylight No Rain/Fog Hours*	6,339	2,781	43.9%

*Seasonal conditions occur anytime from November through April.

These modeling results indicate that the visible plume formation would mainly occur during the cold weather months, with the majority of plume formation occurring at night or early morning. For the proposed cooling tower, the maximum temperature where a visible plume is predicted is 74.7°F when the relative humidity is 90%. Visible plumes could occur at higher temperatures if the relative humidity were above 90%; however, the four years of meteorological data did not show those conditions to exist.

Staff's SACTI modeling analysis visible plume dimension results, using the same four-year (1990-1993) meteorological data set from Sacramento are provided in **Table 3**.

As **Table 3** shows, for a plume frequency of 10 percent, the CSVP model generally predicts similar but taller plume dimensions than the SACTI model. While the CSVP model does have certain limitations, such as no specified mixing height to limit maximum plume heights, it uses actual hourly meteorological data and can model "calm" hours assuming a minimum wind speed; while the SACTI model groups the meteorological data and does not process "calm" hours. Therefore, staff concludes that the CSVP modeling results, which also includes the variable load characteristics of the cooling tower with respect to variable ambient conditions, should provide more realistic visible plume characteristics.

The applicant modeled the cooling tower visible plume dimensions using a program called MISTVUE (SMUD 2001g, DR #109, page VR109-2). MISTVUE uses a linear interpolation of water vapor pressure, between the stack exit and ambient conditions, together with the Goff-Gratch formulation of the Clausius-Clapeyron equation for water vapor pressure, to determine the amount of dilution required for the visible plume to not be visible. These calculations are performed for each hour. MISTVUE performs calculations for various sources including cooling towers and combustion sources. MISTVUE determines the distance along the centerline of the plume where sufficient dilution has occurred such that the plume is no longer visible.

Table 3 – Staff Results of Cooling Tower Visible Plume Dimensions
Sacramento 1990-1993 Meteorological Data

All Hours	Percentile	SACTI Model (9 Cells**)	SACTI Model (18 Cells**)	CSVP Model (9 Cells**)	CSVP Model (18 Cells**)
Length (m)	50%	60-70	60-70	29	42
	10%	700-800	700-800	1,872	2,888
	5%	2,000-3,000	3,000-4,000	>5,000	>5,000
	1%	>10,000	8,000-9,000	>5,000	>5,000
	Maximum	>10,000	>10,000	>5,000	>5,000
Height (m)*	50%	30-40	30-40	43	62
	10%	200-300	100-200	262	336
	5%	200-300	200-300	400	649
	1%	>1,000	>1,000	1,200	1,903
	Maximum	>1,000	>1,000	2,980	4,513
Width (m)	50%	40-60	60-80	21	29
	10%	100-120	140-160	139	201
	5%	180-200	400-600	292	421
	1%	1,000-1,200	1,000-1,200	752	936
	Maximum	1,000-1,200	1,000-1,200	1,330	1,690
Daytime No Rain/Fog Hours					
Length (m)	50%	40-50	50-60	No Plume	No Plume
	10%	200-300	200-300	102	150
	5%	400-500	400-500	221	325
	1%	7,000-8,000	9,000-10,000	764	1,151
	Maximum	>10,000	>10,000	>5,000	>5,000
Height (m)*	50%	20-30	20-30	No Plume	No Plume
	10%	50-60	50-60	109	170
	5%	100-200	100-200	217	346
	1%	>1,000	>1,000	759	1,230
	Maximum	>1,000	>1,000	2,831	4,283
Width (m)	50%	40-60	40-60	No Plume	No Plume
	10%	60-80	80-100	40	56
	5%	80-100	120-140	54	77
	1%	800-1,000	800-1,000	120	171
	Maximum	1,000-1,200	800-1,000	1,078	1,475
Seasonal Daytime No Rain/Fog Hours					
Length (m)	50%	40-50	50-60	No Plume	No Plume
	10%	400-500	300-400	200	295
	5%	2,000-3,000	9,000-10,000	395	586
	1%	>10,000	>10,000	1,085	1,658
	Maximum	>10,000	>10,000	>5,000	>5,000
Height (m)*	50%	20-30	20-30	No Plume	No Plume
	10%	100-200	80-90	192	306
	5%	300-400	900-1,000	372	597
	1%	>1,000	>1,000	1,212	1,960
	Maximum	>1,000	>1,000	2,831	4,283
Width (m)	50%	40-60	40-60	No Plume	No Plume
	10%	80-100	100-120	53	75
	5%	100-120	800-1,000	75	106
	1%	800-1,000	800-1,000	162	230
	Maximum	1,000-1,200	800-1,000	1,078	1,475

Seasonal = November through April (day 120-304).

*SACTI Plume height does not include the height (12.2 meters) of the cooling tower (release point).

**The 18 Cell Tower will have 16 cells operating and the 9 Cell Tower will have 8 cells operating.

The MISTVUE modeling analysis visible plume frequency results provided by the applicant using a three year (1990-1992) meteorological data set from the monitoring station at Sacramento Executive Airport are provided in **Table 4** along with staff's CSVP results using a four year (1990-1993) meteorological data set from Sacramento.

Table 4 – Comparison of Predicted Hours with Cooling Tower Steam Plumes

	Staff CSVP	**Applicant MISTVUE**			
	Percent 1990-1993	**Percent 1990-1992**	**Percent 1990**	**Percent 1991**	**Percent 1992**
All Hours	56.0%	50.4%	48.1%	51.0%	51.9%
Daylight Hours	32.9%	30.5%	28.3%	30.8%	32.6%
Nighttime Hours	80.2%	70.3%	68.0%	71.3%	71.5%
Daylight No Rain/Fog Hours	25.4%	23.1%	22.0%	23.5%	23.6%
Seasonal Daylight No Rain/Fog Hours*	43.9%	N/A	N/A	N/A	N/A

*Seasonal conditions occur anytime from November through April.

Table 4 shows that the plume frequency determinations are very similar.

The applicant models a single cooling tower cell, which staff believes causes the applicant's modeling analysis to underestimate the plume dimensions of the cooling tower by not accounting for the total water emissions from the contiguous cooling tower cell exhausts and not accounting for the interaction of the adjacent exhausts. The plume dimension (height and length) underestimation should be most pronounced when the wind direction is aligned along the length of the tower.

A plume frequency of 10% of seasonal (November through April) daylight no rain/fog high visual contrast hours analysis is used to determine potential plume impact significance. The high visual contrast hours analysis methodology is provided below:

> The Energy Commission has identified a "clear" sky category during which plumes have the greatest potential to cause adverse visual impacts. For this project the meteorological data set[1] used in the analysis categorizes total sky cover and opaque sky cover in 10% increments. Staff has included in the "Clear" category a) all hours with total sky cover equal to or less than 10% plus b) half of the hours with total sky cover 20-100% that have a sky opacity equal to or less than 50%. The rationale for including these two components in this category is as follows: a) plumes typically contrast most with sky under clear conditions and, when total sky cover is equal to or less than 10%, clouds either do not exist or they make up such a small proportion of the sky that conditions appear to be virtually clear; and b) for a substantial portion of the time when total sky cover is 20-100% and the opacity of sky cover is relatively low (equal to or less than 50%), clouds do not substantially reduce contrast with plumes; staff has estimated that approximately half of the hours meeting the latter sky cover and sky opacity criteria can be considered high visual contrast hours and are included in the "clear" sky definition.

[1] This analysis uses an Hourly US Weather Observations (HUSWO) data set.

The results of the high visual contrast hours analysis is provided in **Table 5**.

Table 5 – Staff Predicted Cooling Tower Plume Hours Cloud Cover

Plume Hours by Cloud Cover Type					
All		Clear		Scattered/Broken/Overcast	
Hours	%	Hrs	%	Hours	%
2,781	43.9	1,172	18.5	1,609	25.4

* - Percentiles are calculated by dividing the number of plume hours by the reference number of seasonal daylight no rain no fog hours (6,339).

The "clear" sky plume dimensions are estimated by the CSVP model are as follows:

Table 6 – Staff Predicted "Clear" SDNRNF Cooling Tower Plume Dimensions

	18 Cell Cooling Tower			9 Cell Cooling Tower		
Percentile	Length	Height	Width	Length	Height	Width
1%	1,217 (3,992)	1,549 (5,080)	189 (620)	818 (2,683)	1,038 (3,405)	134 (440)
5%	213 (699)	228 (748)	69 (227)	146 (479)	149 (489)	49 (161)
10%	83 (272)	117 (384)	47 (154)	57 (187)	77 (253)	33 (108)
15%	26 (85)	52 (171)	29 (95)	17 (56)	37 (121)	20 (66)

SDNRNF – Seasonal Daylight No Rain No Fog
Data provided in meters and (feet)

These dimensions include the height of the tower (12.2 meters) but do not include the length of the tower, which is approximately 263 meters (864 feet) long, or half of that length for each 9 cell cooling tower. Therefore, the actual visible plume length is the tower length plus a portion of the plume length, which depends on the angle of the wind relative to the long axis of the cooling tower.

The daily frequency of “clear” daylight hour plume occurrences during seasonal days is provided in **Table 7**.

Table 7 – Staff Predicted Sequential and Total Daily Cooling Tower Plume Hours During Seasonal Daylight “Clear” Hours

Plume Hours	Sequential Occurrences	Sequential Frequency	Total Plume Hours	Frequency
0	--	--	259	35.72%
1	338	46.62%	163	22.48%
2	133	18.34%	115	15.86%
3	84	11.59%	83	11.45%
4	34	4.69%	51	7.03%
5	17	2.34%	33	4.55%
6	3	0.41%	7	0.97%
7	4	0.55%	5	0.69%
8	0	0.00%	1	0.14%
9	1	0.14%	4	0.55%
10	4	0.55%	4	0.55%

The sequential occurrences are the number of times a visible plume is predicted to occur sequentially for any given number of hours from one hour to the next during ‘clear’ conditions. The sequential occurrences can be interrupted by hours with no plume or non-“clear” hours. The frequency for the sequential occurrences is the weighted average frequency of each sequential occurrence happening on any given seasonal day (725 seasonal days were modeled). The total plume hour occurrences indicate the total number of plume hours, sequential and non-sequential, predicted for the seasonal (November through April) days modeled. The frequency of the total plume hours is based on the actual number of seasonal days predicted to have that many total plume hours during clear daylight hours. The frequency of “clear” daylight hour plumes from May through October will be considerable less than that shown for the seasonal (November through April) days.

The ambient conditions that were found during specific plume size frequency ranges are provided in **Table 8**.

Table 8 – Staff Predicted Cooling Tower Plume Ambient Conditions for “Clear” SDNRNF Plumes

Plume Size Interval*	Minimum Temperature	Maximum Temperature	Minimum Relative Humidity	Maximum Relative Humidity
<=1%	20F	57F	85%	100%
1% to 5%	19F	62F	42%	97%
5% to 10%	24F	62F	28%	87%
10% to 15%	32F	68F	26%	84%
>15%	41F	65F	29%	76%

*Where the <=1% plumes are the largest predicted plumes and the >15% plumes are the smallest predicted plumes

The lowest temperature in each range roughly corresponds with the lowest relative humidity, and the highest temperature in each range roughly corresponds with the

highest relative humidity. What this table illustrates is that the colder and wetter the ambient condition the larger the predicted plume size.

The number of days when plumes are forecast to occur, by sorted relative plume size, are provided in **Table 9**.

Table 9 – Daily Plume Size Occurrence Frequency
"Clear" SDNRNF Hours

Relative Plume Size[1]	Total Plume Hours	Days with Plume	Total Seasonal Days	Percentage
Top 1%	64	63	725	8.69%
Top 5%	317	238	725	32.83%
Top 10%	634	356	725	49.10%
Top 15%	951	425	725	58.62%
All Plume Hours	1172	466	725	64.28%

[1] – Percentiles based on the seasonal "clear" daylight plume percentages shown in Tables 5 and 6

The percentiles shown indicate the predicted percentage of seasonal days when plumes can be expected for each size range. So the top 1% hourly plumes will occur during approximately 9% of the seasonal days modeled. The data indicates that the largest (1% or 5%) plumes will not generally occur for more than one or two hours during any one day. In fact, only one day had two occurrences of the top 1% plumes. A further analysis of the data shows that the largest plumes are predicted to occur during the first morning daylight hour and plumes size will generally decrease each hour after sunrise.

The CSVP model predicts plume frequencies greater then 10% of seasonal daylight no rain/fog high visual contrast hours, which would trigger a study of the visual impacts of the plume from the cooling tower. The visual impact analysis for the cooling tower plumes is provided in the Visible Plumes section of the Staff Assessment.

HRSG VISIBLE PLUME MODELING ANALYSIS

Staff evaluated the applicant's AFC (SMUD 2001a, AFC Section 8.11.5.3.3) and Data Request Response #109 (SMUD 2001g, Attachment VR-109) and performed an independent psychrometric analysis and dispersion modeling analysis. The Combustion Stack Visible Plume (CSVP) model was used to estimate the worst-case potential plume frequency, and provide data on predicted plume length, width, and height for each HRSG stack.

HRSG DESIGN PARAMETERS

Based on the stack exhaust parameters anticipated by the applicant for each HRSG stack, the frequency and size of visual plumes can be estimated. The operating data for these stacks are provided in **Table 10**.

Table 10 – HRSG Exhaust Parameters

Parameter	HRSG Exhaust Parameters		
Stack Height	50.3 meters (165 feet)		
Stack Diameter	5.64 meters (18.5 feet)		
	Case 1	**Case 2**	**Case 3**
Ambient Temp	104°F	61°F	34°F
Ambient Relative Humidity	17%	59%	90%
Turbine Load	100%	100%	100%
Inlet Fogging	On	Off	Off
Exhaust Temperature	189°F	185°F	182°F
Exit Velocity	Calculated for each hour modeled		
Exhaust mass flow rate	3,469,410 lbs/hr	3,604,224 lbs/hr	3,750,308 lbs/hr
Exhaust Molecular Weight	28.5 lbs/lb-mol		
Moisture Content (% by wt.)	6.26%	5.29%	5.01%

Source: AFC (SMUD 2001a), Data Request Response #109 (SMUD 2002a, Table VR-109, page 53) and DRR #109 (SMUD 2002g, Table 2, page VR109-4), and AFC Supplement (SMUD 2002j, Figure 2.2-2R).
Notes:
1. For CSVP the analysis, values were extrapolated or interpolated between data points as necessary.

HRSG VISIBLE PLUME MODELING ANALYSIS

Staff modeled the HRSG plumes using the CSVP model with a four-year meteorological data set, obtained from the National Climatic Data Center, for Sacramento. **Table 11** provides the CSVP model visible plume frequency results.

Table 11 – Staff Predicted Hours with HRSG Steam Plumes Sacramento 1990-1993 Meteorological Data

	Available (hr)	Plume (hr)	Percent
All Hours	34,980	4,262	12.2%
Daylight Hours	17,865	948	5.3%
Nighttime Hours	17,115	3,314	19.4%
Daylight No Rain/Fog Hours	16,028	197	1.2%
Seasonal Daylight No Rain/Fog Hours*	6,339	192	3.0%

*Seasonal conditions occur anytime from November through April.

These results confirm that the visible plume formation would mainly occur during the cold weather months, with the majority of plume formation occurring at night or early morning. For the proposed HRSG, the maximum temperature where a visible plume is predicted is 50°F when the relative humidity is 100%.

The MISTVUE modeling analysis visible plume frequency results provided by the applicant using a three year meteorological data set from the monitoring station at Sacramento Executive Airport are provided, compared to staff's results, in **Table 12**.

Table 12 – Comparison of Predicted Hours with HRSG Steam Plumes

	Staff CSVP	Applicant MISTVUE			
	Percent 1990-1993	Percent 1990-1992	Percent 1990	Percent 1991	Percent 1992
All Hours	12.2%	10.8%	9.8%	10.5%	12.0%
Daylight Hours	5.3%	5.1%	4.1%	4.7%	6.5%
Nighttime Hours	19.4%	16.4%	15.5%	16.3%	17.4%
Daylight No Rain/Fog Hours	1.2%	1.3%	1.6%	1.3%	1.1%
Seasonal Daylight No Rain/Fog Hours*	3.0%	N/A	N/A	N/A	N/A

*Seasonal conditions occur anytime from November through April.

As shown in **Table 12**, the applicant's MISTVUE plume frequency results are very similar to staff's CSVP plume frequency results.

A plume frequency of 10% of seasonal (November through April) daylight no rain/fog high contrast hours is used as an initial plume impact study threshold trigger. The CSVP model predicts plume frequencies less then 10% of seasonal daylight no rain/fog hours high contrast hours, which would not trigger additional study of the visual impacts of the plumes from the HRSGs.

PLUME ABATEMENT

The cooling tower plumes can be abated through the use of an air-cooled condenser (dry cooling) or through the use of plume abated cooling towers. A separate cooling alternatives study is being prepared to address these two alternative cooling options. An air-cooled condenser would completely eliminate water vapor plumes. A plume abated cooling tower would need to be designed to an appropriate abatement point. A comparison of an estimate of plume frequencies for the unabated cooling tower and three plume abated cooling towers is provided in **Table 13**. The three plume abated towers are assumed to be wet/dry cooling towers with the following plume mitigation design points: 52°F and 73% relative humidity; 45°F and 80% relative humidity; and 38°F and 80% relative humidity.

Table 13 – Unabated/Abated Cooling Tower Plume Frequency Comparison

	Seasonal Daylight No Rain/No Fog Frequency	
Cooling Tower Design	Plume Hours	Plume Frequency
Applicant Proposed Unabated Design[a]	2,781	43.9%
Abated with 52°F and 73% RH Design Point[b]	1,446	22.8%
Abated with 45°F and 80% RH Design Point[b]	421	6.6%
Abated with 38°F and 80% RH Design Point[a]	149	2.4%

a – The plume frequencies were modeled using design data provided for these two designs by the applicant.
b – The plume frequencies were estimated using frequency fogging curves provided by Marley Cooling Tower (Marley 2002).

Staff's initial screening analysis indicates that a wet/dry cooling tower with a design point somewhere between 52°F and 73% relative humidity and 45°F and 80% relative humidity would reduce the frequency of visible plumes to under 10% of seasonal daylight no fog no rain high visual contrast hours, which is roughly equivalent to plume frequency somewhere between 15% and 20% of all seasonal daylight no rain no fog hours. Abated cooling tower designs that might be proposed to mitigate significant visual impacts would need to be verified through cooling tower performance curves from a qualified cooling tower vendor.

REFERENCES

Marley (Marley Cooling Tower) 2002. Fogging Frequency Curves for 45°F/80% RH and 52°F/73% RH Design Points. May 13, 2002.

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SMUD (Sacramento Municipal Utility District) 2002g. Data Response, Set 1D. February 15, 2002. Docket date February 19, 2002.

SMUD (Sacramento Municipal Utility District) 2002j. AFC Supplement A (Revised General Arrangement). March 15, 2002. Docket date March 15, 2002.

VISUAL RESOURCES

Testimony of Michael Clayton

SUMMARY

This testimony presents Energy Commission staff's analysis of the proposed Cosumnes Power Plant (CPP) project (Phases 1 and 2), except for its plumes, in regard to its impacts on visual resources and its compliance with applicable laws, ordinances, regulations, and standards (LORS) regarding visual resources. The proposed project would be located adjacent to the existing Rancho Seco Power Plant (currently being decommissioned) in a predominantly agricultural and rural residential landscape. Staff's conclusions are as follows:

- The proposed project structures would cause adverse but less than significant project-specific visual impacts. However, the visual effects of the proposed structures would be cumulatively considerable in combination with the ongoing adverse visual effects of the existing Rancho Seco Power Plant structures. With effective implementation of staff's proposed Conditions of Certification **VIS-2** [surface treatment] and **VIS-3** [landscape screening], the project structures' incremental visual effects would not be cumulatively considerable.
- The proposed project's night lighting has the potential to cause adverse and significant project-specific visual impacts. The visual effects of the project's night lighting also have the potential to be cumulatively considerable in combination with the existing lighting at the Rancho Seco Power Plant. However, with effective implementation of staff's proposed Conditions of Certification **VIS-4** and **VIS-5**, project night lighting's project-specific impacts would be less than significant and its incremental visual effect would not be cumulatively considerable.
- In the three cases of the project's inconsistency or partial inconsistency with local LORS, either the inconsistencies would not initially produce significant visual impacts, or with effective implementation of staff's conditions of certification, the visual impacts causing the inconsistencies would not be significant. Effective implementation of staff's proposed Conditions of Certification **VIS-2** through **VIS-5** would eliminate one inconsistency and the one case of partial inconsistency. The one remaining inconsistency is in regard to a zoning ordinance requirement from which the project is exempt based on Government Code Section 53091.

INTRODUCTION

Visual resources are the natural and cultural features of the environment that can be viewed. This analysis focuses on whether CPP would cause significant adverse visual impacts and whether the project would be in compliance with applicable laws, ordinances, regulations, and standards. The determination of the potential for significant impacts to visual resources resulting from the proposed project is required by the California Environmental Quality Act (CEQA).

ORGANIZATION OF ANALYSIS

This analysis is organized as follows:

- Description of analysis methodology;
- Description of applicable laws, ordinances, regulations, and standards;
- Description of the project aspects that may have the potential for significant visual impacts;
- Assessment of the visual setting of the proposed power plant site and linear facility routes;
- Evaluation of the visual impacts of the proposed project on the existing setting;
- Evaluation of compliance of the project with applicable laws, ordinances, regulations, and standards;
- Identification of measures needed to mitigate any potential significant adverse impacts of the proposed project and to achieve compliance with applicable LORS.
- Conclusions and Recommendations; and
- Proposed Conditions of Certification

ANALYSIS METHODOLOGY

Visual resources analysis has an inherently subjective aspect. However, the use of generally accepted criteria for determining impact significance and a clearly described analytical approach aid in developing an analysis that can be readily understood.

Significance Criteria

Commission staff considered the following criteria in determining whether a visual impact would be significant.

State

The CEQA Guidelines define a “significant effect” on the environment to mean a “substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including...objects of historic or aesthetic significance (Cal. Code Regs., tit.14, § 15382).

Appendix G of the CEQA Guidelines, under Aesthetics, lists the following four questions to be addressed regarding whether the potential impacts of a project are significant:

1. Would the project have a substantial adverse effect on a scenic vista?
2. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?
3. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?
4. Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

Local

Energy Commission staff considers any local LORS regarding visual resources. Conflicts with such LORS can constitute significant visual impacts. See the Laws, Ordinances, Regulations, and Standards section.

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 Smardon 1986). The questions listed below address issues commonly raised in visual analyses for energy facilities. Staff considers these questions in assessing whether a project would cause a significant impact in regard to any of the four CEQA criteria listed above.

- Will the project substantially alter the existing viewshed, including any changes in natural terrain?
- Will the project deviate substantially from the form, line, color, and texture of existing elements of the viewshed that contribute to visual quality?
- Will the project eliminate or block views of valuable visual resources?
- Will the project result in significant amounts of backscatter light into the nighttime sky?
- Will the project be in conflict with directly identified public preferences regarding visual resources?
- Will the project result in a significant reduction of sunlight, or the introduction of shadows, in areas used extensively by the community?

Impact Duration

The visual analysis typically distinguishes three different impact durations. **Temporary impacts** typically last no longer than two years. **Short-term impacts** generally last no longer than five years. **Long-term impacts** are impacts with a duration greater than five years.

View Areas and Key Observation Points

The proposed project would be visible from a number of areas in the project region. Energy Commission staff evaluated the visual impact of the project from each of these areas. Staff used Key Observation Points[1], or KOPs, as representative locations from which to conduct detailed analyses of the proposed project and to obtain existing conditions photographs and prepare visual simulations. KOPs are selected to be representative of the most critical locations from which the project would be seen. However, KOPs are not the only locations that staff considered in each view area. Staff conducted a site visit and concluded that the KOPs presented in the Application for Certification were appropriate for this analysis.

[1] The use of KOPs or similar view locations is common in visual resource analysis. The U.S. Bureau of Land Management (USDI BLM 1986a, 1986b, 1984) and the U.S. Forest Service (USDA Forest Service 1995) use such an approach.

Evaluation Process

For each view area, staff considered the existing visual setting and the visual changes that the project would cause to determine impact significance. The results of staff's analysis are summarized in **Visual Resources Appendix VR-1**. Existing conditions photographs and photosimulations from each KOP are presented with all other figures in **Visual Resources Appendix VR-3**.

Elements of the Visual Setting

To assess the existing visual setting, staff considered the following elements:

Visual Quality

Visual quality is an expression of the visual impression or appeal of a given landscape and the associated public value attributed to the visual resource. This analysis used an approach that considers visual quality as ranging from outstanding to low. Outstanding visual quality is a rating reserved for landscapes that would be what a viewer might think of as "picture postcard" landscapes. Low visual quality describes landscapes that are often dominated by visually discordant human alterations, and do not provide views that people would find inviting or interesting (Buhyoff et al., 1994).

Viewer Concern

Viewer concern is a measurement of the level of viewer interest regarding the visual resources in an area. Official statements of public values and goals reflect viewers' expectations regarding a visual setting. This analysis also employed land use as an indicator of viewer concern. Uses associated with 1) designated parks, monuments, and wilderness areas, 2) scenic highways and corridors, 3) recreational areas, and 4) residential areas are generally considered to have high viewer concern. However, existing landscape character may temper viewer concern on some State and locally designated scenic highways and corridors. Similarly, travelers on other highways and roads, including those in agricultural areas, may have moderate viewer concern depending on viewer expectations as conditioned by regional and local landscape features. Commercial uses, including business parks, typically have low-to-moderate viewer concern, though some commercial developments have specific requirements related to visual quality, with respect to landscaping, building height limitations, building design, and prohibition of above-ground utility lines, that indicate high viewer concern. Industrial uses typically have the lowest viewer concern because workers are focused on their work, and generally are working in surroundings with relatively low visual value.

Viewer Exposure

The visibility of a landscape feature, the viewing distance to the landscape feature, the number of viewers, and the duration of the view all affect the exposure of viewers to a given landscape feature. Visibility is highly dependent on screening and angle of view. The smaller the degree of screening and/or the closer the feature is to the center of the view area, the greater its visibility is. Increasing distance reduces visibility. Viewer exposure can range from low values for all factors, such as a partially obscured and brief background view for a few motorists, to high values for all factors, such as an unobstructed foreground view from a large number of residences.

Visual Sensitivity

The overall level of sensitivity of a view area to impacts due to visual change is a function of visual quality, viewer concern, and viewer exposure and can range from low to high.

Types of Visual Change

To assess the visual changes that the project would cause, staff considered the following factors:

Contrast

Visual contrast describes the degree to which a project's visual characteristics or elements (consisting of form, line, color, and texture) differ from the same visual elements established in the existing landscape. The degree of contrast can range from low to high. The presence of forms, lines, colors, and textures in the landscape similar to those of a proposed project indicates a landscape more capable of accepting those project characteristics than a landscape where those elements are absent. This ability to accept alteration is often referred to as visual absorption capability and typically is inversely proportional to visual contrast.

Dominance

Another measure of visual change is project dominance. Dominance is a measure of a feature's apparent size relative to other visible landscape features and the total field of view. A feature's dominance is affected by its relative location in the field of view and the distance between the viewer and the feature. The level of dominance can range from subordinate to dominant.

View Blockage

View blockage describes the extent to which any previously visible landscape features are blocked from view by the project. Blockage of higher quality landscape features by lower quality project features causes adverse visual impacts. The degree of view blockage can range from none to high.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following discussion of Federal, State, and Local laws, ordinances, regulations, and standards is based on Section 8.11.2 (LORS) of the Application for Certification (SMUD 2001a, pp. 8.11-1 and 8.11-14 through 8.11-21) and an independent review of the Sacramento County General Plan and Zoning Ordinance and the Yolo County General Plan.

FEDERAL

No federal LORS relating to visual resources apply to the proposed project.

STATE

In the project vicinity, there are no state designated or eligible scenic highways (Caltrans 2002). When a highway has been designated "scenic," the local jurisdiction is

required to enact a scenic corridor protection program that protects and enhances scenic resources. A properly enforced program can mitigate the effects of uses that might otherwise detract from the scenic values of the corridor landscape. A corridor protection program would typically stipulate specific siting, landscaping, and screening requirements; as well as require appropriate structural characteristics and surface treatments to make new development more compatible with the existing environment.

LOCAL

The proposed generating facility site, transmission interconnection, and the gas line are located in Sacramento County and would be subject to any county laws, ordinances, regulations, and standards (LORS) pertaining to the protection and maintenance of visual resources in Sacramento County. The natural gas compressor station in Yolo County would be subject to any applicable Yolo County LORS.

Twenty-nine applicable LORS from Sacramento County are found in the Public Facilities and Land Use Elements of the Sacramento County General Plan and the Sacramento County Zoning Ordinance. The relevant local LORS and an assessment of the project's LORS consistency are presented in a later section of this analysis. Fifteen policies from the Yolo County General Plan pertain to the protection and/or maintenance of visual resources within scenic highway, waterway, or riverbank corridors, or in areas of scenic value. However, staff determined that none of the fifteen policies are directly applicable to the gas compressor station.

Portions of the underground gas pipeline route pass through the City of Elk Grove and would be subject to their jurisdiction. However, staff did not find visual resources LORS pertaining to an underground pipeline (as presently proposed) for the City of Elk Grove.

PROJECT DESCRIPTION

The following section describes the aspects of the project that may have the potential for significant visual impacts and includes the power plant and associated facilities, switchyard, electric transmission interconnection, natural gas pipeline and compressor stations, and water supply pipeline (see **Project Description Figure 2**).

POWER PLANT AND ASSOCIATED FACILITIES

The proposed project would be located in Sacramento County, 25 miles southeast of the City of Sacramento. The project site for Phases 1 and 2 would occupy approximately 30 acres of 2,480 acres owned by Sacramento Municipal Utility District (applicant). The site is situated between Rancho Seco Power Plant on the north and Clay East Road on the south. **Visual Resources Table 1** presents the heights for a number of the project's key components. The most visible features of the proposed project would include the four 165-foot tall HRSG stacks; the four 107-foot tall HRSG structures; the 65-foot tall air inlets to the combustion turbine generators (CTGs); the two 40-foot tall, 2.5-million-gallon raw water storage tanks; and the 43-foot tall, 864-foot long 18-cell cooling tower structure (see **Visual Resources Figure 1**). Other features associated with the generation site include ancillary structures; parking areas; an 8-foot chain link fence, with an additional two feet of barbed or razor wire; and lighting (which is addressed in a separate section later in this analysis).

Visual Resources Table 1
Dimensions of Key Project Components

Component	Height[1] (feet)	Length (feet)	Diameter / Width (feet)
HRSG Structure (to top of highest relief valve)	107		
HRSG Drums (to top of highest)	97		
HRSG Stacks	165		18.5
HRSG Casings	72	120	32
Gas Combustion Turbine Air Inlet Filters	65	85	40
Steam Turbine Generator Enclosure	40	100	40
Cooling Tower Structure	43	864 (18 cells)	66
Deionized Water Storage Tanks	40		32
Raw Water Tanks	40		105
Switchyard Conductor Take-off Structures	70		
Transmission Towers	100 to 125		

[1] Source: SMUD 2001d, Data Adequacy Response, pp. 13-14)

SWITCHYARD

A new on-site switchyard would be located immediately west of the power generation facilities. Components of the new switchyard would have an industrial appearance similar to that of other components associated with the power generation facilities and would include transformers, A-frame take-off structures, and other electrical equipment. The takeoff structures would be the tallest switchyard components and would be approximately 70 feet in height (see **Visual Resources Figure 1**). The switchyard facilities are visible in **Visual Resources Figure 3B**.

ELECTRICAL TRANSMISSION INTERCONNECTION

Power generated by the proposed project would be transferred over a 0.4-mile double circuit 230 kV transmission interconnection to the existing switchyard at Rancho Seco Power Plant, which is located immediately north of the proposed project site. The transmission line would be 100 feet to the east of and parallel to an existing PG&E 230 kV transmission line right-of-way. The transmission line would be carried on six single-pole tubular structures (SMUD 2001a, p. 5-8; SMUD 2002p, p. 1-3).

NATURAL GAS PIPELINE

Natural gas would be delivered to the project site via a 24-inch diameter, 26-mile long underground pipeline from the Carson Ice-Generation Facility. The underground gas pipeline would also require the installation of several aboveground facilities including one interconnection station, three valve stations, a measurement station, and two compressor stations (which would be required at the time that the second phase of the project is completed and the third and fourth HRSGs are brought on line). At the valve

stations, all valves would be below ground. The only components that would be aboveground would be the high head extensions for the valves (about 3.5 feet above the ground surface), a blow off stack (about 8 feet above the ground surface and up to 10 inches in diameter), and a Remote Terminal Unit (RTU) for the supervisory control and data acquisition system (a metal box about 3 feet x 3 feet x 4 feet tall). The RTU would be enclosed in a 5-foot x 8-foot x 8-foot structure. At the interconnection station and Valve Station 3, there would also be a pig launcher (a "pig" is a torpedo- or sphere-shaped device that is used to inspect or clean gas pipelines). The launcher would be about 10 feet x 10 feet x 5 feet tall.

A slatted, 6-foot cyclone fence topped with barbed wire would enclose all facilities. The slats would be tinted to blend with the surrounding background of each area. The locations of these aboveground facilities are as follows based on the applicant's response to staff's Data Request #89 (SMUD 2002a, pp. 41-43):

- **Interconnection Station** – This station would occupy an area 75 feet by 75 feet on the southwest corner of Laguna Station Road and Glacier Road. The station facilities would include above ground valves, buried valves with elevated stems, a pipeline blow down stack, a pig launcher, and control equipment.
- **Valve Station 1** – This station would occupy an area 50 feet by 50 feet on the west side of Bruceville Road, approximately 0.5 mile north of Eschinger Road. This station would include buried valves with elevated stems, a pipeline blow down stack and control equipment.
- **Valve Station 2** – This station would occupy an area 50 feet by 50 feet on the northwest corner of Arno and Valensin Roads. This station would include buried valves with elevated stems, a pipeline blow down stack and control equipment.
- **Valve Station 3** would occupy an area 100 feet by 100 feet on the southwest corner of Valensin and Alta Mesa Roads. This station would include buried valves with elevated stems, a pipeline blow down stack, a pig launcher, and control equipment.
- **Measurement Station** – This station would occupy an area 100 feet by 100 feet at the proposed power plant site. This station would include aboveground valves, buried valves with elevated gearing, a pipeline blow down stack, a pig receiver, metering equipment, and control equipment. The power plant slatted site fencing would also enclose the Measurement Station.
- **Compressor Station in Yolo County near Winters** (second phase) – A compressor would be installed within the existing inter-tie station located at 27700B County Road 29 in Yolo County. The compressor is anticipated to be skid mounted, approximately 10 feet by 20 feet by 8 feet high, within a slatted fence enclosure.
- **Compressor Station at Carson Ice Generation Plant** (second phase) – A compressor would be installed within the existing inter-tie station located at the crosstie measurement and Valve Station 190, which is located on an un-named access road between Franklin Boulevard and the Carson Ice-Generation Plant. The compressor is anticipated to be skid mounted, approximately 10 feet by 20 feet by 8 feet high, within a slatted fence enclosure.

WATER SUPPLY PIPELINE

Water for the proposed project would be obtained from an existing pipeline from the Folsom South Canal (SMUD 2001a, p. 8.11-7) and would not require off-site pipeline construction. However, a package water treatment plant would be required to treat the water from the canal (SMUD 2001a, p. 1-1). The package water treatment plant would be located inside the deionized water treatment building at the proposed power plant site (SMUD 2002a, Data Response 92).

SETTING

REGIONAL LANDSCAPE

The proposed project would be located in a sparsely developed region of southeast Sacramento County in a landscape characterized by rolling hills, vineyards, cattle grazing land, open space, rural residences, and energy production and transmission infrastructure. The most prominent features in the regional landscape are the Rancho Seco Power Plant's twin 426-foot-high parabolic cooling towers, which will remain standing following the decommissioning of Rancho Seco (SMUD 2001a, pp. 8.11-1 & 2). In the distance to the east are the Sierra Nevada Mountains, which are visible on days when they are not obscured by haze. Other noticeable features in the primarily rural landscape are the electric transmission lines that converge on the Rancho Seco substation; and utility lines along Twin Cities Road, the principal east-west roadway in the project vicinity that passes north of the project site. The principal recreation facility in the region is Rancho Seco Park, located approximately 1.6 miles southeast of the project site. The park offers day use swimming, picnicking, and fishing, and overnight camping.

PROJECT VIEWSHED

The distance zones used within this analysis are defined as *foreground* (0 to 1/2 mile), *middleground* (1/2 to 2 miles), and *background* (beyond 2 miles). Within these zones of influence are relatively few viewing opportunities due to the screening provided by the rolling terrain and the sparsely populated nature of the viewshed. Most viewing opportunities are from the west and south of the project site and some available views are unobstructed and panoramic, encompassing broad vistas of agricultural lands and expansive distances of sky. Views from Twin Cities Road in the immediate project vicinity are partially screened by the intervening rolling terrain. Foreground to middleground views of the proposed project are available from (a) Clay East Road east of Twin Cities Road (immediately adjacent to the south side of the site), (b) the nearest residences on Clay East Road (0.2 mile southwest of the site – KOP 1), (c) a small cluster of residences approximately 1.1 miles southwest of the site along the east side of Kirkwood Street (KOP 2), and (d) the recreational use areas of Rancho Seco Park approximately 1.6 miles southeast of the site (KOP 4). A middleground to background view of the site is available from several hilltop residences west of the project site including one on Clay Station Road (KOP 3), approximately 2 miles northwest of the project site.

The gas pipeline would be underground and would not be visible during project operation.

IMMEDIATE POWER PLANT VICINITY

Similar to the project region, the immediate power plant vicinity presents a mosaic of uses comprised primarily of rural residential intermixed with vineyards, cattle grazing, undeveloped open space, and energy production. The visual character of the immediate project vicinity, while decidedly rural, is dominated by the industrial character and structural prominence of the Rancho Seco Power Plant and the transmission lines converging on the power plant. The 30-acre project site is characterized by level terrain supporting primarily annual grassland, which is used as pasture

ELECTRICAL TRANSMISSION INTERCONNECTION

The proposed electrical transmission interconnection is located within the power plant vicinity, described above.

GAS PIPELINE

The proposed gas pipeline would pass through areas that are characterized as urban residential, rural residential, light industry, agriculture, and open space. The pipeline would follow a railroad alignment; existing utility corridors; and roadways, and would cross some agricultural fields. The view looking south along the proposed gas pipeline alignment from the Laguna Boulevard overcrossing of the Union Pacific Railroad shows baseball diamonds to the east in the foreground, and residential land uses to the east and west. The proposed gas pipeline alignment would parallel the railroad tracks in this area. The view of the proposed gas pipeline alignment from Ed Rau Road looking northeast across agricultural fields shows an existing transmission line alignment. The landscape in this area is primarily agricultural with a few rural residences. The remainder of the route to the project site passes through landscapes characterized by agricultural and rural residential uses.

WATER SUPPLY PIPELINE

The proposed 0.4-mile water supply pipeline connection to an existing 66-inch diameter underground water supply pipeline currently serving Rancho Seco Power Plant is located within the power plant vicinity, described above.

CONSTRUCTION LAYDOWN AREAS

The proposed construction laydown areas are located within the power plant vicinity, described above.

VIEWING AREAS AND KEY OBSERVATION POINTS

Staff evaluated the visual setting and proposed project in detail from several viewing areas represented by four KOPs: (1) Clay East Road, (2) Kirkwood Street, (3) Clay Station Road, and (4) Rancho Seco Park.

Each of these KOPs is shown on **Visual Resources Figure 2**. At each KOP a visual analysis was conducted, the results of which are presented in Appendix VR-1. Existing conditions photographs are presented in Appendix VR-3. A discussion of the visual setting for each KOP is presented in the following paragraphs.

KOP 1 – Clay East Road

KOP 1 is located at the front yard of 14460 Clay East Road, approximately 0.2 mile southwest of the project site. This viewpoint was selected to represent the view from the two residences closest to the project site. It also represents views from eastbound Clay East Road which dead ends just past the project site at the entrance road to a private ranch. **Visual Resources Figure 3A** shows the view from KOP 1 to the northeast toward the proposed project site.

Visual Quality

From this viewpoint, the most prominent features in the predominantly rural landscape are the flat, open agricultural fields that occupy the foreground and middleground; Rancho Seco Power Plant with its complex industrial character and prominent twin parabolic cooling towers in the middleground, the electric transmission and utility infrastructure that crosses the foreground fields and parallels Clay East Road, and the linear form of Clay East Road. Also visible in the background when not obscured by haze are the distant Sierra Nevada Mountains. Although the overall landscape character is rural agricultural, landscape character becomes more industrial in appearance in close proximity to Rancho Seco Power Plant. As a result, the visual quality of the view from KOP 1 is low-to-moderate.

Viewer Concern

The residential viewers represented by KOP 1 anticipate a foreground to middleground rural agricultural landscape with a dominant energy infrastructure presence. However, viewers' expectations would also include open panoramic vistas across the flat to rolling agricultural fields to the north and east. Although such views are partially obscured by the existing power plant and the intermittent presence of electric transmission and road side utility structures, any additional blockage of vista views along either roadway or introduction of features with industrial character would be perceived as an adverse visual change and viewer concern is moderate-to-high.

Viewer Exposure

Site visibility is high because the view of the site from KOP 1 is open and unobstructed at a foreground viewing distance of approximately 0.2 mile, and the duration of view is extended. However, a very low number of potential viewers can outweigh other exposure factors, leading to a low rating for overall viewer exposure, which is the case for the two residences that have this view.

Although the applicant has identified an annual average daily traffic of 790 for Clay East Road (SMUD 2002ai,), almost all of those vehicles either turn south on or travel west from Kirkwood Street. The eastern-most segment of Clay East Road represented by KOP 1 ends just east of the viewpoint and has very little vehicle traffic. The very low number of motorists outweighs other exposure factors, leading to a low rating for overall viewer exposure.

Overall Visual Sensitivity

The low-to-moderate visual quality and low viewer exposure somewhat offsets the moderate-to-high viewer concern at KOP 1. The resulting overall sensitivity for KOP 1 is low-to-moderate.

KOP 2 – Kirkwood Street

KOP 2 is located at the back yard of 11615 Kirkwood Street, near the intersection with Clay East Road. This viewpoint is approximately 1.1 miles southwest of the project site. This viewpoint was selected to represent the slightly elevated perspective from the four residences along Kirkwood Street that are closest to the intersection with Clay East Road. It also somewhat represents the motorist view from eastbound Clay East Road, as the road begins to descend the slight rise from Kirkwood Street. This view is also somewhat similar to views experienced by approximately 50 residences in the area from west of the plant to south of the site. **Visual Resources Figure 4A** shows the existing view to the northeast from KOP 2 toward the project site.

Visual Quality

This viewpoint affords panoramic views of a foreground to middleground flat agricultural landscape with a prominent presence of energy and electric transmission infrastructure in the middleground, backdropped by foothills and the distant Sierra Nevada mountain range. Aside from the foreground flat agricultural fields, the most prominent features in the landscape are the twin parabolic cooling towers at Rancho Seco Power Plant with its complex industrial character. Other noticeable features in the landscape include electric transmission and utility infrastructure and the linear form of Clay East Road. Overall visual quality is moderate.

Viewer Concern

The residential viewers represented by KOP 2 anticipate a foreground to middleground rural agricultural landscape with a dominant energy infrastructure presence in the middleground. However, viewers' expectations also include open panoramic vistas across the flat-to-rolling agricultural fields to the east to the foothills and mountains. Any additional view blockage of natural features (agricultural fields, foothills, or mountains in the background) by project structural elements or introduction of features with industrial character would be perceived as an adverse visual change and viewer concern is moderate-to-high. Eastbound travelers on Clay East Road are almost all either residents of the area or their visitors, so the level of viewer concern is also moderate-to-high for travelers.

Viewer Exposure

Site visibility is high in that the view of the site from KOP 2 is open and unobstructed at a middleground viewing distance of approximately 1.1 miles. Approximately 20 residences represented by this KOP have similar views of the project site, so the number of residential viewers is moderate. The extended duration of viewing opportunities for the residents results in a high value for duration of view. For the moderate number of residences represented by KOP 2, the project's high visibility and the long duration of view result in moderate to high viewer exposure.

Motorists on Kirkwood Street would generally not be able to see the project site except near the intersection with Clay East Road because residences and vegetation along most of the length of the street generally screen views to the east. At the Clay East Road intersection, the attention of the motorist traveling northbound on Kirkwood Street is primarily drawn to the west away from the project site because most of the oncoming traffic is approaching from the west and then turns south on Kirkwood Street. Eastbound motorists on Clay East Road would also have a brief view of the site at the intersection with Kirkwood Street before turning south on Kirkwood Street (there is no stop for traffic on Clay East Road). Overall, for motorists visibility is low to moderate and duration of view is low.

The applicant has identified an annual average daily traffic of 790 for Clay East Road (SMUD 2002ai,). Approximately half of those vehicles would be traveling westbound away from the project, having originated from Kirkwood Street or the eastern-most dead end segment of Clay East Road. The remaining 395 vehicles would be traveling east on Clay East Road with most turning south on Kirkwood Street and a few continuing east on Clay East Road past Kirkwood Street. This constitutes a moderate number of viewers. Considering the low to moderate visibility, low duration of view, and moderate number of viewers, overall viewer exposure for motorists represented by KOP 2 is low to moderate.

Overall Visual Sensitivity

For the residences represented by KOP 2, the moderate visual quality, moderate-to-high viewer concern, and moderate-to-high viewer exposure result in an overall moderate-to-high level of visual sensitivity. For motorists, the moderate visual quality, moderate-to-high viewer concern, and low-to-moderate viewer exposure result in an overall moderate level of visual sensitivity.

KOP 3 – Clay Station Road

KOP 3 is located at the backyard of 11540 Clay Station Road, slightly over two miles northwest of the project site. This viewpoint represents the elevated perspective available to approximately two hilltop residences. **Visual Resources Figure 5A** shows the view from KOP 3 to the southeast toward the proposed project site.

Visual Quality

This viewpoint affords panoramic views of a foreground to background flat agricultural landscape with a prominent presence of energy and electric transmission infrastructure, backdropped by the distant Sierra Nevada mountain range. Aside from the foreground to middleground flat agricultural fields, the most prominent features in the landscape are the twin parabolic cooling towers at Rancho Seco Power Plant with its complex industrial character on the middleground to background margin. Other noticeable features in the landscape include electric transmission lines converging on the power plant. Overall visual quality is moderate.

Viewer Concern

The residential viewers represented by KOP 3 anticipate a foreground to background rural agricultural landscape with a prominent energy infrastructure presence. However, viewers' expectations also include open panoramic vistas across the flat to rolling

agricultural landscape to the distant Sierra Nevada Mountains. Any additional view blockage of natural features (agricultural fields or mountains in the background) by project structural elements or introduction of features with industrial character would be perceived as an adverse visual change and viewer concern is moderate-to-high.

Viewer Exposure

Site visibility is moderate-to-high at this near background viewing distance of slightly over two miles. Although the duration of view is extended, the number of viewers is very low. As discussed above, a very low number of potential viewers can outweigh other exposure factors, leading to a low rating for overall viewer exposure, which is the case for KOP 3.

Overall Visual Sensitivity

For KOP 3 moderate visual quality, moderate-to-high viewer concern, and low overall viewer exposure result in moderate overall visual sensitivity.

KOP 4 – Rancho Seco Park

KOP 4 is located at the swimming and picnic area at Rancho Seco Park. This viewpoint is approximately 1.6 miles southeast of the project site. This viewpoint was selected to represent the recreational views of park users. **Visual Resources Figure 6A** shows the existing view from KOP 4 to the northwest toward the proposed project site.

Visual Quality

This viewpoint affords panoramic views of a foreground to middleground reservoir and park landscape, backdropped by the low reservoir dam and prominent parabolic cooling towers of Rancho Seco Power Plant in the distant middleground. The prominent blue color of the reservoir waters contrasts with the green of the park turf areas, adding visual interest and variety to the view from KOP 4. Overall visual quality is moderate.

Viewer Concern

The recreational viewers represented by KOP 4 anticipate a foreground to middleground park landscape dominated by the level reservoir waters and the prominent features at Rancho Seco Power Plant. However, viewers' expectations also include open panoramic vistas across the reservoir to the predominately open skies beyond. Any additional view blockage of natural features (sky) by project structural elements or introduction of features with industrial character would be perceived as an adverse visual change and viewer concern is moderate-to-high.

Viewer Exposure

Site visibility is moderate at this middleground viewing distance of 1.6 miles. Although the number of viewers is moderate, the duration of view is extended and overall viewer exposure is moderate.

Overall Visual Sensitivity

The moderate-to-high viewer concern is tempered by the moderate visual quality and viewer exposure that would be experienced. The resulting overall sensitivity of the visual setting experienced from KOP 4 is moderate.

IMPACTS

CONSTRUCTION IMPACTS

Construction of the proposed power plant and linear facilities would cause adverse visual impacts due to the presence of equipment, materials, and workforce. Construction would involve the use of cranes, heavy construction equipment, temporary storage and office facilities, and temporary laydown/staging areas. Construction would include site clearing and grading, digging for construction of underground linear facilities, construction of the actual facilities, and site and rights-of-way cleanup and restoration. Project construction would span a period of approximately four years. Construction of the first phase of the project would occur over a 24-month period. Construction of the second phase of the project would occur over a 20-month period, which could follow three months or years after completion of the first phase (SMUD 2001a, p. 8.11-10). Due to the short-term nature of project construction, the adverse visual impacts that would occur during construction would not be significant. However, this conclusion assumes that screening is properly implemented and that complete restoration of construction areas and rights-of-way is accomplished. Proper implementation of Condition of Certification **VIS-1** would ensure that the visual impacts associated with project construction remain less than significant.

Also, while the majority of construction activities would occur during daylight hours when supplemental lighting would not be needed, some construction activity may occur at night to make up schedule deficiencies or to complete critical construction activities. Additionally, some construction activities during the startup phase would continue 24 hours a day, 7 days a week (SMUD 2001a, p. 2-17). Also, if nighttime pipeline construction activities occur, standard white construction lights that are approximately six to eight feet tall would be used to illuminate the immediate construction activity. In order to ensure that significant construction lighting impacts do not occur, staff recommends Condition of Certification **VIS-4**, presented later in this analysis.

There are approximately 530 residences located along the 26-mile pipeline that are within 500 feet of the pipeline alignment (SMUD 2002a, p. 43, Data Response #90). However, it is likely that not all of the 530 residences would have a view of the pipeline construction because of the elevation of residences relative to the pipeline, the orientation of the residence relative to the pipeline, and the presence of vegetation, fencing, or other structures that would obstruct views from the residence.

A typical pipeline construction spread would include a bulldozer, backhoe, boom trucks, excavation diggers, material delivery trucks, welding trucks and inspection vehicles. In traffic areas, the spread would be less than 500 feet in length. In rural or agricultural areas, the spread would depend on safety and construction efficiency. Generally, the speed of construction would be 100 feet to 500 feet per day depending upon width of construction easement, equipment type, soil, and weather conditions (SMUD 2002a, pp. 43-44, Data Responses #90 and #91). Typically, pipeline construction could potentially be viewed from residences for one to seven days with decreasing levels of visual clarity as the distance to construction activities increases. Given the limited duration that pipeline construction activities would be visible, the resulting visual impact would be less

than significant. Views of the two compressor station sites are extremely limited and the compressor station near Winters would be located within an existing facility. The visual impacts of compressor station construction would be less than significant.

OPERATION IMPACTS

An analysis of operation impacts was conducted for the view areas represented by the key viewpoints selected for in-depth visual analysis. The results of the operation impact analysis are discussed below by KOP and presented in the Visual Analysis Summary table included as **Visual Resources Appendix VR-1**. The visual impacts of night lighting are discussed in a separate section of this analysis. For each KOP, an evaluation of visual contrast, project dominance, and view blockage is presented with a concluding assessment of the overall degree of visual change caused by the proposed project.

Impacts of Power Plant Structures

As previously discussed, for Phases 1 and 2, the most prominent power plant structures would be the four 165-foot tall HRSG stacks, the four 107-foot tall HRSGs, the 65-foot tall air inlets to the combustion turbine generators (CTGs), the 40-foot tall steam turbine generator, and the 43-foot tall, 864-foot long cooling tower structure consisting of 18 cells.

The 230 kV electric transmission interconnection and switchyard would also be visible in the immediate power plant vicinity. The transmission interconnection would be located adjacent to the existing PG&E 230 kV transmission line. The existing lattice structures are a maximum of 138 feet tall. The proposed transmission line would be carried on six single-pole tubular structures, which would be a maximum of 125 feet in height (SMUD 2002a, Data Response #97).

The proposed switchyard, located immediately west of the power generation facilitates, would be noticeable in the views from KOPs 1-3 but would not be prominent project features within the context of the existing transmission line, Rancho Seco Power Plant, and the proposed power generation facilities that would be prominently visible immediately behind the switchyard.

KOP 1 – Clay East Road

Visual Resources Figure 3B presents a visual simulation of the proposed project as viewed from KOP 1 from the front yard of 14460 Clay East Road. The most obvious change to the landscape would be the introduction of prominent geometric forms with horizontal and vertical lines and complex industrial character. The resulting structural mass would appear similar to that of the adjacent Rancho Seco Power Plant.

The proposed transmission structures and switchyard are also shown in **Visual Resources Figure 3B**. As shown in the simulation, the interconnection's tubular structures and switchyard would be only marginally noticeable within the context of the existing transmission line, Rancho Seco Power Plant, and the proposed power generation facilities.

Visual Contrast

The proposed project would introduce the prominent geometric forms and vertical and horizontal lines of the HRSG structures and stacks and intake air inlet structures and the vertical forms and lines of the electric transmission interconnection and switchyard. These structural characteristics would appear similar to the existing forms and lines established by the adjacent Rancho Seco Power Plant and electric transmission infrastructure converging on the plant. The neutral gray color of the proposed facilities would also be consistent with the color of the existing Rancho Seco Power Plant and electric transmission towers. While the apparent scale of these introduced forms and structural masses would appear similar to the existing power plant; they would be substantially larger than other developed features in the immediate project vicinity including transmission lines, roadside utility infrastructure, and agricultural fences and outbuildings. The resulting visual contrast would be moderate (see the Visual Analysis Summary table presented as **Visual Resources Appendix VR-1**).

Project Dominance

The predominantly rural agricultural landscape visible from KOP 1 is dominated by the flat, horizontal form of the agricultural fields and the prominent complex industrial forms of Rancho Seco Power Plant and electric transmission infrastructure. The proposed power plant facilities would be spatially prominent in the view from KOP 1. The scale of the proposed facilities, without landscaping, would appear co-dominant with the existing power plant and landforms. Also, the height of the vertical HRSG stacks would contribute to the structural prominence of the proposed facilities. Overall project dominance would be co-dominant.

View Blockage

From KOP 1 the vertical HRSG structures and stacks and intake air filters (lower quality landscape features) would block the view to portions of sky (higher quality landscape feature). Portions of the Sierra foothills would also be partially blocked from view on days when they are not obscured by valley haze. The resulting view blockage would be moderate.

Overall Visual Change

From KOP 1, the overall visual change caused by the proposed project would be moderate due to the moderate degree of contrast that would occur from the project's co-dominant structures, combined with the project's moderate degree of view blockage of higher quality landscape features (sky).

Visual Impact Significance

When considered within the context of the overall low-to-moderate visual sensitivity of the existing landscape and viewing characteristics, the moderate visual change that would be perceived from KOP 1 would cause an adverse but not significant visual impact.

KOP 2 –Kirkwood Street

Visual Resources Figure 4B presents a visual simulation of the proposed project as viewed from KOP 2 from the backyard of 11615 Kirkwood Street, near the intersection

with Clay East Road. The most obvious change to the landscape would be the introduction of noticeable geometric forms with horizontal and vertical lines and complex industrial character.

Visual Contrast

The proposed project would introduce the noticeable geometric forms and vertical and horizontal lines of the HRSG structures and stacks and intake air inlet structures and the vertical forms and lines of the electric transmission interconnection and switchyard. These structural characteristics would appear similar to the existing forms and lines established by the adjacent Rancho Seco Power Plant and electric transmission infrastructure converging on the plant. The neutral gray color of the proposed facilities would also be consistent with the color of the existing Rancho Seco Power Plant and electric transmission towers. However, the project's structural characteristics would appear dissimilar to the surrounding flat, agricultural landscape. While the apparent scale of these introduced forms and structural masses would appear smaller than the existing power plant; they would be larger than other developed features in the immediate project vicinity including transmission lines, roadside utility infrastructure, and rural residential structures. The resulting visual contrast would be low-to-moderate (see the Visual Analysis Summary table presented as **Visual Resources Appendix VR-1**).

Project Dominance

The flat, horizontal form of the agricultural fields along with the low rolling hills and the prominent complex industrial forms of Rancho Seco Power Plant dominate the predominantly rural agricultural landscape visible from KOP 2. The proposed power plant facilities would be spatially noticeable in the view from KOP 2 but the scale of the proposed facilities, without landscaping, would appear smaller than that of either the surrounding landforms or power plant with its two massive hyperbolic cooling towers. Overall project dominance would be subordinate-to-co-dominant.

View Blockage

From KOP 2 the vertical HRSG structures and stacks and intake air filters (lower quality landscape features) would block from view portions of the Sierra Nevada foothills and surrounding agricultural fields (higher quality landscape features). However, compared to KOP 1 which is considerably closer to the proposed project site, the view blockage experienced at KOP 2 would be less apparent in the wider field of view available from this more distant viewpoint (see **Visual Resources Figure 4B**). The resulting view blockage would be low-to-moderate.

Overall Visual Change

From KOP 2, the overall visual change caused by the proposed project would be low-to-moderate due to the low-to-moderate degrees of contrast and view blockage that would occur from the project's subordinate-to-co-dominant structures.

Visual Impact Significance

When considered within the context of the overall moderate visual sensitivity of the existing landscape and viewing characteristics, the low-to-moderate visual change that

would be perceived from KOP 2 would cause an adverse but not significant visual impact.

KOP 3 – Clay Station Road

Visual Resources Figure 5B presents a visual simulation of the proposed project as viewed from KOP 3 from the backyard of 11540 Clay Station Road. The most obvious change to the landscape would be the introduction of noticeable geometric forms with horizontal and vertical lines and complex industrial character. However, at this background viewing distance, the structural mass of the proposed project would appear smaller than that of the existing Rancho Seco Power Plant to the north of the project site.

It should be noted that the simulation presented in Figure 5B does not reflect the most recent changes to the project design, which are reflected in the simulations for KOP 1 (**Visual Resources Figure 3B**) and KOP 2 (**Visual Resources Figure 4B**). However, the most substantial visual changes in the new design (slightly different spacing between HRSG structures and stacks and a five-foot increase in the height of the HRSG stacks) would not be readily apparent at this near background viewing distance and would not change the conclusions reached in the KOP 3 analysis.

Visual Contrast

At this near background viewing distance, the most noticeable project elements would be the vertical forms and lines of the HRSG structures and stacks and the vertical forms and lines of the electric transmission interconnection and switchyard. These structure characteristics would appear similar to the existing forms established by the adjacent Rancho Seco Power Plant and electric transmission infrastructure converging on the plant. The neutral gray color of the proposed facilities would also be consistent with the color of the existing Rancho Seco Power Plant and electric transmission towers. Also, the apparent scale of these introduced forms and structural masses would appear substantially smaller than the existing power plant structures. However, the proposed project's linear forms, vertical lines, and industrial character would appear dissimilar to the surrounding flat, horizontal, agricultural landscape. The resulting visual contrast would be low-to-moderate (see the Visual Analysis Summary table presented as **Visual Resources Appendix VR-1**).

Project Dominance

The predominantly rural agricultural landscape visible from KOP 3 is dominated by the flat, horizontal landforms comprised of the foreground to middleground agricultural fields and the prominent and complex industrial forms of Rancho Seco Power Plant. The proposed power plant facilities would be spatially noticeable in the view from KOP 3 but the scale of the proposed facilities, without landscaping, would appear smaller than that of either the foreground to middleground level landforms or the existing power plant with its two massive hyperbolic cooling towers. Overall project dominance would be subordinate.

View Blockage

From KOP 3 the vertical HRSG structures and stacks (lower quality landscape features) would block from view small portions of the Sierra Nevada foothills and distant agricultural fields (higher quality landscape features). The resulting view blockage would be low.

Overall Visual Change

From KOP 3, the overall visual change caused by the proposed project would be low due to the low-to-moderate degree of contrast and low degree of view blockage that would result from the project's visually subordinate structures.

Visual Impact Significance

When considered within the context of the overall moderate visual sensitivity of the existing landscape and viewing characteristics, the low visual change that would be perceived from KOP 3 would cause an adverse but not significant visual impact.

KOP 4 – Rancho Seco Park

Visual Resources Figure 6B presents a visual simulation of the proposed project as viewed from KOP 4 from the swimming and picnic area at Rancho Seco Park. The proposed project would introduce the noticeable linear forms and vertical lines of the HRSG stacks. However, at this distant middleground viewing distance, minimal structural mass would be apparent compared to the massive hyperbolic forms of the Rancho Seco Power Plant cooling towers.

It should be noted that the simulation presented in Figure 6B does not reflect the most recent changes to the project design, which are reflected in the simulations for KOP 1 (**Visual Resources Figure 3B**) and KOP 2 (**Visual Resources Figure 4B**). However, the most substantial visual changes in the new design (slightly different spacing between HRSG structures and stacks and a 5-foot increase in the height of the HRSG stacks) would not be readily apparent at this distant middleground viewing distance and would not change the conclusions reached in the KOP 4 analysis.

Visual Contrast

At this middleground viewing distance, the most noticeable project elements would be the linear forms and vertical lines of the HRSG stacks. The stacks would be minimally visible above Rancho Seco Dam. The neutral gray color of the proposed facilities would also be consistent with the color of the existing Rancho Seco Power Plant and electric transmission towers. The scale of these structural masses would appear substantially smaller than the existing Rancho Seco Power Plant cooling towers. Although the proposed project's linear vertical lines would appear dissimilar to the predominantly horizontal lines created by the dam and water lines, at this distant middleground viewing distance the project's vertical lines would be minimally noticeable (see **Visual Resources Figure 6B**). The resulting visual contrast would be low (see the Visual Analysis Summary table presented as **Visual Resources Appendix VR-1**).

Project Dominance

The view from KOP 4 is dominated by the broad horizontal bands of sky, water, and grass, punctuated only by the prominent hyperbolic forms of the Rancho Seco cooling towers. While the proposed power plant facilities would be spatially noticeable in the center of the view from KOP 4, they would appear subordinate in size compared to the existing natural features in the landscape (sky, water, and grass) and existing power plant structures. Overall project dominance would be subordinate.

View Blockage

From KOP 4 the vertical HRSG stacks (lower quality landscape features) would block from view very small portions sky above the horizon (higher quality landscape feature). The resulting view blockage would be low.

Overall Visual Change

From KOP 4, the overall visual change caused by the proposed project would be low due to the low amounts of contrast and view blockage that would result from the project's visually subordinate structures.

Visual Impact Significance

When considered within the context of the overall moderate visual sensitivity of the existing landscape and viewing characteristics, the low visual change that would be perceived from KOP 4 would cause an adverse but not significant visual impact.

Linear Facilities

The electric transmission interconnection and associated switchyard are discussed above under the power plant facilities.

The proposed underground natural gas supply line would not be visible following installation except for an occasional warning marker and would not result in adverse visual impacts. However, the gas pipeline would include two aboveground gas compressor stations, an interconnection station, and three valve stations that would be located in areas with public visual access. Valve Station 3 would be particularly noticeable at the intersection of Valensin and Alta Mesa roads. The above ground valves, elevated valve stems, blow down stacks, and small structure for control equipment would appear industrial in character, and inconsistent with the surrounding landscape features. The valve stems would extend about 3.5 feet above the ground surface while the blow down stacks would be 10 inches in diameter and extend about 8 feet above the ground surface. The remote terminal unit (RTU) would be enclosed in a 5-foot by 8-foot by 8-foot tall structure. At the interconnection station, the pig launcher station would be approximately 10 feet by 10 feet by 5 feet tall. While the resulting visual impacts of these above facilities would not be significant due to their small size relative to other visible features in the landscape, they would be adverse and should be mitigated with appropriate screening. The other aboveground facilities (measurement station and two compressor stations) would be located within other larger facilities and would not cause adverse visual impacts.

The proposed underground water supply pipeline would be located within SMUD's 2,480-acre property and would not result in adverse visual impacts.

Lighting

The proposed project would be located in an agricultural and rural residential area, which has relatively minimal existing night lighting except for residential lighting. The nearby Rancho Seco Power Plant has only nighttime security lighting, which is visible as a combination of orange-colored and white lights on poles and mounted on structures. A faint glow, from the lighting at the plant, can be seen in the sky above the power plant and there are red flashing lights atop the two 426-foot-tall cooling towers. There are also red, non-flashing lights on the cooling towers at heights of approximately 180 feet and 270 feet (SMUD 2002a, Data Response #101).

The proposed project would require nighttime lighting for operational safety and security, but the project would not be required to have FAA-style red, flashing warning lights on the HRSG stacks (SMUD 2002a, Data Response #104). It is expected that silhouettes of some facilities would be partially visible to nearby residences. Also, because the lights would be directed downward, illumination of visible plumes is expected to be minimal. It is, however expected that project lighting may produce a faint nighttime sky glow during periods of high humidity, and the plumes could be visible in the sky glow (SMUD 2002a, Data Response 103). Because the Rancho Seco Power Plant facilities are located approximately 0.5 mile north of the project site, existing power plant lighting is not expected to significantly illuminate proposed project facilities.

To reduce the off-site visibility of night lighting, light bulbs and reflectors would be installed so that they are not visible from public viewing areas and illumination of the vicinity and the nighttime sky would be minimized during project operation (SMUD 2001a, p. 8.11-9). The applicant has also committed to installing light switches on the HRSGs and cooling towers so that they would only be illuminated when needed (SMUD 2001a, p. 8.11-13).

Exterior light fixtures would be hooded, and lights would be directed on-site so that significant light or glare (backscatter to the nighttime sky) would be minimized. Low-pressure sodium lamps and fixtures of a non-glare type would be specified. In addition, the nighttime lighting system would include switches, timers, and sensors to the extent possible. This would minimize the time the lights are on to further reduce the potential for project lighting to be visible off-site (SMUD 2001a, p. 8.11-9).

However, given the lack of existing lighting at the project site and vicinity and the lack of a specific lighting plan for the proposed project, the proposed project lighting has the potential to change the character of the existing landscape at night both during construction and operation of the project. Project night lighting would be most visible from project vicinity residences (KOPs 1, 2, and 3) where views of the site are open and unobstructed with no intervening structures or light sources. Even shielded lighting elements could create significant light and glare impacts as a result of indirect lighting of project structures and backscatter. The resulting visual impacts from night lighting could be adverse and significant.

CUMULATIVE IMPACTS

Cumulative impacts to visual resources could occur where project facilities or activities (such as construction) occupy the same field of view as other built facilities or impacted landscapes. It is also possible that a cumulative impact could occur if a viewer's perception is that the general visual quality of an area is diminished by the proliferation of visible structures (or construction effects such as disturbed vegetation), even if the new structures are not within the same field of view as the existing structures. The significance of the cumulative impact would depend on the degree to which (1) the viewshed is altered; (2) visual access to scenic resources is impaired; (3) visual quality is diminished; or (4) the project's visual contrast is increased.

Sacramento County identified one cumulative project within one mile of the proposed power plant site. The project is a proposed biosolids storage facility that would be located on the north side of Twin Cities Road, northwest of the proposed power plant site. Depending on where the biosolids storage facility is located on the candidate parcels, it may be visible in the same field of view of westbound motorists on Twin Cities Road, when approaching the project region east of the proposed power plant site. However, to the extent that both the proposed power plant and biosolids storage facility are visible in the same field of view, it would only be for a very brief viewing period due to the intermittent screening of the power plant site by intervening terrain. The resulting cumulative impact would be adverse but not significant.

Sacramento County has also identified eight recently approved or proposed projects within 500 feet of the proposed gas pipeline route or compressor station including an RV & boat storage facility, a subdivision extension of time, a rezone, two lot splits, two residential accessory buildings, and an apartment development project (SCPCDD 2002). There would be no cumulative visual impacts associated with pipeline construction since construction impacts would be temporary and none of the identified cumulative project locations would be within the same viewshed as the interconnection station or three valve stations. There would also be no cumulative visual impacts associated with operation of the pipeline or the associated aboveground facilities because the pipeline would be buried and not visible and the associated aboveground facilities would be relatively small and not be in the same viewshed as the identified cumulative projects.

The gas compressor station in Yolo County would be located at the back of an existing PG&E-SMUD natural gas intertie station and would not be noticeable from the one public access road in the project vicinity. Therefore, no cumulative visual impacts would occur as a result of the gas compressor station in Yolo County.

The proposed power plant structures would create adverse incremental visual effects that would be cumulatively considerable in conjunction with the ongoing effects of the existing Rancho Seco Power Plant structures. The Rancho Seco Power Plant introduced a substantial industrial element to the rural setting, which includes prominent natural features. The proposed project would continue that process of industrialization with the addition of complex geometric, metallic forms and strong horizontal and vertical lines. These structural characteristics contrast with the natural forms, lines, colors, and textures of the valley floor vegetation and rolling Sierra foothills and the mountains in

the distance. In addition, the proposed project's exterior lighting has the potential to be contribute considerably along with lighting at the Rancho Seco Power Plant to significant cumulative lighting impacts.

CONSIDERATION OF IMPACTS IN RELATION TO CEQA SIGNIFICANCE CRITERIA

This analysis considered the potential impacts of the proposed project structures in relation to the four significance criteria for visual resource impacts listed in Appendix G of the CEQA Guidelines, under Aesthetics, specified below.

1. **Would the project have a substantial adverse effect on a scenic vista?**

   There are no scenic vistas in the project region so the proposed project would not result in significant visual impacts under this criterion.

2. **Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?**

   The proposed project is not located within the viewshed of a state scenic highway nor would it damage the types of resources specified in this criterion. Therefore, project structures would not result in significant visual impacts under this criterion.

3. **Would the project substantially degrade the existing visual character or quality of the site and its surroundings?**

   As discussed previously, the proposed project would introduce prominent structures of industrial character into the foreground to middleground of views from nearby residences and roadways. However, the resulting visual change would range from low to moderate, depending on viewpoint location. As a result, viewers of project facilities on adjacent roads and at nearby residences would not experience a high level of visual degradation or a significant visual impact under this criterion. However, the project's contribution to the significant cumulative degradation of the visual character and quality of the site and its surroundings would be considerable, as discussed in the previous section.

4. **Would the project create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?**

   The project has the potential to create a new source of substantial light that would adversely affect nighttime views in the area and result in a significant visual impact under this criterion.

Mitigation of the visual impacts identified under Criteria 3 and 4 is addressed below in the Mitigation section.

ENVIRONMENTAL JUSTICE

Staff has reviewed Census 2000 information that shows the minority population is less than 50 percent within a six-mile radius of the proposed project (please refer to **Socioeconomics Figure 1** in this Staff Assessment). However, as indicated in **Socioeconomics Figure 1**, there are multiple census blocks with greater than 50 percent minority persons within the six-mile radius; staff considers these to be pockets or clusters. Staff also reviewed Census 2000 information that shows the low-income

population is less than fifty percent within the same radius. Based on the visual resources analysis, staff has concluded that project structures would not cause direct significant visual impacts. However, project structures would contribute substantially to adverse and significant cumulative visual impacts. Although some of the impacted residents would be part of the local minority population, the visual impact that they would experience would be similar to that of other dispersed non-minority residents in the project area. Therefore, the minority population located within the project area would not be disproportionately impacted by the proposed project in regard to visual resources.

FACILITY CLOSURE

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

Planned closure occurs at the end of a project's life, when the facility is closed in an anticipated, orderly manner, at the end of its useful economic or mechanical life, or due to gradual obsolescence. The closure plan that the project owner is required to prepare will address removal of the power plant structures.

Unexpected temporary closure occurs when the facility is closed suddenly and/or unexpectedly, on a short-term basis, due to unforeseen circumstances such as a natural disaster, or an emergency.

Unexpected permanent closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unexpected closure where the owner remains accountable for implementing the on-site contingency plan. It can also include unexpected closure where the project owner is unable to implement the contingency plan, and the project is essentially abandoned. The contingency plan that the project owner is required to prepare would address removal of the power plant structures. No special conditions regarding visual resources are expected to be required to address any of the three types of closure.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

LOCAL

Visual Resources Table 4 provides a listing of the applicable LORS for the County of Sacramento. Twenty-nine LORS were found to pertain to the enhancement and/or maintenance of visual quality and the protection of views. Of the 29 pertinent LORS, 10 are from the Sacramento County Zoning Ordinance. Section 53091 of the Government Code specifically exempts local agency projects involving the production of energy from city or county zoning code and building permit requirements. Table 4 identifies the proposed project's consistency with all local LORS as well as those Zoning Ordinance sections the project is exempt from. Based on staff's analysis it appears that the proposed project would be consistent with twenty-five of the local policies referenced in

Table 4, partially consistent with one local LORS, and inconsistent with two local LORS. In one case, staff has not received sufficient information to enable a consistency determination. The proposed project would be exempt from one of the Zoning Ordinance sections where an inconsistency was found as well as the in stance where consistency has yet to be determined. In the three cases of inconsistency or partial consistency, effective implementation of staff's proposed Conditions of Certification **VIS-2** through **VIS-5** would eliminate one of the inconsistencies and the one partial inconsistency. The one remaining inconsistency is that the project would exceed the County Zoning Ordinance's height limitation of 40 feet. However, the project is exempt from this requirement under Section 53091 of the Government Code.

Staff is aware that Sacramento County has determined that the project is consistent with local LORS (SCPCDD 2001b). Typically, staff will defer to the local jurisdiction's interpretation of local LORS consistency. However, in this case, staff has not seen or been informed of the basis for that conclusion with respect to the inconsistencies identified here. Therefore, until such time as staff is provided additional information by the County, staff will follow a literal interpretation of the local LORS in the identification of project inconsistencies with local LORS.

In addition, portions of the underground gas pipeline route pass through the City of Elk Grove and Yolo County and would be subject to their jurisdiction. However, staff did not find visual resources LORS pertaining to an underground pipeline (as presently proposed) for either the City of Elk Grove or Yolo County.

Visual Resources Table 4
Proposed Project's Consistency with
Local LORS Applicable to Visual Resources

LORS		Consistency Determination Before/After Mitigation Conditions	Basis for Consistency or Inconsistency
Source	**Description of Principles, Objectives, and Policies**		
Sacramento County General Plan Public Facilities Element	Objective: Minimize the health, safety, aesthetic, cultural and biological impacts of energy facilities in Sacramento County.	NO/YES	The lack of vegetative screening along the proposed project's western side increases project visibility and maximizes visual impact to views from the southwest to northwest (KOPs 1 through 3). Effective implementation of staff's Mitigation Measure 3 and Condition of Certification **VIS-3** would bring the proposed project into compliance with this requirement.
Public Facilities Element (cont'd)	Policy PF-71: Locate and design production and distribution facilities so as to minimize visual intrusion problems in urban areas and areas of scenic and/or cultural value including: recreation and historic areas; scenic highways; landscape corridors; state or federal designated wild and scenic rivers; visually prominent locations such as ridges, designated scenic corridors, and open viewsheds; and Native American sacred sites.	YES	The proposed project would not be located in an urban area, an area of identified scenic and/or cultural value, or a visually prominent area.

Visual Resources Table 4
Proposed Project's Consistency with
Local LORS Applicable to Visual Resources

LORS		Consistency Determination Before/After Mitigation Conditions	Basis for Consistency or Inconsistency
Source	**Description of Principles, Objectives, and Policies**		
Public Facilities Element (cont'd)	Policy PF-72: Locate and design energy production and distribution facilities in a manner that is compatible with surrounding land uses by employing the following methods when appropriate to the site: (1) visually screen facilities with topography and existing vegetation and install landscaping consistent with surrounding land use zone development standards where appropriate, except where it would adversely affect photovoltaic performance or interfere with power generating capability; (2) provide site-compatible landscaping; (3) minimize glare through siting, facility design, nonreflective coatings, etc., and (4) site facilities in a manner to equitably distribute their visual impacts in the immediate vicinity.	PARTIALLY/ YES	The lack of vegetative screening along the proposed project's western side increases project visibility and maximizes visual impact to views from the southwest to northwest (KOPs 1 through 3). As a result, the proposed project would not be consistent with this aspect of the policy. However, effective implementation of staff's Mitigation Measure 3 and Condition of Certification **VIS-3** would bring the proposed project into compliance with this requirement. The applicant has committed to using non-reflective coatings and providing shielded, directional lighting with switches to minimize light emissions off-site. However, the applicant's glare and lighting control measures are not sufficiently specific to conclude that significant glare or night lighting impacts would be avoided. Effective implementation of staff's Mitigation Measures 2, 4, and 5 and Conditions of Certification **VIS-2**, **VIS-4,** and **VIS-5** would bring the proposed project into compliance with this requirement.

Visual Resources Table 4
Proposed Project's Consistency with
Local LORS Applicable to Visual Resources

LORS		Consistency Determination Before/After Mitigation Conditions	Basis for Consistency or Inconsistency
Source	**Description of Principles, Objectives, and Policies**		
Public Facilities Element (cont'd)	Objective: Ensure the provision of safe, reliable efficient, and economical electric service while minimizing potential land use conflicts, and health, safety, environmental, and aesthetic impacts of transmission facilities.	YES	The proposed project would require only a 0.4-mile transmission interconnection between the project site and the existing Rancho Seco Power Plant switchyard. The proposed interconnection would parallel (to the east) existing double-circuit transmission lines to the switchyard. The short length and location adjacent to similar facilities would minimize aesthetic impacts of the transmission facilities.
Public Facilities Element (cont'd)	Policy PF-85: New transmission corridors should, whenever possible, avoid existing and planned urban areas; specifically those areas designated for residential and commercial uses. When avoidance is not possible, transmission lines should be placed underground.	YES	The proposed project would require only a 0.4-mile transmission interconnection between the project site and the existing Rancho Seco Power Plant switchyard. The proposed interconnection would therefore, avoid existing and planned urban areas.
Public Facilities Element (cont'd)	Policy PF-87: To minimize visual impacts and protect the county's visual and aesthetic resources, new bulk substations should be located in industrial and non-retail commercial areas. To further minimize visual intrusion and potential land use conflicts; substations shall be enclosed with an 8-foot-high security fence in concert with a 25-foot landscaped setback along all public street frontages.	YES	The proposed project's switchyard would be located on-site. The applicant proposes enclosing all facilities with an 8-foot-high fence, and the project would include a 25-foot, landscaped setback from Clay East Road.

Visual Resources Table 4
Proposed Project's Consistency with
Local LORS Applicable to Visual Resources

LORS		Consistency Determination Before/After Mitigation Conditions	Basis for Consistency or Inconsistency
Source	**Description of Principles, Objectives, and Policies**		
Public Facilities Element (cont'd)	Policy PF-88: Proposals to locate all new bulk substations and all other large scale energy distribution facilities shall be submitted to the Planning Department for review and comment in the form of a General Plan Conformity request.	YES	The applicant has committed to submitting proposed plans to Sacramento County and to consult with the County as necessary. Also, staff's Conditions of Certification will require the submittal of plans to Sacramento County for review and comment.
Public Facilities Element (cont'd)	Objective: Plan and design transmission facilities to minimize visual impacts, preserve existing land uses, and avoid biological and cultural resources.	YES	The proposed transmission interconnection would be of minimal length and would be situated adjacent to an existing transmission corridor. The proposed location and length of the interconnection would minimize visual impacts.
Public Facilities Element (cont'd)	Policy PF-92: Whenever feasible, utilize existing transmission poles to accommodate new overhead transmission lines. Existing and future transmission corridors should be shared by more than one utility company.	YES	While it would not be feasible to utilize the existing transmission structures for the proposed interconnection, the proposed interconnection would be located immediately adjacent to the existing transmission corridor, thereby avoiding the proliferation of electric transmission and utility rights-of-way.
Public Facilities Element (cont'd)	Policy PF-93: Transmission rights-of-way should avoid bisecting parcels wherever possible.	YES	The proposed electric transmission line is located on the project site and thereby avoids bisecting a parcel.
Public Facilities Element (cont'd)	Policy PF-98: Transmission lines should avoid paralleling recreation areas, historic areas, rural scenic highways, landscaped corridors, and designated federal or state	YES	The proposed project would not parallel any of the policy's referenced uses or areas.

Visual Resources Table 4
Proposed Project's Consistency with
Local LORS Applicable to Visual Resources

LORS		Consistency Determination Before/After Mitigation Conditions	Basis for Consistency or Inconsistency
Source	**Description of Principles, Objectives, and Policies**		
	wild and scenic river systems.		
Public Facilities Element (cont'd)	Policy PF-99: Locate transmission facilities in a manner that maximizes the screening potential of topography and vegetation.	YES	The location of the proposed transmission interconnection takes advantage of the screening potential of the surrounding topography.
Public Facilities Element (cont'd)	Policy PF-100: Utilize monopole construction, where practicable, to reduce the visual impact on a corridor's middle and distant views.	YES	The proposed transmission line would use monopole construction. However, it should be noted that lattice construction is more effective in reducing structure visibility in distant views due to the "transparency" effect achieved by the open lattice structure.
Public Facilities Element (cont'd)	Policy PF-118: Route new high-pressure gas mains within railway and electric transmission corridors, along collector roads, and wherever possible, within existing easements. If not feasible, these gas mains shall be placed as close to the easement as possible.	YES	The proposed natural gas pipeline would follow existing railroad and transmission line easements for a portion of the alignment. It would also be located in or adjacent to road easements where possible.
Land Use Element	Objective: Use low glare external building surfaces and light fixtures that minimize reflected light and focalize illumination.	YES	The applicant has committed to consult with the CEC regarding surface treatments and staff's proposed Mitigation Measure 2 and Condition of Certification **VIS-2** will require appropriate surface treatments and colors. The applicant has also committed to providing shielded, directional lighting with switches to minimize light emissions off-site. Staff's proposed Mitigation

Visual Resources Table 4
Proposed Project's Consistency with
Local LORS Applicable to Visual Resources

LORS		Consistency Determination Before/After Mitigation Conditions	Basis for Consistency or Inconsistency
Source	**Description of Principles, Objectives, and Policies**		
			Measures 4 and 5 and Conditions of Certification **VIS-4** and **VIS-5** would require appropriate lighting control measures.
Land Use Element	Policy LU-22: Exterior building materials on nonresidential structures shall be composed of a minimum of 50 percent low-reflectance, non-polished finishes.	YES	The applicant has committed to consult with the CEC regarding surface treatments and staff's proposed Mitigation Measure 2 and Condition of Certification **VIS-2** would require appropriate surface treatments and colors.
Land Use Element	Policy LU-23: Bare metallic surfaces such as pipes, flashing, vents, and light standards on new construction shall be painted to minimize reflectance.	YES	The applicant has committed to consult with the CEC regarding surface treatments and staff's proposed Mitigation Measure 2 and Condition of Certification **VIS-2** would require appropriate surface treatments and colors.
Land Use Element	Policy LU-24: Require overhead light fixtures to be shaded and directed away from adjacent residential areas.	YES	The applicant has committed to providing shielded, directional lighting with switches to minimize light emissions off-site and to use night lighting only where necessary for safety and security purposes. Staff's proposed Mitigation Measures 4 and 5 and Conditions of Certification **VIS-4** and **VIS-5** would require appropriate lighting control measures.

Visual Resources Table 4
Proposed Project's Consistency with
Local LORS Applicable to Visual Resources

LORS		Consistency Determination Before/After Mitigation Conditions	Basis for Consistency or Inconsistency
Source	**Description of Principles, Objectives, and Policies**		
Land Use Element	Policy LU-25: Require exterior lighting to be low-intensity and only used where necessary for safety and security purposes.	YES	The applicant has committed to providing shielded, directional lighting with switches to minimize light emissions off-site and to use night lighting only where necessary for safety and security purposes. Staff's proposed Mitigation Measures 4 and 5 and Conditions of Certification **VIS-4** and **VIS-5** would require appropriate lighting control measures.
Zoning Ordinance	Section 301-17: All utilities shall be placed underground unless the Planning Director determines it to be impractical.	YES But **EXEMPT**	The proposed natural gas pipeline would be placed underground. It must be noted that Section 53091 of the Government Code specifically **exempts** local agency projects involving the production of energy from city or county zoning code and building permit requirements.
Zoning Ordinance	Section 301.21: Fences or walls may be required and conditioned to exceed 6 feet in height.	YES But **EXEMPT**	The applicant proposes to install an 8-foot-high cyclone perimeter fence with wood slats and barbed wire atop the fence. See Section 301-17 above regarding project exemption.
Zoning Ordinance	Section 301-62a: Outside storage of materials and equipment shall be located within the buildable portion of the lot and screened from view with solid wood fences, masonry walls, or chain link with slats.	YES But **EXEMPT**	The applicant proposes to install an 8-foot-high cyclone perimeter fence with wood slats and barbed wire atop the fence. See Section 301-17 above regarding project exemption.

Visual Resources Table 4
Proposed Project's Consistency with
Local LORS Applicable to Visual Resources

LORS		Consistency Determination Before/After Mitigation Conditions	Basis for Consistency or Inconsistency
Source	**Description of Principles, Objectives, and Policies**		
Zoning Ordinance	Section 301-63: a) All required fences shall be at least 6 feet in height and may be erected to a maximum height of 8 feet b) Fence height shall be measured from the highest elevation at the property line or at the finished grade of the rear or side yard setback, whichever is higher.	YES But **EXEMPT**	The applicant proposes to install an 8-foot-high cyclone perimeter fence with wood slats and barbed wire atop the fence. See Section 301-17 above regarding project exemption.
Zoning Ordinance	Section 301-70 and 301-71: Require appropriate long-term care and maintenance of all landscaping.	YES But **EXEMPT**	The applicant proposes to install low-maintenance, drought-resistant native tree and shrub species and has committed to maintaining all landscaping plantings. See Section 301-17 above regarding project exemption.
Zoning Ordinance	Section 320-04: No building or structure, nor the enlargement of any building or structure for any of the uses specified in Section 320-01 may be erected to a height exceeding 40 feet.	NO But **EXEMPT**	The proposed project would include buildings and/or structures that would exceed the 40-foot height limitation. See Section 301-17 above regarding project exemption.

Visual Resources Table 4
Proposed Project's Consistency with
Local LORS Applicable to Visual Resources

LORS		Consistency Determination Before/After Mitigation Conditions	Basis for Consistency or Inconsistency
Source	**Description of Principles, Objectives, and Policies**		
Zoning Ordinance	Section 320-05: No building or structure may be erected or enlarged for any of the uses specified in Section 320-01 unless the following development requirements are provided and maintained in connection with such buildings or uses: a) A planter or landscaped area at least twenty-five (25) feet wide shall be provided adjacent to all public street rights-of-way, excluding approved driveway entrances. b) A six- (6) foot high perimeter fence of solid wood, masonry or chain link with slats shall be installed along such boundary line. (g) Landscaping provided shall be cared for, maintained and appropriate permits shall be acquired as specified in Title III, Chapter 1, Article 6 of this Code.	NOT DETERMINED But **EXEMPT** YES But **EXEMPT** YES But **EXEMPT**	a) The applicant has not submitted a revised site plan with the landscape setback clearly identified. b) The applicant proposes to install an 8-foot-high cyclone perimeter fence with wood slats and barbed wire atop the fence. g) The applicant proposes to install low-maintenance, drought-resistant native tree and shrub species and has committed to maintaining all landscaping plantings. See Section 301-17 above regarding project exemption.

Visual Resources Table 4
Proposed Project's Consistency with
Local LORS Applicable to Visual Resources

LORS		Consistency Determination Before/After Mitigation Conditions	Basis for Consistency or Inconsistency
Source	**Description of Principles, Objectives, and Policies**		
Zoning Ordinance	Section 325-07: Reflectors, spotlight, floodlights, and other sources of illumination may be used to illuminate buildings, landscaping, signs, and parking and loading areas on any site only if they are equipped with lenses or other devices which concentrate the illumination upon such buildings, landscaping, signs, and parking and loading areas. No unshielded lights, reflectors, or spotlights shall be so located and directed that they shine toward or are directly visible from adjacent properties or streets.	YES But **EXEMPT**	The applicant has committed to providing shielded, directional lighting with switches to minimize light emissions off-site and to use night lighting only where necessary for safety and security purposes. Staff's proposed Mitigation Measures 4 and 5 and Conditions of Certification **VIS-4** and **VIS-5** would require appropriate lighting control measures. See Section 301-17 above regarding project exemption.

MITIGATION

APPLICANT'S PROPOSED MITIGATION MEASURES

The proposed project includes a proposal to plant landscaping along the south side of the project, outside of and along the perimeter fence. It would consist of native, drought-resistant trees and shrubs that would require low levels of maintenance (SMUD 2001a, p. 8.11-9). The proposed project also includes some lighting control measures (SMUD 2001a, pp. 8.11-9 and –13). However, beyond the limited screening and general lighting control measures, the applicant proposes no formal mitigation measures.

ADDITIONAL MITIGATION PROPOSED BY STAFF

Energy Commission staff generally agrees with the applicant's mitigation proposals. However, staff's position is that some of these proposals need to be more precisely developed. The following paragraphs discuss additional staff-proposed measures to mitigate project impacts.

Mitigation of Construction Impacts

Construction of the proposed gas pipeline could result in adverse visual impacts. Given that construction activities would move along the pipeline route at a rate of 100 to 500 feet per day, pipeline construction impacts would only be visible to adjacent and nearby residents for a period of one to seven days. However, staff has proposed Mitigation Measure 1 to ensure that visual impacts resulting from pipeline construction do not become significant.

1. The project owner shall ensure that visual impacts of gas pipeline construction are adequately mitigated. The project owner shall require from its contractors that all staging, material, and equipment storage areas for gas pipeline construction are visually screened from adjacent public roads and nearby residences. All evidence of pipeline construction activities, including ground disturbance due to staging and storage areas, shall be removed and remediated upon completion of construction to its pre-construction condition. Any vegetation removed in the course of construction will be replaced on a 1-to-1 in-kind basis. Such replacement planting shall be monitored for a period of three years to ensure survival. During this period, all dead plant material shall be replaced (see also Condition of Certification **VIS-1**).

Effective implementation of Mitigation Measure 1, through Condition of Certification **VIS-1**, would minimize the intrusiveness of gas pipeline construction and keep construction visual impacts to less than significant levels.

Mitigation of Impacts of Proposed Structures

As presently proposed, the project's structures would result in direct adverse visual impacts and significant cumulative visual impacts when viewed from adjacent roads and nearby residences and recreation areas (as illustrated in views from KOPs 1 through 4). Staff has proposed Mitigation Measure 2 to help blend project structures with the existing landscape.

2. Prior to initial firing, the project owner shall treat all project structures and buildings, gas interconnection and measurement stations, aboveground gas valve stations, and fences in appropriate colors or hues that minimize visual intrusion and contrast by blending with the landscape, such that those structures and buildings have surfaces that do not create glare; and such that they are consistent with local laws, ordinances, regulations, and standards. The project owner shall submit for CPM review and approval, a specific treatment plan whose proper implementation will satisfy these requirements (see also Condition of Certification **VIS-2**).

Staff has conducted a line-of-sight analysis from KOP 2 and KOP 3, and concluded that the planting of screening vegetation along the applicant's (not CPP's) western property boundary could be effective in screening from view a majority of the project facilities. However, vernal pools and swales exist on portions of the property west of the site. U.S. Fish and Wildlife Service (USFWS) guidelines require a 250-foot buffer between such wetlands and actions that could adversely affect them. The wetlands have been delineated. Staff has mapped the areas within 250 feet of delineated wetlands. In addition, USFWS staff have advised Energy Commission staff that tree species native to the Central Valley should be used for landscape screening west of the CPP site.

USFWS also stated that the landscape irrigation should be designed so it does not drain into or otherwise impact the wetland areas.

Staff has identified four areas on the property on the west side of the CPP site that are more than 250 feet from the wetlands that could be planted with trees to provide visual screening of the CPP. Staff has determined that appropriate deciduous species, native to the Central Valley (e.g., *Populus fremontii*), strategically planted in groves in each of these four areas would provide sufficient screening to make the visual effect of project structures less than cumulatively considerable. Therefore, staff has proposed Mitigation Measure 3.

3. The project owner shall provide landscaping that is effective in screening the proposed CPP project from adjacent roads and nearby residences. The project owner shall screen from view the aboveground gas pipeline interconnection and valve stations with landscaping or other aesthetically acceptable screening material. Trees and other vegetation consisting of informal groupings of fast-growing trees must be strategically placed and of sufficient density and height to effectively screen the majority of the project's structural masses (see also Condition of Certification **VIS-3**). Landscape screening must include placement of trees on the west side of the project site. To address biological concerns, landscaping on the west side of the project site shall a) be planted at least 250 feet from vernal pools and swales; b) shall consist of species native to the Central Valley; and c) shall be irrigated such that adverse impacts to wetlands are avoided.

Effective implementation of Mitigation Measure 2, through Condition of Certification **VIS-2**, and Mitigation Measure 3, through Condition of Certification **VIS-3**, would reduce the incremental effects of project structures to a level that is not cumulatively considerable. Effective implementation of Mitigation Measure 3 would also ensure the project's compliance with local LORS regarding landscaping.

Mitigation of Project Lighting Impacts

As previously discussed, the proposed project lighting has the potential to change the character of the existing landscape at night both during construction and operation of the project and could result in significant visual impacts to nearby residences in spite of the control measures included in the proposed project. Therefore, staff proposes Mitigation Measures 4 and 5 to mitigate project night lighting impacts.

4. To minimize the impacts of night lighting during construction of the power plant and linear facilities, the project owner shall ensure that such lighting is used in a manner that minimizes direct public views of light bulbs and reflectors, and reflected glare and illumination of the construction vicinity (see also Condition of Certification **VIS-4**).

5. To minimize the impacts of night lighting during project operation, the project owner shall design and install all permanent lighting such that light bulbs and reflectors are not visible from public viewing areas, lighting does not cause reflected glare, and illumination of the project, the vicinity, and the nighttime sky is minimized (see also Condition of Certification **VIS-5**).

Effective implementation of Mitigation Measures 4 and 5, through Conditions of Certification **VIS-4** and **VIS-5**, would minimize lighting and keep lighting impacts to less than significant levels.

Mitigation of Impacts in Relation to CEQA Significance Criteria

Effective implementation of staff's previously discussed Mitigation Measures 2 and 3 (through Conditions of Certification **VIS-2** and **VIS-3**, respectively) would reduce the visual effects of the project's structures in regard to Criterion 3 to a level that would be less than cumulatively considerable.

In regard to Criterion 4, the lighting control measures proposed by the applicant and expanded by staff in Mitigation Measures 4 and 5, (through Conditions of Certification **VIS-4** and **VIS-5**, would ensure that project-specific lighting impacts would be less than significant and the effect of project lighting would be less than cumulatively considerable.

RESPONSES TO COMMENTS

ELK 4 Please discuss the permanent and temporary visual resources impacts that could potentially result from the construction activities within the Stonelake Open Space Reserve.

Response: The project would not pass through the Stonelake Open Space Reserve. However, effective implementation of staff recommended Mitigation Measure 1 through Condition of Certification VIS-1 would adequately mitigate construction related visual impacts on sensitive natural areas.

KF-3 and KF-4: The proposed project, as well as any landscaping consisting of fast growing trees as proposed by the staff, will block a significant portion of my view of this panorama. I would also note that in direct conflict with the "low to moderate in visual quality" staff conclusion, is that rare blue oak grassland upon which Rancho Seco is situated is immediately adjacent to land recently acquired by the Nature Conservancy for transfer into private ownership as permanent managed rangeland…I…can tell you that it provides some of the most beautiful landscape I have ever seen.

Response: Staff concluded that visual quality in the project area ranged from low-to-moderate (KOP 1) to moderate (KOPs 2,3, and 4). When viewed from the more distant and elevated hilltop vantagepoints available northwest to southwest of the project site (e.g. KOP 3 on Clay Station Road), the proposed project's lower structures and lower portions of the HRSGs would block small portions of grassland landscape, while the HRSG stacks would block small portions of the Sierra foothills. The extent of this view blockage would be low as illustrated in **Visual Resources Figure 5B**. Also, the proposed landscaping would result in minimal view blockage and would not be expected to extend upward into that portion of the landscape consisting of Sierra foothills when viewed from elevated hilltop vantagepoints.

KF-5: One of the measures of importance of visual impact appears to be the number of people who will see the plumes, structure, light, etc. This is a bit of a Catch-22, in that the very lack of people is the reason most of us have chosen to live in the greater Cosumnes basin.

Response: Although staff acknowledges the point of the comment, staff believes that it is appropriate to consider the number of people that would be exposed to the potential impact in determining the degree of visual impact.

KF-6: An additional issue relates to pipeline construction. Because my house is on a hill directly overlooking Twin Cities Road and the area of construction, no fence can be built high enough to screen my view of the construction. Staff's proposed mitigation will do nothing for me to reduce the sight and sound of the construction.

Response: Staff acknowledges that construction equipment, materials, and personnel will likely be visible from hilltop viewing locations. However, given that construction activities would move along the pipeline route at a rate of 100 to 500 feet per day, pipeline construction impacts would only be visible to adjacent and nearby residents for a period of one to seven days. Although hilltop vantagepoints may be able to see pipeline construction activities for more than seven days, the duration of visible construction would still be relatively brief at the anticipated pace of construction. Therefore, the resulting visual impacts during pipeline construction would not be significant.

KF-9: The staff report fails to note the cumulative impact of lighting or to address SMUD's increased lighting at the existing site. VIS-4 and VIS-5 as proposed by staff must be amended to include a requirement that SMUD mitigate the lighting it has chosen to augment at the existing power plant.

Response: The FSA discusses the cumulative impact of lighting and mitigation of the proposed project's contribution to that impact.

KF-12: If this site ultimately is approved, the CEC should require some real mitigation of these effects, such as requiring SMUD to install plume abatement technology; to remove and recycle at least some of the fencing, lighting, reactor, rail line, cooling towers, and other industrial detritus associated with the now non-operational plant.

Response: The above Cumulative Impacts section and the **Visible Plumes** section of the FSA discusses the cumulative visual impacts.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

- The proposed project structures would cause adverse but less than significant project-specific visual impacts. However, the visual effects of the proposed structures would be cumulatively considerable in combination with the ongoing adverse visual effects of the existing Rancho Seco Power Plant structures. With effective implementation of staff's proposed Conditions of Certification **VIS-2**

[surface treatment] and **VIS-3** [landscape screening], the project structures' incremental visual effects would not be cumulatively considerable.

- The proposed project's night lighting has the potential to cause adverse and significant project-specific visual impacts. The visual effects of the project's night lighting also have the potential to be cumulatively considerable in combination with the existing lighting at the Rancho Seco Power Plant. However, with effective implementation of staff's proposed Conditions of Certification **VIS-4** and **VIS-5,** project night lighting's project-specific impacts would be less than significant and its incremental visual effect would not be cumulatively considerable.
- In the three cases of inconsistency or partial consistency with applicable laws, ordinances, regulations, and standards, either the inconsistencies would initially not produce a significant visual impact, or with effective implementation of staff's proposed conditions of certification, the impacts causing the inconsistencies would not be significant. Effective implementation of staff's proposed Conditions of Certification **VIS-2** through **VIS-5** would eliminate one inconsistency and the one case of partial inconsistency. The one remaining inconsistency is in regard to a zoning ordinance requirement from which the project is exempt based on Government Code Section 53091.

RECOMMENDATIONS

Staff recommends the adoption of the following conditions of certification if the Energy Commission approves the project.

PROPOSED CONDITIONS OF CERTIFICATION

Gas Pipeline Construction Screening and Surface Restoration

VIS-1 The project owner shall require the following as a condition of contract with its contractors to construct the gas pipeline:

If visible from nearby residences and roads, aboveground facility construction sites and staging and material and equipment storage areas for gas pipeline construction shall be visually screened with temporary screening fencing. Fencing will be of an appropriate design and color for each specific location, as determined by the CPM. All evidence of construction activities, including ground disturbance due to staging and storage areas, shall be removed and all disturbed areas shall be remediated to an original or improved condition upon completion of construction including the replacement of any vegetation or paving removed during construction.

The project owner shall submit to the CPM for review and approval and to Sacramento County for review and comment a specific screening and restoration plan whose proper implementation will satisfy these requirements.

The project owner shall not begin construction of the gas pipeline or implement the screening and restoration plan until receiving written approval of the plan from the CPM.

Verification At least 90 days prior to construction of the gas pipeline, the project owner shall submit the plan to the CPM for review and approval and to Sacramento County for review and comment.

If the CPM notifies the project owner that any revisions of the plan are needed, the project owner shall submit to the CPM a revised plan.

The project owner shall install screening at each gas pipeline construction site prior to construction activities at that site.

The project owner shall install screening at each gas pipeline staging area and material and equipment storage area before the first use of that area.

The project owner shall notify the CPM within seven days after installing screening at staging and material and equipment storage areas that it is ready for inspection.

The project owner shall notify the CPM within seven days after completing the surface restoration that it is ready for inspection.

Surface Treatment of Project Structures and Buildings

VIS-2 Prior to initial firing, the project owner shall treat the surfaces of all project structures and buildings visible to the public such that their colors minimize visual intrusion and contrast by blending with the landscape; their surfaces do not create glare; and they are consistent with local laws, ordinances, regulations, and standards. The project owner shall submit for CPM review and approval and Sacramento County review and comment, a specific treatment plan whose proper implementation will satisfy these requirements. The treatment plan shall include:

a) Specification, and 11” x 17” color simulations at life size scale, of the treatment proposed for use on project structures, including structures treated during manufacture;

b) A list of each major project structure, building, tank, transmission line tower and/or pole, and fencing specifying the color(s) and finish proposed for each (colors must be identified by vendor brand or a universal designation);

c) Two sets of brochures and/or color chips for each proposed color;

d) Samples at least 5” by 7” of each proposed treatment and color on each material to which they would be applied that would be visible to the public;

e) A detailed schedule for completion of the treatment; and

f) A procedure to ensure proper treatment maintenance for the life of the project.

The project owner shall not specify to the vendors the treatment of any buildings or structures treated during manufacture, or perform the final treatment on any buildings or structures treated on site until the project owner receives notification of approval of the treatment plan by the CPM.

Verification: Before preparing the treatment plan, the project owner shall contact the CPM to arrange a meeting to discuss the requirements of the plan.

The project owner shall submit its proposed treatment plan at least 90 days prior to ordering the first structures that are color treated during manufacture.

If a revision is required, the project owner shall provide the CPM with a revised plan.

Prior to first turbine roll, the project owner shall notify the CPM that all buildings and structures are ready for inspection.

The project owner shall provide a status report regarding treatment maintenance in the Annual Compliance Report.

Landscape Screening

VIS-3 The project owner shall provide landscaping that is effective in screening the proposed project from views from nearby residences.

The project owner shall screen from view the aboveground gas pipeline interconnection and valve stations with landscaping or other aesthetically acceptable screening material.

The project owner shall install a 25-foot landscape setback along the entire length of the project site that fronts Clay East Road.

The project owner shall submit a landscaping plan to the CPM for review and approval and to Sacramento County for review and comment. The plan shall include:

a) 11"x17" color simulations of the proposed landscaping at 5 years and at 20 years as viewed from KOPs 2 and 3.

b) A landscaping plan(s) and map(s) drawn to scale showing the proposed location and species of plants.

c) The following are requirements for the area west of the project site:

1.) Tree species used shall be native to the Central Valley, fast-growing, and the species expected to reach the greatest height at maturity for the site conditions.

2.) No plantings shall be within 250 feet of any vernal pools or swales.

3.) Plantings shall consist of informal groupings strategically placed to maximize screening of views from residences.

4.) Tree spacing within groupings shall be designed to achieve as dense a screen as possible without inhibiting tree growth or height at maturity.

5.) Irrigation shall be designed and operated to avoid adverse impacts to wetlands.

d) A detailed list of plants to be used and expected times to maturity given their size and age at planting.

The project owner shall not implement the plan until the project owner receives approval of the submittal from the CPM. However, the planting must be completed within one year after the start of project construction.

Verification: Before preparing the landscape screening plan, the project owner shall meet with the CPM to discuss the requirements of the plan.

Prior to the start of site mobilization and at least 90 days prior to installing the landscaping, the project owner shall submit the landscaping plan to the CPM for review and approval and to Sacramento County for review and comment.

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.

No later than one year after the start of project construction, the project owner shall notify the CPM that the landscaping is installed and ready for inspection

Construction Lighting

VIS-4 The project owner shall ensure that lighting for construction of the power plant is used in a manner that minimizes potential night lighting impacts, as follows:

a) All lighting shall be of minimum necessary brightness consistent with worker safety.

b) All fixed position lighting shall be shielded, hooded, and directed downward to minimize backscatter to the night sky and direct light trespass (direct lighting extending outside the boundaries of the construction area).

c) Wherever feasible and safe, lighting shall be kept off when not in use and motion detectors shall be employed.

d) A lighting complaint resolution form (following the general format of that in **Visual Resources Appendix VR-2**) shall be maintained by plant construction management, to record all lighting complaints received and to document the resolution of each complaint.

Verification: Within seven days after the first use of construction lighting, the project owner shall notify the CPM that the lighting is ready for inspection. If the CPM notifies the project owner that modifications to the lighting are needed to minimize impacts, within 15 days of receiving that notification the project owner shall implement the necessary modifications and notify the CPM that the modifications have been completed.

The project owner shall report any lighting complaints and documentation of resolution in the Monthly Compliance Report, accompanied by any lighting complaint resolution forms for that month.

Permanent Lighting

VIS-5 The project owner shall design and install all permanent lighting such that light bulbs and reflectors are not visible from public viewing areas; lighting does not cause reflected glare; and illumination of the project, the vicinity, and the nighttime sky is minimized. To meet these requirements the project owner shall submit a lighting mitigation plan that includes but is not necessarily limited to the following:

a) Lighting shall be designed so 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 the lighting shall be such that the luminescence or light source is shielded to prevent light trespass outside the project boundary;

b) All lighting shall be of minimum necessary brightness consistent with worker safety;

c) Lighting in high illumination areas not occupied on a continuous basis (such as maintenance platforms) shall, in addition to the hoods required above, have switches or motion detectors to light the area only when occupied; and

d) A lighting complaint resolution form (following the general format of that in **Visual Resources Appendix VR-2**) shall be used by plant operations to record all lighting complaints received and document the resolution of each complaint. All records of lighting complaints shall be kept in the on-site compliance file.

Verification: Before preparing the lighting mitigation plan, the project owner shall meet with the CPM to discuss the requirements of the plan.

At least 60 days prior to ordering any permanent exterior lighting, the project owner shall submit to the CPM for review and approval a lighting mitigation plan that describes the measures to be used and demonstrates that the requirements of the condition will be satisfied. The project owner shall not order any exterior lighting until it receives CPM approval of the lighting mitigation plan.

At least 30 days prior to initial firing, the project owner shall notify the CPM that the lighting has been installed and is ready for inspection. If the CPM notifies the project owner that modifications to the lighting are needed, within 30 days of receiving that notification the project owner shall implement the modifications and notify the CPM that the modifications have been completed.

The project owner shall report any complaints about permanent lighting and provide documentation of resolution in the Annual Compliance Report, accompanied by any lighting complaint resolution forms for that year.

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APPENDIX VR – 1: SUMMARY OF ANALYSIS

PLACEHOLDER FOR 11 X 17 SUMMARY TBL

APPENDIX VR – 2

LIGHTING COMPLAINT RESOLUTION FORM

Cosumnes Power Plant Project Sacramento County, 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.)

APPENDIX VR – 3: VISUAL RESOURCES FIGURES

VISUAL RESOURCES FIGURES 1 THROUGH 5B (10 total)

Figure 1 *Power Plant South Elevation*.

Figure 2 *Location of Key Observation Points.*

Figure 3A *KOP 1 – Existing view to the northeast from the front yard of 14460 Clay East Road*

Figure 3B *KOP 1 – Visual simulation of the proposed project at the start of project operation, as viewed from the front yard of 14460 Clay East Road.*

Figure 4A *KOP 2 – Existing view to the northeast from the backyard of 11615 Kirkwood Street, near the intersection with Clay East Road.*

Figure 4B *KOP 2 – Visual simulation of the proposed project at the start of project operation, as viewed from the backyard of 11615 Kirkwood Street near the intersection with Clay East Road.*

Figure 5A *KOP 3 – Existing view to the southeast from the backyard of 11540 Clay Station Road.*

Figure 5B *KOP 3 – Visual simulation of the proposed project at the start of project operation, as viewed from the backyard of 11540 Clay Station Road.*

Figure 6A *KOP 4 – Existing view from Rancho Seco Park*

Figure 6B *KOP 4 – Visual simulation from RSP*

WASTE MANAGEMENT

Testimony of Alvin J. Greenberg, Ph.D.

INTRODUCTION

This Final Staff Assessment presents an analysis of issues associated with managing wastes generated from constructing and operating the proposed 1,000-MW Cosumnes Power Plant (CPP) (both Phase 1 and Phase 2). Staff evaluated the proposed waste management plans and mitigation measures designed to reduce the risks and environmental impacts associated with handling, storing, and disposing of project-related hazardous and nonhazardous wastes. The technical scope of this analysis encompasses both solid and liquid wastes generated during facility construction and operation. Wastewater from facility operations, however, is more fully discussed in the **Water and Soil Resources** section of this document. Staff assumed that the amounts of waste anticipated to be generated by the applicant as described in the AFC apply to the entire 1,000-MW project.

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

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

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

FEDERAL

Resource Conservation and Recovery Act (42 U.S.C. § 6922)

RCRA 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 U.S. Environmental Protection Agency (EPA) or authorized state agency.

Title 40, Code of Federal Regulations, Part 260

These sections contain regulations promulgated by the EPA to implement the requirements of RCRA as described above. Characteristics of hazardous waste are

described in terms of ignitability, corrosivity, reactivity, and toxicity; and specific types of wastes are listed.

STATE

California Health and Safety Code § 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 (DTSC) 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.

Public Resources Code, § 40050 et seq. (The California Integrated Waste Management Act, as amended).

This act created the framework for the management and reduction of all non-hazardous waste generated in California. It mandates the Integrated Waste Management Board to develop and implement programs to reduce, recycle, and reuse solid waste and to limit waste flow to landfills. Certain authority to enforce this act is delegated to local government.

Title 14, California Code of Regulations, § 17200 et seq. (Minimum Standards for Solid Waste Handling and Disposal)

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

Title 22, California Code of Regulations, § 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.

Title 22, California Code of Regulations, § 67100.1 et seq. (Hazardous Waste Source Reduction and Management Review)

These sections establish reporting requirements for generators of certain hazardous and extremely hazardous wastes in excess of specified limits. The required reports must indicate the generator's waste management plans and performance over the reporting period.

LOCAL

The Sacramento County Environmental Management Department, Environmental Health Division, has the responsibility for administration and enforcement of the California Integrated Waste Management Act for non-hazardous solid waste at the proposed CPP. The Hazardous Materials Division of this Department is responsible for administering and enforcing compliance with the California Hazardous Waste Control Act.

The CPP must also comply with the Sacramento County Fire Code, which governs the storage and use of hazardous materials and wastes per Fire Code requirements. This Code also requires that the CPP obtain a Hazardous Materials and Waste Storage Permit from the County.

SETTING

PROJECT AND SITE DESCRIPTION

The proposed CPP would be located on approximately 30 acres of a 2,480-acre area owned by the Sacramento Municipal Utility District (SMUD), south of the Rancho Seco Nuclear Plant, which is now being decommissioned. The proposed site is located on the north side of Clay East Road in Sacramento County, California, approximately 4 miles north of the San Joaquin County line and 5 miles west of the Amador County line. The Rancho Seco plant is located approximately 2,000 feet directly north of the site, and electric transmission lines run along the proposed site's western border. An additional 20-acre portion of the SMUD property located immediately south of the proposed project site across Clay East Road would be used as a construction laydown area. The proposed project site is currently used as a publicly inaccessible fenced buffer area for the Rancho Seco Plant, and has been leased out for cattle grazing to control vegetation.

The proposed CPP would be a combined-cycle facility, comprised of four natural gas-fired combustion turbine generators (CTG), four heat recovery steam generators (HRSG), two condensing steam turbine generators (STG), two deaerating surface condensers, and two mechanical draft cooling towers, along with accompanying control and administration facilities, electrical transformers, and other related equipment. A natural gas pipeline would be constructed from the termination point of an existing SMUD pipeline at the Carson Ice-Gen cogeneration plant, located 26 miles to the northwest to the CPP site. A water pipeline would be constructed northward from the CPP to the Rancho Seco Plant to intercept and supply project water. A 0.4-mile 230 kV transmission line would be constructed to connect the CPP with the existing Ranch Seco Plant switchyard. As proposed, the CPP would be developed in two 500-megawatt (MW) phases.

Originally, the AFC was completed and submitted without the performance of a Phase I Environmental Site Assessment (ESA) conducted according to American Society for Testing and Materials (ASTM) standards. Section 8.13.3.2 of the AFC states that this was due to the fact that the proposed project site had been under SMUD's continuous

control since 1966. As an alternative, the applicant summarized the historic uses of the site and surrounding areas (SMUD 2001a, section 8.13.3.1), and summarized the results of a database search and site inspection (SMUD 2001a, sections 8.13.3 and 8.13.4). Staff requested that a Phase I ESA be performed for the site, the laydown area, and the 26-mile gas pipeline route and that this assessment be prepared according to ASTM Standard E 1527 published in July 2000 (CEC 2002a, Data Request 183). An ESA was submitted, dated March 18, 2002. Each of the noted efforts (the AFC and the ESA) include information not reported in the other, including a discussion of past mining and feedlot operations on nearby property and a description of recorded (and remediated) leaking underground storage tanks within ½-mile of the proposed project site. Both documents noted that the Rancho Seco Nuclear Power Plant is listed on the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) because there is a closed landfill, the site contains underground storage tanks, and it is a registered generator of hazardous waste. Both documents also concluded that there is no historic, anecdotal, database, or observable site evidence indicating any environmentally detrimental activity on the proposed site nor any chemical, biological, radioactive, or other type of contamination to the site.

It was staff's opinion that the Phase I ESA was inadequate and did not conform to the ASTM standard. The Phase I ESA also lacked any assessment of the gas pipeline route. Both Energy Commission staff and the staff of the California Department of Toxic Substances Control (DTSC) requested an assessment of the gas pipeline route. Staff therefore issued a second data request asking for information on the precise boundaries of Rancho Seco Nuclear Power Plant, the schedule for decommissioning the facility, and that sampling and analysis of soil and groundwater be conducted for the planned Cosumnes Power Plant site and the laydown area, including analysis for radioactive wastes. This data request also reiterated staff's earlier request for a Phase I ESA for the gas pipeline route.

SMUD then provided a modified Phase I ESA containing historic information on the natural gas pipeline route and the site and laydown areas (SMUD 2002z). The modified Phase I ESA also satisfied staff's requirement that it be prepared according to ASTM guidelines. Staff has reviewed and evaluated the modified Phase I ESA provided for the 26-mile pipeline and agrees with the applicant's assessment that minimal hazardous wastes are expected to be encountered along the pipeline route. Staff also agrees with the applicant that migration of hazardous waste and/or radioactive waste from the Rancho Seco Nuclear Power Plant to the proposed site and laydown areas has not occurred. Therefore, staff finds it unnecessary for the applicant to conduct a sampling and analysis plan at the proposed site and laydown areas. Staff proposes Conditions of Certification **Waste-1** and **-2** (which require having a Registered Professional Engineer or Geologist with experience in remedial investigation and feasibility studies available for consultation during soil excavation and grading activities) which it believes would be adequate to address any soil or groundwater contamination that may be encountered.

IMPACTS

PROJECT SPECIFIC IMPACTS

Construction

Site preparation and construction of the proposed generating plant and associated facilities for both Phase 1 and Phase 2 would generate both nonhazardous and hazardous wastes in solid and liquid forms.

NONHAZARDOUS SOLID WASTES

Nonhazardous solid wastes anticipated to be generated during construction are detailed in Section 8.13.4.1.1 of the AFC (SMUD 2001a). Approximately 170 tons of wood, paper, glass and plastics, 120 tons of excess concrete, and 45 tons of scrap metal could be generated during project construction. Wherever possible and practical, these wastes would be recycled, particularly the paper products and metals. Nonrecyclable wastes would be collected and disposed of in a Class III landfill. A possible exception might include the disposal of the waste concrete in a clean fill site if one is available.

NONHAZARDOUS LIQUID WASTES

Nonhazardous liquid wastes would be generated during construction including sanitary wastes, equipment washwater, stormwater runoff, and wastewater from the gas pipeline hydrotesting process. If excavation dewatering would have to occur, additional nonhazardous wastewater would be generated.

Sanitary waste would be collected in portable toilet facilities. Equipment washwater would be contained at the designated wash sites and disposed of offsite. Stormwater runoff would be managed according to an approved plan developed by the construction contractor and is discussed in more detail in the **Water and Soil Resources** section of this document. Wastewater resulting from the hydrostatic test of the gas pipeline would be filtered to remove sediment and welding fragments, and then tested for contaminating components. The construction contractor would discharge non-contaminated hydrotesting water to an existing storm sewer along the pipeline corridor per applicable regulations. Contaminated wastewater would be trucked to the Sacramento Regional Wastewater Treatment Plant for disposal (SMUD 2001a, section 8.13.4.1.2).

HAZARDOUS WASTES

Hazardous wastes anticipated to be generated during construction are discussed in Section 8.13.4.1.3 of the AFC (SMUD 2001a). Solid hazardous wastes may include spent welding materials and dried paint. Liquid hazardous wastes would include waste solvents along with flushing, cleaning and passivating (nitrate or phosphate solution) fluids. Minimal quantities of the solid wastes and solvents are anticipated. The liquid flushing, cleaning and passivating wastes would be generated in quantities estimated at one to two times the internal volumes of the pipes being cleaned (SMUD 2001a, p. 8.13-7).

The construction contractor would be considered the generator of hazardous wastes at this site during the construction period and would be responsible for proper waste handling, storage, disposal, record keeping, and employee training. Solid hazardous wastes along with liquid wastes (except for the flushing wastes referred to above which would be temporarily stored on-site in portable tanks and disposed off-site) would be accumulated at satellite locations and then transported daily to the 90-day storage area located at the site construction laydown area. The wastes thus accumulated would be removed from the site and transported by a certified collection company to a permitted transfer, storage, and disposal (TSD) facility prior to the expiration of the 90-day limit (SMUD 2001a, p. 8.13-7).

Operation

The proposed CPP would generate both nonhazardous and hazardous wastes in solid and liquid forms under normal operating conditions.

NONHAZARDOUS SOLID WASTES

Nonhazardous solid wastes generated during plant operation are expected to include rags, turbine air filters, machine parts, electrical materials, empty containers, and typical worker and small office wastes. Approximately 120 cubic yards of these wastes are projected to be generated annually. Large metal parts would be recycled (SMUD 2001a, p. 8.13-8) and all other nonhazardous solid wastes would be deposited in a Class III landfill (SMUD 2001a, section 8.13.5).

NONHAZARDOUS LIQUID WASTES

As discussed in Section 8.13.4.2.2 of the AFC (SMUD 2001a), there would be two separate wastewater collection systems, the primary or Plant Wastewater System, and the second or Sanitary Wastewater System. This secondary system would collect sanitary liquid wastes, treat them in a package plant, and discharge the effluent to a leachfield. The primary system would collect wastewater from the circulating system blowdown, which includes wastes recycled from the purification of power-cycle makeup water and HRSG and auxiliary boiler blowdown. The system would also collect wastewater from general plant drains and the oil/water separator, drains from the chemical feed area containments, and evaporative cooler blowdown. Most of these wastes would have been exposed to treatment chemicals and large volumes would result from processes that concentrate dissolved solids. Some of these wastes would be directed through the oil/water separator. Depending on quantity, wastewater containing cleaning chemicals that results from combustion turbine washing operations would be either transported offsite for disposal at an approved wastewater treatment facility, or directed to the plant package treatment system. The zero-liquid discharge (ZLD) system proposed by the applicant (discussed below) would process all plant wastewater from the primary Plant Wastewater System, and therefore eliminate the need for a National Pollution Discharge Elimination System (NPDES) discharge permit from the Regional Water Quality control Board (RWQCB).

Zero Liquid Discharge System

In order to reduce and reuse wastewater in the plant, SMUD proposes to implement a zero-liquid discharge (ZLD) system for the proposed CPP (SMUD 2002ae). The ZLD

system would include a brine concentrator system, crystallizer system, and associated equipment such as tanks and pumps.

The ZLD system would be designed to process all of the wastewater produced by the plant's primary wastewater system, returning a relatively high quality distillate stream for reuse in the plant and producing a solid waste stream (salt cake). Wastewater would be processed in two steps. The first would be a brine concentrator, which would concentrate the wastewater to approximately a 15 percent salt concentration and produce a clean distillate stream. The second step would further process the remaining wastewater, producing another clean distillate stream and the salt cake.

The operation of the ZLD system would result in a generation of approximately 6.8 tons per day of salt cake waste. This would require disposal of about 2,500 tons of salt cake per year. Testing was done for similar ZLD systems in support of the Three Mountain Project and Pastoria Energy Facility siting cases in order to determine if the wastes might be classified as hazardous. Analyses of the solid wastes similar to those that would be generated from the softener as well as the crystallizer indicated that all metals of concern were below California regulatory limits that define hazardous waste (Ogden 2000a and PEF/Thompson 2000f). In order to ensure the correct classification of such wastes from the proposed project, however, staff proposes Condition of Certification **WASTE-6**, which would require testing of the salt cake.

Although the solid waste generated from the crystallizer may not be classified as hazardous, it might be considered a California designated waste due to its high salt content. The category of designated waste includes nonhazardous waste that contains pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations that could exceed applicable water quality objectives or affect the beneficial uses of waters of the state (Cal. Code Regs., tit. 27, § 20210). Designated wastes are required to be disposed of at Class I or Class II disposal sites.

The effluent from the brine concentrator would be piped to the crystallizer for further concentration as typically done in ZLD systems. Secondary materials (such as the effluent) that are reclaimed and returned in a closed system to the original process in which they were generated where they are reused (in this case, as plant process water) are exempt from management as hazardous wastes (Cal. Code Regs., tit. 22, § 66261.4(a)(5)(A)). Thus, because the effluent would be recycled in a closed system, it would not require hazardous waste testing nor would a permit be required from DTSC. Construction and operation of the zero liquid discharge system would not have any significant effects on any of the other waste streams generated at CPP.

HAZARDOUS WASTES

Hazardous wastes anticipated to be generated during routine project operation include waste lubricating oil, used oil filters, laboratory waste, Selective Catalytic Reduction (SCR) and oxidation catalysts, oily rags and absorbents, and used acidic and alkaline chemical cleaning wastes (potentially containing high concentrations of heavy metals). Table 8.13-2 in the AFC lists the anticipated hazardous wastes (except the cleaning solutions) along with their origin, composition, estimated quantity, hazard class, and

disposal method. Most of the wastes would be generated in relatively small quantities and would be recycled by certified recyclers. For example, all the oil and oil-contaminated wastes would total approximately 2,400 pounds per year, and all would be recycled. Acidic and alkaline cleaning wastes would be disposed of offsite. The emission control catalysts would require regeneration every three to five years resulting in the generation of a total of 16,000 pounds of waste material. The SCR generated portion of that total (8,000 pounds) could require disposal in a Class I facility if recycling/ regeneration proves not to be feasible. Chemical materials collected in drains as a result of spillage, overflows, and maintenance operations would be neutralized onsite (if necessary) and directed into the cooling tower basin. In addition, Table 8.13-2 of the AFC notes that up to 340 pounds per year of cooling tower sludge normally requires disposal in a Class II facility, but sometimes may require disposal as a hazardous waste.

IMPACT ON EXISTING WASTE DISPOSAL FACILITIES

Section 8.13.5 of the AFC indicates that the 120 cubic yards of nonhazardous solid wastes generated yearly at the CPP would be recycled if possible, or disposed of in a Class III landfill. Another 6.8 tons per day (2,500 tons per year) of salt cake would also be generated and require disposal at a Class I or II landfill as noted above, depending upon the results of toxicity testing. Section 8.13.5.1 further notes that B.F.I., the company that presently removes nonhazardous solid wastes from the Ranch Seco Plant, would also collect wastes from the CPP. B.F.I. currently transports waste to the Elder Creek Road transfer facility and then to the Forward Landfill in Manteca, California. AFC Table 8.13-3 notes that this landfill has a permitted capacity of 16 million cubic yards, a remaining capacity of 13 million cubic yards, and an estimated closure date of 2006. The AFC notes that the Kiefer Road Landfill in Rancho Cordova, California, with a remaining capacity of 88 million cubic yards and an estimated closure date of 2035, is a probable alternative to the Forward Landfill. Given that more than 88 million cubic yards of Class III landfill capacity exists through the year 2035 and potentially beyond, staff finds that disposal of the solid wastes generated by the CPP can occur without significantly impacting the capacity or remaining life of any of these facilities.

Section 8.13.5.1 of the AFC indicates that of the 250 RCRA TSD facilities in California listed by the U.S. EPA, the closest to the proposed CPP are a Safety-Kleen transfer station and Ramos Environmental, in West Sacramento. Both facilities can recycle used oil, and the Safety-Kleen facility can also store and transfer several other types of hazardous waste. The subsequent sections of the AFC discuss the three Class I landfills in California: the Buttonwillow Landfill in Kern County and Westmorland Landfill in Imperial County (both owned by Clean Harbors), and the Kettleman Hills Landfill in King's County (owned by Waste Management); and note the existence of other offsite hazardous waste treatment and recycling facilities in California capable of handling various portions of the facility's hazardous waste. Together, the two Clean Harbors facilities and the Kettleman Hills facility possess an excess of 17.1 million cubic yards of remaining hazardous waste disposal capacity, with remaining operating lifetimes up to the year 2050. Although it is difficult to estimate the density of the salt cake from the ZLD system and thus the number of cubic yards generated each year, staff estimates that each ton of salt cake would be approximately one cubic yard, resulting in about

2,500 cubic yards annually. Thus, even if the salt cake were to be placed in a Class I facility, no significant impact on waste disposal facilities would occur.

CUMULATIVE IMPACTS

As proposed, the quantities of nonhazardous and hazardous wastes generated during construction and operation of the CPP project would add to the total quantities of waste generated in Sacramento County and the State of California. This facility would generate an estimated 335 tons of solid waste during construction and approximately 85 tons per year during operation (including about 5 tons of hazardous waste). Additionally, 2,500 tons per year of salt cake from the ZLD system would be generated. For comparative purposes, Section 8.13.7 of the AFC indicates that 703,660 tons of solid waste was disposed of in Sacramento County in the year 2000. The amounts anticipated to be generated by the proposed facility constitute an insignificant percentage increase to this total. Consequently, because recycling efforts would be prioritized wherever practical, and capacity is available in a variety of disposal facilities, the added waste quantities generated by CPP would not result in significant waste management impacts.

MITIGATION

In section 8.13.6 of the AFC the applicant states that the handling and management of wastes at the proposed CPP facility would follow the hierarchical approach described in the following order of preference from greatest to least:

1. Source reduction through pollution prevention measures
2. Recycling or reusing waste materials
3. Treatment to render the waste nonhazardous such as through neutralization,
4. Disposal of only those wastes that cannot be reduced, treated or recycled.

Sections 8.13.6.1 and .2 of the AFC discuss waste management measures CPP would employ during the construction and operation phases to manage and mitigate the impacts of the generation of liquid and solid non-hazardous and hazardous wastes. In addition, section 8.13.3.5 describes other measures that the applicant would employ during pipeline construction to identify and manage areas of potential soil contamination that might be encountered on properties not belonging to the applicant.

Staff has examined the waste management related measures proposed by the applicant and concluded that, together with applicable LORS and the Conditions of Certification proposed by staff, would adequately assure that no significant adverse environmental impacts would result from the management and disposal of project-related waste.

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

Energy Commission staff concludes that the proposed Cosumnes Power Plant would be able to comply with all applicable LORS regulating the management of hazardous and non-hazardous wastes during facility construction and operation. The applicant is

required to dispose of hazardous and non-hazardous wastes at facilities approved by the California Department of Toxic Substances Control (DTSC). Because hazardous wastes would be produced during project construction and operation, both the CPP and its construction contractor would be required to obtain hazardous waste generator identification numbers from the DTSC. Accordingly, both CPP and its construction contractor would be required to properly store, package, and label waste, use only approved transporters, prepare hazardous waste manifests, keep detailed records, and appropriately train their employees. Pursuant to California Code of Regulations, Title 22, section 67100.1 et seq., a hazardous waste Source Reduction and Evaluation Review and Plan must be prepared by the CPP.

FACILITY CLOSURE

Section 8.13.6.3 of the AFC discusses CPP's responsibilities for waste management in the event of a temporary facility closure due to a disruption in the supply of natural-gas fuel or damage to the facility due to a natural disaster; or permanent closure due to a cessation of operations. The applicant indicates that a contingency plan for temporary closure will be prepared prior to facility startup. In addition, a Risk Management Plan (SMUD 2001a, Section 8.12.8.4) would be established containing additional procedures to be followed in the event of temporary closure due to plant damage or the possible release of a hazardous waste or material into the environment.

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

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

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

For planned permanent closure, CPP would develop a facility General Closure Plan at least 12 months prior to commencement of closure and is committed to complying with LORS that are applicable at the time of closure. The applicant indicates (see AFC Section 8.13.6.3.2) that such a closure plan would emphasize the maximum recycling of facility components and 24-hour site security.

RESPONSE TO PUBLIC AND AGENCY COMMENTS

DTSC – 1 The Department of Toxic Substances Control concurs with the PSA's recommendation that the "Management of wastes generated during the construction and operation of the CPP will not result in any significant adverse impact if the specified waste management measures proposed in the Application For Certification and the proposed conditions of certification are implemented."

Response: Comment noted.

CONCLUSIONS AND RECOMMENDATIONS

Management of the wastes generated during construction and operation of the CPP would not result in any significant adverse impacts if the waste management measures proposed in the Application for Certification and the proposed conditions of certification are implemented.

CONDITIONS OF CERTIFICATION

WASTE-1 The project owner shall provide the resume of a Registered Professional Engineer or Geologist, who shall be available for consultation during soil excavation and grading activities, to the CPM for review and approval. The resume shall show experience in remedial investigation and feasibility studies.

The Registered Professional Engineer or Geologist shall be given full authority by the project owner to oversee any earth moving activities that have the potential to disturb contaminated soil.

Verification: At least 30 days prior to the start of site mobilization the project owner shall submit the resume to the CPM for approval.

WASTE-2 If potentially contaminated soil is unearthed during excavation at either the proposed site or linear facilities as evidenced by discoloration, odor, detection by handheld instruments, or other signs, the Registered Professional Engineer or Geologist shall inspect the site, determine the need for sampling to confirm the nature and extent of contamination, and file a written report to the project owner and CPM stating the recommended course of action.

Depending on the nature and extent of contamination, the Registered Professional Engineer or Geologist shall have the authority to temporarily suspend construction activity at that location for the protection of workers or the public. If, in the opinion of the Registered Professional Engineer or Geologist, significant remediation may be required, the project owner shall contact representatives of the Central Valley Regional Water Quality Control Board (as appropriate), the Sacramento County Environmental Management Department, and the Sacramento Office of the California Department of Toxic Substances Control for guidance and possible oversight.

Verification: The project owner shall submit any final reports filed by the Registered Professional Engineer or Geologist to the CPM within 5 days of their receipt. The

project owner shall notify the CPM within 24 hours of any orders issued to halt construction.

WASTE-3 The project owner shall obtain a hazardous waste generator identification number from the Department of Toxic Substances Control prior to generating any hazardous waste.

Verification: The project owner shall keep its copy of the identification number on file at the project site and notify the CPM via the Monthly Compliance Report of its receipt.

WASTE-4 Upon becoming aware of any impending waste management-related enforcement action by any local, state, or federal authority, the project owner shall notify the CPM of any such action taken or proposed to be taken against the project itself, or against any waste hauler or disposal facility or treatment operator with which the owner contracts.

Verification: The project owner shall notify the CPM in writing within 10 days of becoming aware of an impending enforcement action. The CPM shall notify the project owner of any changes that will be required in the manner in which project-related wastes are managed.

WASTE-5 The project owner shall prepare a Construction Waste Management Plan and an Operation Waste Management Plan for all wastes generated during construction and operation of the facility, respectively, and shall submit both plans to the CPM for review and approval. 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 30 days prior to the start of site mobilization, the project owner shall submit the Construction Waste Management Plan to the CPM.

The operation waste management plan shall be submitted to the CPM no less than 30 days prior to the start of project operation. The project owner shall submit any required revisions within 20 days of notification by the CPM.

In the Annual Compliance Reports, the project owner shall document the actual waste management methods used during the year compared to the planned management methods.

WASTE-6 The project owner shall initially test the salt cake product from the crystallizer for the presence of hazardous levels of metals. If levels are below ten times the Soluble Threshold Level Concentration as listed in Title 22, California Code of Regulations, section 66261.24, then future testing is not required unless there is a substantial change in the wastewater treatment process. If not

classified as a hazardous waste, the project owner shall manage the salt cake product appropriately as a nonhazardous or designated waste unless it is sold as a commercial product. If it is classified as a hazardous waste, the project owner shall handle and dispose of it in accordance with the requirements of Health & Safety Code § 25100 et seq.

Verification: No later than 30 days after the initial generation of salt cake, or after any substantive change in the treatment process, the project owner shall notify the CPM of the test results and the planned disposal method.

REFERENCES

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Ogden 2000a. Detailed Mitigation Plan and Analysis of Impact Assessments in Resource Areas Affected by the Mitigation Plan. Three Mountain Power, LLC. AFC-99-02. Submitted to the California Energy Commission. August 21.

PEF (Pastoria Energy Facility/Thompson) 2000f. Applicant's Data Request Responses (Third Data Response Submittal). Submitted to the California Energy Commission on April 3, 2000.

SMUD (Sacramento Municipal Utility District) 2001a. Application for Certification, Volumes 1 and 2 (01-AFC-19). Submitted to the California Energy Commission on September 13, 2001. Docket date September 13, 2001.

SMUD (Sacramento Municipal Utility District) 2002o. Data Response, Set 3A. April 15, 2002. Docket date April 15, 2002.

SMUD (Sacramento Municipal Utility District) 2002s. Data Response, Set 3B – Responses to Data Request 184, 185, 186, 187, 188, 190, 197, 198, 200, 201, 203, 206, 207, 220, 230, 231, 232, 241, 242, 244, 245, 246, 247, 248, 249, 250, and 251. May 6, 2002. Docket date May 6, 2002.

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SMUD (Sacramento Municipal Utility District) 2002ac. AFC Supplement C – Zero Liquid Discharge Arrangement, Executive Summary. July 10, 2002. Docket date July 10, 2002.

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WORKER SAFETY AND FIRE PROTECTION

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

INTRODUCTION

Worker safety and fire protection is enforced by laws, ordinances, regulations, and standards (LORS), and implemented at the Federal, State, and local levels. Worker safety is of utmost priority at the project location and is documented through worker safety practices and training. Industrial workers at the facility operate process equipment and handle hazardous materials daily and may face hazards that can result in accidents and serious injury. Protection measures are employed to either eliminate these hazards or minimize the risk through special training, protective equipment, or procedural controls.

The purpose of this Staff Assessment is to assess the worker safety and fire protection measures proposed by the 1,000-MW Cosumnes Power Plant (CPP) project (both Phase 1 and Phase 2I) and to determine whether the applicant has proposed adequate measures to:

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

Staff assumed that all details described in the AFC apply to the entire 1,000-MW project.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

FEDERAL

In December 1970 Congress enacted Public Law 91-596, the Federal Occupational Safety and Health Act of 1970. This Act mandates safety requirements in the workplace (29 United States Code (U.S.C.) § 651—678). Implementing regulations are codified at Title 29, Code of Federal Regulations (C.F.R.), under General Industry Standards §§ 1910.1 - 1910.1500 and clearly define the procedures for conducting inspections to implement and enforce safety and health procedures to protect workers, particularly in the industrial sector. Most of the general industry safety and health standards now in force under this OSH Act represent a compilation of materials from existing federal standards and national consensus standards. These include standards from the voluntary membership organizations of the American National Standards Institute (ANSI) and the National Fire Protection Association (NFPA) which publishes the National Fire Codes.

The purpose of the Occupational Safety and Health Act is to “assure so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources,” (29 U.S.C., § 651). The Federal Department of

Labor promulgates and enforces safety and health standards that are applicable to all businesses affecting interstate commerce. The Department of Labor established the Occupational Safety and Health Administration (OSHA) in 1971 to discharge the responsibilities assigned by the OSH Act.

Applicable Federal requirements include:

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

STATE

California passed the Occupational Safety and Health Act of 1973 ("Cal/OSHA") as published in the California Labor Code § 6300 et seq. Regulations promulgated as a result of the Act are codified at Title 8, California Code of Regulations, beginning with §337-560 and continuing with §1514 through 8568. The California Labor Code requires that the Cal/OSHA Standards Board adopt standards at least as effective as the federal standards (Labor Code § 142.3(a)) and thus all Cal/OSHA health and safety standards meet or exceed the Federal requirements. California obtained federal approval of its State health and safety regulations, in lieu of the federal requirements published at Title 29, C.F.R., §1910.1 - 1910.1500. The Federal Secretary of Labor, however, continually oversees California's program and will enforce any federal standard for which the State has not adopted a Cal/OSHA counterpart.

The State of California Department of Industrial Relations is charged with responsibility for administering the Cal/OSHA plan. The Department of Industrial Relations is further split into six divisions to oversee, among other activities: industrial accidents, occupational safety and health, labor standards enforcement, statistics and research, and the State Compensation Insurance Fund (workers compensation).

Employers are responsible for informing their employees about workplace hazards, potential exposure, and the work environment (Labor Code § 6408). Cal/OSHA's principal tool in ensuring that workers and the public are informed is the Hazard Communication standard first adopted in 1981 (California Code of Regulations, Title 8, §5194). This regulation was promulgated in response to California's Hazardous Substances Information and Training Act of 1980. It was later revised to mirror the Federal Hazard Communication Standard (29 C.F.R., §1910.1200) which established on the federal level an employee's "right to know" about chemical hazards in the workplace, but added the provision of applicability to public sector employers. A major component of this regulation is the required provision of Material Safety Data Sheets (MSDSs) to workers. MSDSs provide information on the identity, toxicity, and precautions to take when using or handling hazardous materials in the workplace.

Finally, Title 8, California Code of Regulations, §3203 requires that employers establish and maintain a written Injury and Illness Prevent Program to identify workplace hazards and communicate them to its employees through a formal employee-training program.

Applicable State requirements include:

- California Code of Regulations, Title 8, §330, et seq. Cal/OSHA regulations;
- California Code of Regulations, Title 24, §3, et seq. - incorporates the current addition of the Uniform Building Code;
- Health and Safety Code § 25500, et seq. - Risk Management Plan requirements for threshold quantity of listed acutely hazardous materials at the facility; and
- Health and Safety Code § 25500 - 25541 - Hazardous Material Business Plan detailing emergency response plans for hazardous materials emergency at the facility.

LOCAL

The California Building Standards Code published at Title 24, California Code of Regulations, § 3 et seq. is comprised of eleven parts containing the building design and construction requirements relating to fire and life safety and structural safety. The Building Standards Code includes the electrical, mechanical, energy, and fire codes applicable to the project. Local planning/building & safety departments enforce the California Uniform Building Code.

National Fire Protection Association (NFPA) standards are published in the California Fire Code. The fire code contains general provisions for fire safety, including but not restricted to: 1) required road and building access; 2) water supplies; 3) installation of fire protection and life safety systems; 4) fire-resistive construction; 5) general fire safety precautions; 6) storage of combustible materials; 7) exits and emergency escapes; and 8) fire alarm systems. The California Fire Code reflects the body of regulations published at Part 9 of Title 24 pertaining to the California Fire Code.

Similarly, the Uniform Fire Code (UFC) Standards, a companion publication to the California Fire Code, contains standards of the American Society for Testing and Materials and the NFPA. It is the United States' premier model fire code. It is updated annually as a supplement and published every third year by the International Fire Code Institute to include all approved code changes in a new edition. The Herald Fire Department is the administering agency for the 1998 Uniform Fire Code (Hendrickson 2002).

Applicable local (or locally enforced) requirements include:

- 1998 Edition of California Fire Code and all applicable NFPA standards (California Code of Regulations, Title 24, Part 9);
- California Building Code (California Code of Regulations, Title 24, § 3, et seq.) and
- Uniform Fire Code, 1998.

SETTING

The proposed project is located in southern Sacramento County, about 25 miles southeast of the city of Sacramento, about 0.5 miles south of the former Rancho Seco nuclear power plant.

The CPP project involves construction and operation of a natural gas fired combined cycle facility with ancillary facilities including pipelines.

Fire support services to the site would be under the jurisdiction of the Herald Fire District. The closest fire station is located at 11620 Clay Station Road in Herald, which is approximately 2 miles away (Hendrickson 2002). The response time to the project site is estimated to be less than 10 minutes (Hendrickson 2002). Backup fire suppression support would be provided by the station located at 12746 Ivie Road in Herald, with a response time of about 15 minutes.

The City of Sacramento Hazardous Materials Team Station 7 is assigned as the off-site hazardous materials first responder for the CPP. Station 7 is located north of Elk Grove, and their response time is estimated to be 30 minutes (Rothchild 2002).

IMPACTS

WORKER SAFETY

Industrial environments are potentially dangerous during construction and operation of facilities. Workers at the proposed project would be exposed to loud noises, moving equipment, trenches, and confined space entry and egress problems. The workers may experience falls, trips, burns, lacerations, and numerous other injuries. They have the potential to be exposed to falling equipment or structures, chemical spills, hazardous waste, fires, explosions, and electrical sparks and electrocution. It is important for the Cosumnes Power Plant project to have well-defined policies and procedures, training, and hazard recognition and control at their facility to minimize such hazards and protect workers. If the facility complies with all LORS, workers would be adequately protected from health and safety hazards.

FIRE HAZARDS

During construction and operation of the proposed Cosumnes Power Plant project there is the potential for both small fires and major structural fires. Electrical sparks, combustion of fuel oil, natural gas or flammable liquids, explosions, and over-heated equipment may cause small fires. Major structural fires may develop from uncontrolled fires or be caused by large explosions of natural gas or other flammable gasses or liquids. Compliance with all LORS would be adequate to assure protection from all fire hazards. The Herald Fire District has stated that it is adequately equipped and staffed to respond to an on-site fire within 10 minutes or less (Hendrickson 2002), and the Sacramento County Environmental Management Department (SCEMD) stated that they are prepared to deal with any hazardous materials spill (Rothchild 2002).

APPLICANT'S PROPOSED MITIGATION

WORKER SAFETY

A Safety and Health Program would be prepared by the applicant to minimize worker hazards during construction and operation. Staff uses the phrase "Safety and Health

Program" to refer to the measures that would be taken to ensure compliance with the applicable LORS during the construction and operational phases of the project.

Construction Safety and Health Program

The Cosumnes Power Plant project encompasses construction and operation of a natural gas fired facility with ancillary facilities such as transmission lines and pipelines. Workers would be exposed to hazards typical of construction and operation of a gas-fired combined cycle facility.

Construction Safety Orders are published at Title 8, California Code of Regulation, § 1502, et seq. These requirements are promulgated by Cal/OSHA and are applicable to the construction phases of the project. The Construction Safety and Health Program would include the following:

- Construction Injury and Illness Prevention Program (California Code of Regulations, Title 8, § 1509);
- Construction Fire Protection and Prevention Plan (California Code of Regulations, Title 8, § 1920); and
- Personal Protective Equipment Program (California Code of Regulations, Title 8, § 1514 –1522).

Additional programs under General Industry Safety Orders (California Code of Regulations, Title 8, § 3200 – 6184), Electrical Safety Orders (8 CCR §§2299 - 2974) and Unfired Pressure Vessel Safety Orders (California Code of Regulations, Title 8, § 450 –544) would include:

- Electrical Safety Program;
- Unfired Pressure Vessel Safety Orders;
- Equipment Safety Program;
- Forklift Operation Program;
- Excavation/Trenching Program;
- Fall Prevention Program;
- Scaffolding/Ladder Safety Program;
- Articulating Boom Platforms Program;
- Crane and Material Handling Program;
- Housekeeping and Material Handling and Storage Program;
- Hot Work Safety Program;
- Respiratory Protection Program;
- Employee Exposure Monitoring Program;
- Confined Space Entry Program;
- Hand and Portable Power Tool Safety Program;
- Hearing Conservation Program;
- Back Injury Prevention Program;
- Hazard Communication Program;
- Air Monitoring Program;

- Heat and Cold Stress Monitoring and Control Program; and
- Pressure Vessel and Pipeline Safety Program.

The AFC includes adequate outlines of each of the above programs. Prior to construction of the CPP project, detailed programs and plans would be provided pursuant to the condition of certification **WORKER SAFETY-1**.

Operations and Maintenance Safety and Health Program

Upon completion of construction and prior to operations at the Cosumnes Power Plant project, the Operations and Maintenance Safety and Health Program would be prepared. This operational safety program would include the following programs and plans:

- Injury and Illness Prevention Program (California Code of Regulations, Title 8, § 3203);
- Emergency Action Plan (California Code of Regulations, Title 8, § 3220);
- Hazardous Materials Management Program;
- Operations and Maintenance Safety Program;
- Fire Protection and Prevention Program (California Code of Regulations, Title 8, § 3221); and
- Personal Protective Equipment Program (California Code of Regulations, Title 8, § 3401-3411).

In addition, the requirements under General Industry Safety Orders (California Code of Regulations, Title 8, § 3200 – 6184), Electrical Safety Orders (California Code of Regulations, Title 8, § 2299 – 2974) and Unfired Pressure Vessel Safety Orders (California Code of Regulations, Title 8, § 450 -- 544) would be applicable to the project. Written safety programs, which the applicant would develop, for the Cosumnes Power Plant project would ensure compliance with the above-mentioned requirements.

The AFC includes an adequate outline of the Emergency Action Plan (SMUD 2001a, pages 8.7-12 and 8.7-16). Prior to operation of the CPP project, all detailed programs and plans would be provided pursuant to condition of certification **WORKER SAFETY-2**.

Safety and Health Program Elements

The applicant provided the proposed outlines for both a Construction Safety and Health Program and an Operation Safety and Health Program (SMUD 2001a, Section 8.7.4.3). The measures in these plans are derived from applicable sections of state and federal law. The major items required in both construction and operation Safety and Health programs are as follows:

Injury and Illness Prevention Program (IIPP)

The applicant would submit an expanded Construction and Operations Illness and Injury Prevention Program to Cal/OSHA for review and comment 30 days prior to construction and operation of the project.

The IIPP would include the following components as presented in the AFC:

- Identity of person(s) with authority and responsibility for implementing the program;

- System ensuring employees comply with safe and healthy work practices;
- System facilitating employer-employee communications;
- Procedures identifying and evaluating workplace hazards, including inspections to identify hazards and unsafe conditions;
- Methods for correcting unhealthy/unsafe conditions in a timely manner;
- Methods of documenting inspections and training and for maintaining records; and
- A training program for introducing the program; for new, transferred, or promoted employees; for new processes and equipment; for supervisors; for contractors.

Emergency Action Plan

California regulations require an Emergency Action Plan (California Code of Regulations, Title 8, § 3220). The AFC contains a satisfactory outline for an emergency action plan (SMUD 2001a, pages 8.7-12 and 8.7-16).

The outline lists the following features:

- Purpose and Scope of Emergency Action Plan;
- Personnel Responsibilities during Emergencies;
- Specific Response Procedures;
- Evacuation Plan;
- Emergency Equipment Locations;
- Fire Extinguisher Locations;
- Site Security;
- Accident Reporting and Investigation;
- Lockout/Tagout;
- Hazard Communication;
- Spill Containment and Reporting;
- First Aid and Medical Response;
- Respiratory Protection;
- Personal Protective Equipment;
- Sanitation; and
- Work Site Inspections.

Fire Prevention Plan

California Code of Regulations requires an Operations Fire Prevention Plan (California Code of Regulations, Title 8, § 3221). The AFC describes a proposed fire prevention plan which is acceptable to staff (SMUD 2001a, pages 8.7-11 and 8.7-15). The plan would include the following topics:

- Responsibilities;
- Procedures for fire control;
- Fixed and Portable fire-fighting equipment;

- Housekeeping;
- Employee alarm/communication practices;
- Servicing and refueling areas;
- Training; and
- Flammable and combustible liquid storage.

Staff proposes that the applicant submit a final Fire Protection and Prevention Plan to the California Energy Commission Compliance Project Manager (CPM) for review and approval and to the Herald Fire District for review and comment to satisfy proposed conditions of certification **WORKER SAFETY-1** and **-2**.

Personal Protective Equipment Program

California regulations require Personal Protective Equipment (PPE) and first aid supplies whenever hazards are encountered which, due to process, environment, chemicals or mechanical irritants can cause injury or impair bodily function as a result of absorption, inhalation, or physical contact (California Code of Regulations, Title 8, § 3380--3400). The CPP project's operational environment would require a PPE program.

Information provided in the AFC indicates that all employees required to use PPE would be checked for proper fit and to see if they are medically capable of wearing the equipment. All safety equipment would meet the National Institute of Occupational Safety and Health (NIOSH) or the American National Standards Institute (ANSI) standards and would carry markings, numbers, or certificates of approval. Respirators would meet NIOSH and California Department of Health and Human Services Standards. Each employee would be provided with the following information pertaining to the protective clothing and equipment:

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

A PPE program ensures that employers comply with the applicable requirements for PPE and provide employees with the information and training necessary to implement the program.

Operations and Maintenance Written Safety Program

In addition to the specific plans listed above, there are additional LORS applicable to the project, which are called "safe work practices." Both the Construction and the Operations Safety Programs would address safe work practices under a variety of programs. The components of these programs include the following:

- Fall Protection Program;
- Hot Work Safety Program;
- Confined Space Entry;
- Hearing Conservation Program;

- Hazard Communication Program;
- Process Safety Management (PSM) Program; and
- Contractor Safety Program.

Operations and Maintenance Safety Training Programs

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

FIRE PROTECTION

Staff reviewed the information provided in the AFC regarding available fire protection services and equipment (SMUD 2001a, Sections 8.7.4.5 and 8.8.3.6.2) to determine if the project would adequately protect workers and if it would affect the fire protection services in the area. The project would rely on both onsite fire protection systems and local fire protection services. The onsite fire protection system provides the first line of defense for small fires. In the event of a major fire, fire support services including trained firefighters and equipment for a sustained response would be required from the Herald Fire District.

During construction, an interim fire protection system would be in place. The permanent facility fire protection system would be placed in service as early as possible during the construction phase.

The information in the AFC indicates that the project intends to meet the fire protection and suppression requirements. Staff agrees that the project would meet all requirements. Elements include both fixed and portable fire extinguishing systems. The Rancho Seco Reservoir would supply firewater for the project site, via connection to an existing 48” water pipe. Backup water would be provided by on-site firewater storage supply consisting of a minimum of 180,000-gallons in raw water storage tanks. The firewater pumping system consists of two fire pumps driven by electric motors. This system would provide more than an adequate quantity of fire-fighting water to yard hydrants, hose stations, and water spray and sprinkler systems. Fire hydrants and fixed suppression systems would be supplied from the underground firewater loop piping system (SMUD 2001a, Section 2.2.12).

This fire water supply and an on-site electric fire-water pumping system would provide more than an adequate quantity of fire-fighting water to yard hydrants, hose stations, and water spray and sprinkler systems. The motor driven fire pump would be capable of supplying maximum water demand for any automatic sprinkler system plus water for fire hydrants and hose stations.

An FM 200 fire protection system would be provided for the combustion turbine generator (CTG) and accessory equipment (SMUD 2001a, Section 2.2.12). FM 200 is a non-halon chemical fire retardant approved by the US EPA for use in occupied structures.

Fire hydrants and hose stations would supplement the plant fire protection system using water from the plant underground firewater system. Fire hydrants with hose houses would be placed in accordance with NFPA 10 and local fire codes.

The applicant would be required to provide the final Fire Protection and Prevention Program to staff and to the Herald Fire District, prior to construction and operation of the project, to confirm the adequacy of the proposed fire protection measures.

FACILITY CLOSURE

The project owner/operator is responsible for maintaining an operational fire protection system during closure activities. The project must also stay in compliance with all applicable health and safety LORS during that time. A facility closure plan would be developed prior to closure to incorporate these requirements.

CUMULATIVE IMPACTS

Staff reviewed the potential for the construction and operation of the Cosumnes Power Plant project, combined with existing industrial facilities, to result in impacts on the fire and emergency service capabilities of the Herald Fire District and found that cumulative impacts were insignificant. There are few industrial facilities in this agricultural area. Fire Chief Glen Hendrickson confirmed that the Herald Fire Department is adequately staffed and equipped to control whatever fire would occur at an industrial facility of this type, and the department's response time will be adequate (Hendrickson 2002). Staff also finds that the fire-fighting response time is no greater than for other California rural power plants previously certified by the Energy Commission.

RESPONSE TO PUBLIC AND AGENCY COMMENTS

No comments have been received regarding worker safer or fire protection.

CONCLUSION AND RECOMMENDATIONS

If the applicant provides a Project Construction Safety and Health Program and a Project Operations Safety and Health Program as required by conditions of certification **WORKER SAFETY-1** and **-2**, staff believes that the project would incorporate sufficient measures to ensure adequate levels of industrial safety, and comply with applicable LORS. The Safety and Health Programs apply to all project-related construction and operations, including the new gas pipeline and compressor stations. Staff also concludes that the proposed project, including the new natural gas line and compressor stations, would not have significant impacts on local fire protection services. The proposed facility is located south of the former Rancho Seco Power Plant site which is currently served by the local fire department. The fire risks of the proposed facility are similar to those of the decommissioned Rancho Seco Power Plant and thus pose no new or added demands on local fire protection services.

If the Energy Commission certifies the project, staff recommends adoption of the following proposed conditions of certification. The proposed conditions of certification provide assurance that the Construction Safety and Health Program and the Operations Safety and Health Program proposed by the applicant would be reviewed by the appropriate agencies before implementation. The conditions also require verification

that the proposed plans adequately assure worker safety and fire protection and comply with applicable LORS.

PROPOSED CONDITIONS OF CERTIFICATION

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

1. A Construction Injury and Illness Prevention Program
2. A Construction Fire Protection and Prevention Plan
3. A Personal Protective Equipment Program

- 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, if appropriate, 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 CPM for review and approval and to the Herald Fire District for review and comment.

Verification: At least 30 days prior to the start of construction, the project owner shall submit to the CPM a copy of the Project Construction Safety and Health Program, the Personal Protective Equipment Program and the Construction Fire Protection and Prevention Plan, including a copy of the cover letter transmitting the Programs to Cal/OSHA's Consultation Service, if appropriate.

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

1. Operation Injury and Illness Prevention Program
2. Emergency Action Plan
3. Operation Fire Protection Program
4. Personal Protective Equipment Program

- The Operation Injury and Illness Prevention Program, 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, as appropriate, for review and comment concerning compliance of the program with all applicable Safety Orders.
- The Operation Fire Protection Program and the Emergency Action Plan shall be submitted to the fire protection agency serving the project for review and comment.

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. The document shall incorporate Cal/OSHA's Consultation Service comments, if any, regarding its review and acceptance of 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, including all records and files on accidents and incidents, is present onsite.

REFERENCES

1998 California Fire Code. Published by the International Fire Code Institute comprised of the International Conference of Building Officials, the Western Fire Chiefs Association, and the California Building Standards Commission. Whittier, Ca.

Hendrickson, Glen. Fire Chief, Herald Fire Department. Personal communications, April 30 and July 29, 2002.

Rothchild, Elise. Supervising Hazardous Materials Specialist, Sacramento County Environmental Management Department, Hazardous Materials Division. Personal communications April 30, 2002.

SMUD (Sacramento Municipal Utility District) 2001a. Application for Certification, Volumes 1 and 2 (01-AFC-19). Submitted to the California Energy Commission on September 13, 2001. Docket date September 13, 2001.

FACILITY DESIGN

Testimony of Shahab Khoshmashrab, Al McCuen, and Steve Baker

INTRODUCTION

Facility Design encompasses the civil, structural, mechanical, and electrical engineering design of the project. The purpose of the Facility Design analysis is to:

- verify that the laws, ordinances, regulations, and standards (LORS) applicable to the engineering design and construction of the project have been identified;
- verify that the project and ancillary facilities have been described in sufficient detail, including proposed design criteria and analysis methods, to provide reasonable assurance that the project can be designed and constructed in accordance with all applicable engineering LORS, and in a manner that assures public health and safety;
- determine whether special design features should be considered during final design to deal with conditions unique to the site which could influence public health and safety; and
- describe the design review and construction inspection process and establish Conditions of Certification that will be used to monitor and ensure compliance with the intent of the engineering LORS and any special design requirements.

FINDINGS REQUIRED

The Warren Alquist Act requires the Energy 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 discussed in this analysis include:

- Identification of the engineering LORS applicable to facility design;
- Evaluation of the applicant's proposed design criteria, including the identification of those criteria that are essential to ensuring public health and safety;
- Proposed modifications and additions to the Application for Certification (AFC) that are necessary to comply with applicable engineering LORS; and
- Conditions of Certification proposed by staff to ensure that the project will be designed and constructed to assure public health and safety and comply with all applicable engineering LORS.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Lists of LORS applicable to each engineering discipline (civil, structural, mechanical, and electrical) are described in the AFC (SMUD 2001a, Appendices 10A through 10G). Some of these LORS include the California Building Code (CBC) and guidelines promulgated by the American National Standards Institute (ANSI), American Society of Mechanical Engineers (ASME), American Society for Testing and Materials (ASTM) and American Welding Society (AWS).

SETTING

SMUD proposes to construct and operate a nominally rated 1,000 megawatt (two 500 MW phases), combined cycle power plant known as the Cosumnes Power Plant (CPP). The project would be located 25 miles southeast of the city of Sacramento. The site would occupy approximately 30 fenced acres located south of the Rancho Seco Nuclear Plant and would lie in seismic zone 3. For more information on the site and related project description, please see the **Project Description** section of this document. Additional engineering design details are contained in the Application for Certification (AFC), in Appendices 10A through 10G (SMUD 2001a).

ANALYSIS

The basis of this analysis is the applicant's proposed analysis and construction methods and list of engineering LORS and design criteria set forth in the AFC.

SITE PREPARATION AND DEVELOPMENT

Staff has evaluated the proposed design criteria for grading, flood protection, erosion control, site drainage, and site access. Staff has assessed the criteria for designing and constructing linear support facilities such as a natural gas pipeline and electric transmission line. The applicant proposes to use accepted industry standards (see AFC Appendices 10A through 10G for a representative list of applicable industry standards), design practices and construction methods in preparing and developing the site. Staff concludes that the project, including its linear facilities, would likely comply with all applicable site preparation LORS, and proposes Conditions of Certification (see below and the **Geology, Mineral Resources, and Paleontology** section of this document) 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, that require a long lead time to repair or replace, or that are used for the storage, containment, or handling of hazardous or toxic materials. Major structures and equipment will be identified through compliance with proposed Condition of Certification **GEN-2** (below).

The AFC contains lists of the civil, structural, mechanical, and electrical design criteria that demonstrate the likelihood of compliance with applicable engineering LORS, and

that staff believes are essential to ensuring that the project is designed in a manner that protects public health and safety.

Each phase of the project shall be designed and constructed to the currently applicable edition of the California Building Standards Code (CBSC) (also known as Title 24, California Code of Regulations), which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and other applicable codes and standards in effect at the time design and construction of the project actually commences. In the event the initial designs are submitted to the Chief Building Official (CBO) for review and approval when the successor to the currently applicable edition of the CBSC is in effect, the CBC provisions, identified herein, shall be replaced with the applicable successor provisions.

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

PROJECT QUALITY PROCEDURES

The AFC (SMUD 2001a, § 2.4.5) describes a project Quality Program that will be used on the project to maximize confidence that systems and components will be designed, fabricated, stored, transported, installed, and tested in accordance with the technical codes and standards appropriate for a power plant. Compliance with design requirements will be verified through an appropriate program of inspections and audits. Employment of this quality assurance/quality control (QA/QC) program would ensure that the project is actually designed, procured, fabricated, and installed as contemplated in this analysis.

COMPLIANCE MONITORING

Under Section 104.2 of the CBC, the building official is authorized and directed to enforce all the provisions of the CBC. For all energy facilities certified by the Energy Commission, the Energy Commission is the building official and has the responsibility to enforce the code. In addition, the Energy Commission has the power to render interpretations of the CBC and to adopt and enforce rules and supplemental regulations to clarify the application of the CBC's provisions.

The Energy Commission's design review and construction inspection process is developed to conform to CBC requirements and ensure that all facility design Conditions of Certification are met. As provided by Section 104.2.2 of the CBC, the Energy Commission appoints experts to carry out the design review and construction inspections and act as delegate CBO on behalf of the Energy Commission. These delegates typically include the local building official and/or independent consultants hired to cover technical expertise not provided by the local official. The applicant, through permit fees, as provided by CBC Sections 107.2 and 107.3, pays the costs of

the reviews and inspections. While building permits in addition to the Energy Commission certification are not required for this project, in-lieu permit fees are paid by the applicant consistent with CBC Section 107, to cover the costs of reviews and inspections.

Energy Commission staff has completed and signed a Memorandum of Understanding (MOU) with SMUD, a municipal utility, to act as CBO for the project. The MOU outlines SMUD's roles and responsibilities and those of its subcontractors and delegates.

Staff has developed proposed Conditions of Certification to ensure public health and safety and compliance with engineering design LORS. Some of these conditions address the roles, responsibilities, and qualifications of the applicant's engineers responsible for the design and construction of the project (proposed Conditions of Certification **GEN-1** through **GEN-8**). Engineers responsible for the design of the civil, structural, mechanical, and electrical portions of the project are required to be registered in California, and to sign and stamp each submittal of design plans, calculations, and specifications to the CBO. These conditions require that no element of construction subject to CBO review and approval shall proceed without prior approval from the CBO. They also require that qualified special inspectors be assigned to perform or oversee special inspections required by the applicable LORS.

While the Energy Commission and delegate CBO have the authority to allow some flexibility in scheduling construction activities, these conditions are written to require that no element of construction of permanent facilities subject to CBO review and approval, which would be difficult to reverse or correct, may proceed without prior approval of plans by the CBO. Those elements of construction that are not difficult to reverse are allowed to proceed without approval of the plans. The applicant shall bear the responsibility of fully modifying those elements of construction to comply with all design changes that result from the CBO's subsequent plan review and approval process.

FACILITY CLOSURE

The removal of a facility from service, or decommissioning, as a result of the project reaching the end of its useful life, may range from "mothballing" to removal of all equipment and appurtenant facilities and restoration of the site. Future conditions that may affect the decommissioning decision are largely unknown at this time.

In order to assure that decommissioning of the facility will be completed in a manner that is environmentally sound, safe, and will protect public health and safety, the applicant shall submit a decommissioning plan to the Energy Commission for review and approval prior to the commencement of decommissioning. The plan shall include a discussion of the following items:

- proposed decommissioning activities for the project and all appurtenant facilities constructed as part of the project;
- all applicable LORS, local/regional plans, and the conformance of the proposed decommissioning activities to the applicable LORS and local/regional plans;

- the activities necessary to restore the site if the plan requires removal of all equipment and appurtenant facilities; and
- decommissioning alternatives, other than complete site restoration.

The above requirements should serve as adequate protection, even in the unlikely event of project abandonment. Staff has proposed general conditions (see **General Conditions**) to ensure that these measures are included in the Facility Closure plan.

RESPONSE TO PUBLIC AND AGENCY COMMENTS

On May 28, 2002, staff received a phone call from Barbara Dieter, a resident who lives west of the proposed Winters natural gas compressor station. The existing PG&E's natural gas pipeline passes through her property. She wanted to know if it would be safe to compress the gas in the existing pipeline to the pressure that SMUD is proposing. She asked if the existing pipeline is strong enough to handle the additional pressure and if it were sized to handle the pressure that SMUD is now proposing to place in the pipeline.

PG&E's guaranteed pressure to SMUD at the Winters inter-tie station is 600 pounds per square inch gauge (psig). Currently, the delivered pressure is higher than 600 psig; it is 722 psig or greater. In 1996, SMUD installed the existing piping at the Winters inter-tie station, a Class 2 location (as designated by Federal Department of Transportation (CFR 49 § 192.5)). Piping in Class 2 locations has a maximum allowable operating pressure (MAOP) of 787 psig. However, SMUD operates the piping at the Winters inter-tie station as a Class 3 location (which has a MAOP of 722 psig). Therefore the natural gas pressure in the existing line currently does not exceed 722 psig. Natural gas leaving SMUD's Winters inter-tie must be at 722 psig to provide adequate pressure to fuel the existing Carson Ice-Gen cogeneration facility in Elk Grove and to fuel SMUD's proposed Phase 2 of the CPP project. Over time, as there are additional inter-ties/users along PG&E's 400/401 line, pressure available at the existing Winters inter-tie could drop to the PG&E guaranteed 600 psig. SMUD proposes to install a natural gas compressor station adjacent to the Winters inter-tie so that in the event the gas pressure drops below 722 psig, the pressure would be boosted to 722 psig, which would not exceed the 787 psig MAOP (SMUD 2002aa, page 10 and CEC 2002q).

Staff has evaluated SMUD's response and agrees that since the Winters compressor station would only boost the pipeline pressure to within the current MAOP, the continued operation of the existing pipeline at the higher pressure stated above would not create the potential to endanger public safety.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

1. The laws, ordinances, regulations, and standards (LORS) identified in the AFC and supporting documents are those applicable to the project.

2. Staff has evaluated the proposed engineering LORS, design criteria, and design methods in the record, and concludes that the design, construction and eventual closure of the project are likely to comply with applicable engineering LORS.

3. The Conditions of Certification proposed will ensure that the proposed facilities are designed and constructed in accordance with applicable engineering LORS. This will occur through the use of design review, plan checking, and field inspections, which are to be performed by the CBO or other Energy Commission delegate. Staff will audit the CBO to ensure satisfactory performance.

4. Whereas future conditions that may affect decommissioning are largely unknown at this time, it can reasonably be concluded that if the project owner submits a decommissioning plan as required in the **General Conditions** portion of this document prior to the commencement of decommissioning, the decommissioning procedure is likely to occur in compliance with all applicable engineering LORS.

RECOMMENDATIONS

Energy Commission staff recommends that::

1. The Conditions of Certification proposed herein be adopted to ensure that the project is designed and constructed to assure public health and safety, and to ensure compliance with all applicable engineering LORS;

2. Each phase of the project be designed and built to the currently applicable edition of the CBSC (or successor standard, if such is in effect when the initial project engineering designs are submitted for review); and

3. The CBO shall review the final designs, conduct plan checking, and perform field inspections during construction. Energy Commission staff shall audit and monitor the CBO to ensure satisfactory performance.

CONDITIONS OF CERTIFICATION

GEN-1 The project owner shall design, construct, and inspect each phase of the project in accordance with the currently applicable edition of the California Building Standards Code (CBSC), which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and all other applicable engineering LORS in effect at the time initial design plans are submitted to the CBO for review and approval. (The CBSC in effect is that edition that has been adopted by the California Building Standards Commission and published at least 180 days previously.)

In the event that the initial engineering designs are submitted to the CBO when a successor to the currently applicable edition of the CBSC is in effect, the CBSC provisions identified herein shall be replaced with the applicable successor provisions. Where, in any specific case, different sections of the code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict

between a general requirement and a specific requirement, the specific requirement shall govern. All transmission facilities (lines, switchyards, switching stations, and substations) Conditions of Certification are addressed in the **Transmission System Engineering** section of this document.

Verification: Within 30 days after receipt of the Certificate of Occupancy, the project owner shall submit to the CPM a statement of verification, signed by the responsible design engineer, attesting that all designs, construction, installation, and inspection requirements of the applicable LORS and the Energy Commission's Decision have been met in the area of facility design. The project owner shall provide the CPM a copy of the Certificate of Occupancy within 30 days of receipt from the CBO [CBC, Section 109 – Certificate of Occupancy].

GEN-2 Prior to submittal of the initial engineering designs for CBO review, the project owner shall furnish to the CPM and to the CBO a schedule of facility design submittals, a Master Drawing List and a Master Specifications List. The schedule shall contain a list of proposed submittal packages of designs, calculations, and specifications for major structures and equipment. To facilitate audits by Energy Commission staff, the project owner shall provide specific packages to the CPM when requested.

Verification: At least 60 days (or project owner and CBO approved alternative timeframe) prior to the start of rough grading, the project owner shall submit to the CBO and to the CPM the schedule, the Master Drawing List, and the Master Specifications List of documents to be submitted to the CBO for review and approval. These documents shall be the pertinent design documents for the major structures and equipment listed in **Facility Design Table 1** below. Major structures and equipment shall be added to or deleted from the table only with CPM approval. The project owner shall provide schedule updates in the Monthly Compliance Report.

Facility Design Table 1
Major Structures and Equipment List for Phases I and II

Equipment/System	Quantity (Plant)
Combustion Turbine & Generator (CTG) Foundation and Connections	4
Steam Turbine & Generator (STG) Foundation and Connections	2
Heat Recovery Steam Generator (HRSG) & Stack Structure, Foundation and Connections	4
CTG Main Transformer Foundation and Connections	4
STG Main Transformer Foundation and Connections	2
CTG Air Inlet Filter Foundation and Connections	4
CEMS Enclosure Structure, Foundation and Connections	4
Blowdown Tank Foundation and Connections	4
HRSG Boiler Feed-water Pump Foundation and Connections	4
Ammonia Injection Skid Foundation and Connections	4
Circulating Water Pumps Foundation and Connections	2
Cooling Tower Structure, Foundation and Connections	2

Equipment/System	Quantity (Plant)
Service/Fire Water Storage Tank and Service Water Pumps Foundations and Connections	2
Demineralized Water Storage Tank and Pumps Foundation and Connections	2
Admin/Maintenance/Warehouse & Water Treatment Building Structure, Foundation and Connections	1
Ammonia Storage Tank Foundation and Connections	1
Accessory Module (Lube Oil, Hydraulics and Liquid Fuel) Foundations and Connections	4
STG Lube Oil Module Foundation and Connections	2
Electrical Control Panel Foundation and Connections	4
Isolation and Excitation Transformer Foundation and Connections	4
Electrical Building Structure, Foundation and Connections	2
Water Wash Skid Foundation and Connections	4
Air Process Skid Foundation and Connections	4
Oil/Water Separator Skid Foundation and Connections	1
Cooling Tower Chemical Feed System Foundation and Connections	1
Switchyard Building Structure, Foundation and Connections	1
Auxiliary Transformer Foundation and Connections	4
CO2 Tank Foundation and Connections for CTGs	4
Generator Auxiliary and Static Starter Foundation and Connections	4
Acid and Caustic Tank Foundation and Connections for Zero Liquid Discharge (ZLD)	1
Gas Metering Station Structure, Foundation and Connections	1
HRSG Chemical Feed System Foundation and Connections	4
Waste Water Sump Structure and Foundation	1
Emergency Backup Transformer Foundation and Connections	1
Fire Water Pump Foundation and Connections	1
Gas Compressor Recycle Cooler Foundation and Connections	1
Condensate Pumps Foundation and Connections	3
ZLD Building Structure, Foundation and Connections	2
Brine Concentrator System Structure, Foundation and Connections	2
Crystallizer System Structure, Foundation and Connections	2
Distillate Storage Tanks Structure, Foundation and Connections	2
Brine Holding Tanks Structure, Foundation and Connections	4
Oil Conditioner Skid Foundation and Connections	2
Solid Handling Building Structure, Foundation and Connections	2
Potable Water Systems	1 Lot
Drainage Systems (including sanitary drain and waste)	1 Lot
High Pressure and Large Diameter Piping	1 Lot
HVAC and Refrigeration Systems	1 Lot

Equipment/System	Quantity (Plant)
Temperature Control and Ventilation Systems (including water and sewer connections)	1 Lot
Building Energy Conservation Systems	1 Lot
Substation/Switchyard, Buses and Towers	2 Lots
Electrical Duct Banks	1 Lot
Site Earth Work, Grading & Drainage	1 Lot
Station Switchgear & Connections greater than 480 volts	1 Lot
Grounding System	1 Lot
Pipe Rack	1 Lot
Fire Protection Systems	1 Lot
Natural Gas Pipeline	1 Lot

GEN-3 The project owner shall make payments to the CBO for design review, plan check, and construction inspection based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. These fees may be consistent with the fees listed in the currently applicable edition of the CBC [Chapter 1, Section 107 and Table 1-A, Building Permit Fees; Appendix Chapter 33, Section 3310 and Table A-33-A, Grading Plan Review Fees; and Table A-33-B, Grading Permit Fees], adjusted for inflation and other appropriate adjustments; may be based on the value of the facilities reviewed; may be based on hourly rates; or may be as otherwise agreed by the project owner and the CBO.

Verification: The project owner shall make the required payments to the CBO in accordance with the agreement between the project owner and the CBO. The project owner shall send a copy of the CBO's receipt of payment to the CPM in the next Monthly Compliance Report indicating that the applicable fees have been paid.

GEN-4 Prior to the start of rough grading, the project owner shall assign a California registered architect, structural engineer, or civil engineer as a resident engineer (RE) to be in general responsible charge of the project (Cal. Code Regs., tit. 24, § 4-209, Designation of Responsibilities).

The RE may delegate responsibility for portions of the project to other registered engineers. Registered mechanical and electrical engineers may be delegated responsibility for mechanical and electrical portions of the project respectively. A project may be divided into parts, provided each part is clearly defined as a distinct unit. Separate assignment of general responsible charge may be made for each designated part. All transmission facilities (lines, switchyards, switching stations, and substations) Conditions of Certification are addressed in the **Transmission System Engineering** section of this document.

The RE shall:

1. Monitor construction progress of work requiring CBO design review and inspection to ensure compliance with LORS;
2. Ensure that construction of all the facilities subject to CBO design review and inspection conforms in every material respect to the applicable LORS, these Conditions of Certification, approved plans, and specifications;
3. Prepare documents to initiate changes in the approved drawings and specifications when directed by the project owner or as required by conditions on the project;
4. Be responsible for providing the project inspectors and testing agency(ies) with complete and up-to-date set(s) of stamped drawings, plans, specifications, and any other required documents;
5. Be responsible for the timely submittal of construction progress reports to the CBO from the project inspectors, the contractor, and other engineers who have been delegated responsibility for portions of the project; and
6. Be responsible for notifying the CBO of corrective action or the disposition of items noted on laboratory reports or other tests as not conforming to the approved plans and specifications.

The RE shall have the authority to halt construction and to require changes or remedial work, if the work does not conform to applicable requirements.

If the RE or the delegated engineers are reassigned or replaced, the project owner shall submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

Verification: At least 30 days (or project owner and CBO approved alternative timeframe) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, the resume and registration number of the 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 resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

GEN-5 Prior to the start of rough grading, the project owner shall assign at least one of each of the following California registered engineers to the project: A) a civil engineer; B) a soils engineer, or a geotechnical engineer or a civil engineer experienced and knowledgeable in the practice of soils engineering; and C) an engineering geologist. Prior to the start of construction, the project owner shall

assign at least one of each of the following California registered engineers to the project: D) a design engineer, who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; E) a mechanical engineer; and F) an electrical engineer. [California Business and Professions Code section 6704 et seq., and sections 6730, 6731, and 6736 requires state registration to practice as a civil engineer or structural engineer in California.] All transmission facilities (lines, switchyards, switching stations, and substations) Conditions of Certification are addressed in the **Transmission System Engineering** section of this document.

The tasks performed by the civil, mechanical, electrical, or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (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 responsible engineers assigned to the project [CBC, Section 104.2, Powers and Duties of Building Official].

If any one of the designated responsible engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications, and registration number of the newly assigned responsible engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

A. The civil engineer shall:

   1. Review the Foundation Investigations Report, Geotechnical Report or Soils Report prepared by the soils engineer, the geotechnical engineer, or by a civil engineer experienced and knowledgeable in the practice of soils engineering;
   2. Design, or be responsible for design, stamp, and sign all plans, calculations and specifications for proposed site work, civil works and related facilities requiring design review and inspection by the CBO. At a minimum, these include: grading, site preparation, excavation, compaction, construction of secondary containment, foundations, erosion and sedimentation control structures, drainage facilities, underground utilities, culverts, site access roads and sanitary sewer systems; and
   3. Provide consultation to the 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.

B. The soils engineer, geotechnical engineer, or civil engineer experienced and knowledgeable in the practice of soils engineering, shall:

1. Review all the engineering geology reports;
2. Prepare the Foundation Investigations Report, Geotechnical Report or Soils Report containing field exploration reports, laboratory tests and engineering analysis detailing the nature and extent of the soils that may be susceptible to liquefaction, rapid settlement or collapse when saturated under load [CBC, Appendix Chapter 33, Section 3309.5, Soils Engineering Report; Section 3309.6, Engineering Geology Report; and Chapter 18, Section 1804, Foundation Investigations];
3. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with the requirements set forth in the currently applicable edition of the 1998 CBC, Appendix Chapter 33; Section 3317, Grading Inspections; (depending on the site conditions, this may be the responsibility of either the soils engineer or engineering geologist or both, as set forth in the currently applicable edition of the CBC, Appendix Chapter 33; Section 3317.1, General); and
4. Recommend field changes to the civil engineer and RE.

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 [CBC, section 104.2.4, Stop orders].

C. The engineering geologist shall:

1. Review all the engineering geology reports and prepare final soils grading report; and
2. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with the requirements set forth in the currently applicable edition of the CBC, Appendix Chapter 33; Section 3317, Grading Inspections; (depending on the site conditions, this may be the responsibility of either the soils engineer or engineering geologist or both, as set forth in the currently applicable edition of the CBC, Appendix Chapter 33; Section 3317.1, General).

D. 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 engineering LORS;
4. Evaluate and recommend necessary changes in design; and
5. Prepare and sign all major building plans, specifications, and calculations.

E. The mechanical engineer shall be responsible for, and sign and stamp a statement with, each mechanical submittal to the CBO, stating that the proposed final design plans, specifications, and calculations conform with all of the mechanical engineering design requirements set forth in the Energy Commission's Decision.

F. The electrical engineer shall:

1. Be responsible for the electrical design of the project; and
2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: At least 30 days (or project owner and CBO approved alternative timeframe) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible civil engineer, soils (geotechnical) engineer, and engineering geologist assigned to the project.

At least 30 days (or project owner and CBO approved alternative timeframe) prior to the start of construction, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible design engineer, mechanical engineer, and electrical engineer assigned to the project.

The project owner shall notify the CPM of the CBO's approvals of the responsible engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

GEN-6 Prior to the start of an activity requiring special inspection, the project owner shall assign to the project, qualified and certified special inspector(s) who shall be responsible for the special inspections required by the CBC, Chapter 17 [Section 1701, Special Inspections; Section 1701.5, Type of Work (requiring special inspection)]; and Section 106.3.5, Inspection and observation program. All transmission facilities (lines, switchyards, switching stations, and substations) Conditions of Certification are addressed in the **Transmission System Engineering** section of this document.

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 for corrective action [CBC, Chapter 17, Section 1701.3, Duties and Responsibilities of the Special Inspector]; and

4. Submit a final signed report to the RE, CBO, and CPM, stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans and specifications and the applicable provisions of the applicable edition of the CBC.

A certified weld inspector, certified by the American Welding Society (AWS), and/or American Society of Mechanical Engineers (ASME) as applicable, shall inspect welding performed on-site requiring special inspection (including structural, piping, tanks, and pressure vessels).

Verification: At least 15 days (or project owner and CBO approved alternative timeframe) prior to the start of an activity requiring special inspection, the project owner shall submit to the CBO for review and approval, with a copy to the CPM, the name(s) and qualifications of the certified weld inspector(s), or other certified special inspector(s) assigned to the project to perform one or more of the duties set forth above. The project owner shall also submit to the CPM a copy of the CBO's approval of the qualifications of all special inspectors in the next Monthly Compliance Report.

If the special inspector is subsequently reassigned or replaced, the project owner has five days in which to submit the name and qualifications of the newly assigned special inspector to the CBO for approval. The project owner shall notify the CPM of the CBO's approval of the newly assigned inspector within five days of the approval.

GEN-7 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend the corrective action required [CBC, Chapter 1, Section 108.4, Approval Required; Chapter 17, Section 1701.3, Duties and Responsibilities of the Special Inspector; Appendix Chapter 33, Section 3317.7, Notification of Noncompliance]. The discrepancy documentation shall be submitted to the CBO for review and approval. The discrepancy documentation shall reference this Condition of Certification and, if appropriate, the applicable sections of the CBC and/or other LORS.

Verification: The project owner shall transmit a copy of the CBO's approval of any corrective action taken to resolve a discrepancy to the CPM in the next Monthly Compliance Report. If any corrective action is disapproved, the project owner shall advise the CPM, within five days, of the reason for disapproval and the revised corrective action to obtain CBO's approval.

GEN-8 The project owner shall obtain the CBO's final approval of all completed work that has undergone CBO design review and approval. The project owner shall request the CBO to inspect the completed structure and review the submitted documents. When the work and the "as-built" and "as graded" plans conform to the approved final plans, the project owner shall notify the CPM regarding

the CBO's final approval. The marked up "as-built" drawings for the construction of structural and architectural work shall be submitted to the CBO. Changes approved by the CBO shall be identified on the "as-built" drawings [CBC, Section 108, Inspections]. The project owner shall retain one set of approved engineering plans, specifications, and calculations at the project site or at another accessible location during the operating life of the project [CBC, Section 106.4.2, Retention of Plans].

Verification: Within 15 days of the completion of any work, the project owner shall submit to the CBO, with a copy to the CPM, in the next Monthly Compliance Report, (a) a written notice that the completed work is ready for final inspection, and (b) a signed statement that the work conforms to the final approved plans. After storing final approved engineering plans, specifications, and calculations as described above, the project owner shall submit to the CPM a letter stating that the above documents have been stored and indicate the storage location of such documents.

CIVIL-1 The project owner shall submit to the CBO for review and approval the following:

1. Design of the proposed drainage structures and the grading plan;
2. An erosion and sedimentation control plan;
3. Related calculations and specifications, signed and stamped by the responsible civil engineer; and
4. Soils report, Geotechnical Report or Foundation Investigations Report required by the CBC [Appendix Chapter 33, Section 3309.5, Soils Engineering Report; Section 3309.6, Engineering Geology Report; and Chapter 18, Section 1804, Foundation Investigations].

Verification: At least 15 days (or project owner and CBO approved alternative timeframe) prior to the start of site grading the project owner shall submit the documents described above to the CBO for design review and approval. In the next Monthly Compliance Report following the CBO's approval, the project owner shall submit a written statement certifying that the documents have been approved by the CBO.

CIVIL-2 The resident engineer shall, if appropriate, stop all earthwork and construction in the affected areas when the responsible soils engineer, geotechnical engineer, or the civil engineer experienced and knowledgeable in the practice of soils engineering identifies unforeseen adverse soil or geologic conditions. The project owner shall submit modified plans, specifications, and calculations to the CBO based on these new conditions. The project owner shall obtain approval from the CBO before resuming earthwork and construction in the affected area [CBC, Section 104.2.4, Stop orders].

Verification: The project owner shall notify the CPM within 24 hours, when earthwork and construction is stopped as a result of unforeseen adverse geologic/soil conditions. Within 24 hours of the CBO's approval to resume earthwork and

construction in the affected areas, the project owner shall provide to the CPM a copy of the CBO's approval.

CIVIL-3 The project owner shall perform inspections in accordance with the currently applicable edition of the CBC, Chapter 1, Section 108, Inspections; Chapter 17, Section 1701.6, Continuous and Periodic Special Inspection; and Appendix Chapter 33, Section 3317, Grading Inspection. All plant site-grading operations, for which a grading permit is required, shall be subject to inspection by the CBO.

If, in the course of inspection, it is discovered that the work is not being performed in accordance with the approved plans, the discrepancies shall be reported immediately to the resident engineer, the CBO and the CPM [CBC, Appendix Chapter 33, Section 3317.7, Notification of Noncompliance]. The project owner shall prepare a written report, with copies to the CBO and the CPM, detailing all discrepancies, non-compliance items, and the proposed corrective action.

Verification: Within five days of the discovery of any discrepancies, the resident engineer shall transmit to the CBO and the CPM a Non-Conformance Report (NCR) and the proposed corrective action. 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 [CBC, Section 109, Certificate of Occupancy].

Verification: Within 30 days of the completion of the erosion and sediment control mitigation and drainage facilities, the project owner shall submit to the CBO the responsible civil engineer's signed statement that the installation of the facilities and all erosion control measures were completed in accordance with the final approved combined grading plans, and that the facilities are adequate for their intended purposes. The project owner shall submit a copy of this report to the CPM in the next Monthly Compliance Report.

STRUC-1 Prior to the start of any increment of construction of any major structure or component listed in **Facility Design Table 1** of Condition of Certification **GEN-2**, above, the project owner shall submit to the CBO for design review and approval the proposed lateral force procedures for project structures and the applicable designs, plans and drawings for project structures. Proposed lateral force procedures, designs, plans and drawings shall be those for the following items (from **Facility Design Table 1**, above):

1. Major project structures;

2. Major foundations, equipment supports and anchorage;
3. Large field fabricated tanks;
4. Turbine/generator pedestal; and
5. Switchyard structures.

Construction of any structure or component shall not commence until the CBO has approved the lateral force procedures to be employed in designing that structure or component.

The project owner shall:

1. Obtain approval from the CBO of lateral force procedures proposed for project structures;
2. Obtain approval from the CBO for the final design plans, specifications, calculations, soils reports, and applicable quality control procedures. If there are conflicting requirements, the more stringent shall govern (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 [CBC, Section 108.4, Approval Required];
3. Submit to the CBO the required number of copies of the structural plans, specifications, calculations, and other required documents of the designated major structures at least 60 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of on-site fabrication and installation of each structure, equipment support, or foundation [CBC, Section 106.4.2, Retention of plans; and Section 106.3.2, Submittal documents]; and
4. Ensure that the final plans, calculations, and specifications clearly reflect the inclusion of approved criteria, assumptions, and methods used to develop the design. The final designs, plans, calculations, and specifications shall be signed and stamped by the responsible design engineer [CBC, Section 106.3.4, Architect or Engineer of Record].

Verification: At least 30 days (or project owner and CBO approved alternative timeframe) prior to the start of any increment of construction of any structure or component listed in **Facility Design Table 1** of Condition of Certification **GEN-2** above, the project owner shall submit to the CBO, with a copy to the CPM, the responsible design engineer's signed statement that the final design plans, specifications, and calculations conform with all of the requirements set forth in the Energy Commission's Decision.

If the CBO discovers non-conformance with the stated requirements, the project owner shall resubmit the corrected plans to the CBO within 20 days of receipt of the non-conforming 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 engineering LORS.

STRUC-2 The project owner shall submit to the CBO the required number of sets of the following documents related to work that has undergone CBO design review and approval:

1. Concrete cylinder strength test reports (including date of testing, date sample taken, design concrete strength, tested cylinder strength, age of test, type and size of sample, location and quantity of concrete placement from which sample was taken, and mix design designation and parameters);
2. Concrete pour sign-off sheets;
3. Bolt torque inspection reports (including location of test, date, bolt size, and recorded torques);
4. Field weld inspection reports, including type of weld, location of weld, inspection of non-destructive testing (NDT) procedure and results, welder qualifications, certifications, qualified procedure description, or number (ref: AWS); and
5. Reports covering other structural activities requiring special inspections shall be in accordance with the currently applicable edition of the CBC, Chapter 17, Section 1701, Special Inspections; Section 1701.5, Type of Work (requiring special inspection); Section 1702, Structural Observation and Section 1703, Nondestructive Testing.

Verification: If a discrepancy is discovered in any of the above data, the project owner shall, within five days, prepare and submit an NCR describing the nature of the discrepancies to the CBO, with a copy of the transmittal letter to the CPM [CBC, Chapter 17, Section 1701.3, Duties and Responsibilities of the Special Inspector]. The NCR shall reference the Condition(s) of Certification and the applicable CBC chapter and section. Within five days of resolution of the NCR, the project owner shall submit a copy of the corrective action to the CBO and the CPM.

The project owner shall transmit a copy of the CBO's approval or disapproval of the corrective action to the CPM within 15 days. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action to obtain CBO's approval.

STRUC-3 The project owner shall submit to the CBO design changes to the final plans required by the CBC, Chapter 1, Section 106.3.2, Submittal documents and Section 106.3.3, Information on plans and specifications, including the revised drawings, specifications, calculations, and a complete description of, and supporting rationale for, the proposed changes, and shall give to the CBO prior notice of the intended filing.

Verification: On a schedule suitable to the CBO, the project owner shall notify the CBO of the intended filing of design changes, and shall submit the required number of sets of revised drawings and the required number of copies of the other above-mentioned documents to the CBO, with a copy of the transmittal letter to the CPM. The project owner shall notify the CPM, via the Monthly Compliance Report, when the CBO has approved the revised plans.

STRUC-4 Tanks and vessels containing quantities of toxic or hazardous materials exceeding amounts specified in Chapter 3, Table 3-E of the currently applicable edition of the CBC shall, at a minimum, be designed to comply with the requirements of this Chapter.

Verification: At least 30 days (or project owner and CBO approved alternate timeframe) prior to the start of installation of the tanks or vessels containing the above specified quantities of toxic or hazardous materials, the project owner shall submit to the CBO for design review and approval final design plans, specifications, and calculations, including a copy of the signed and stamped engineer's certification.

The project owner shall send copies of the CBO approvals of plan checks to the CPM in the following Monthly Compliance Report. The project owner shall also transmit a copy of the CBO's inspection approvals to the CPM in the Monthly Compliance Report following completion of any inspection.

MECH-1 The project owner shall submit, for CBO design review and approval, the proposed final design, specifications, and calculations for each plant major piping and plumbing system listed in **Facility Design Table 1**, Condition of Certification **GEN-2**, above. Physical layout drawings and drawings not related to code compliance and life safety need not be submitted. The submittal shall also include the applicable QA/QC procedures. Upon completion of construction of any such major piping or plumbing system, the project owner shall request the CBO's inspection approval of said construction [CBC, Section 106.3.2, Submittal Documents; Section 108.3, Inspection Requests; Section 108.4, Approval Required; California Plumbing Code, Section 103.5.4, Inspection Request; Section 301.1.1, Approval].

The responsible mechanical engineer shall stamp and sign all plans, drawings and calculations for the major piping and plumbing systems subject to the CBO design review and approval, and submit a signed statement to the CBO when the said proposed piping and plumbing systems have been designed, fabricated, and installed in accordance with all of the applicable laws, ordinances, regulations, and industry standards [Section 106.3.4, Architect or Engineer of Record], which may include, but not be limited to:

- American National Standards Institute (ANSI) B31.1 (Power Piping Code);
- ANSI B31.2 (Fuel Gas Piping Code);
- ANSI B31.3 (Chemical Plant and Petroleum Refinery Piping Code);
- ANSI B31.8 (Gas Transmission and Distribution Piping Code);

- Title 24, California Code of Regulations, Part 5 (California Plumbing Code);
- Title 24, California Code of Regulations, Part 6 (California Energy Code, for building energy conservation systems and temperature control and ventilation systems);
- Title 24, California Code of Regulations, Part 2 (California Building Code); and
- Specific County (local) code.

The CBO may deputize inspectors to carry out the functions of the code enforcement agency [CBC, Section 104.2.2, Deputies].

Verification: At least 30 days (or project owner and CBO approved alternative timeframe) prior to the start of any increment of major piping or plumbing construction listed in **Facility Design Table 1**, Condition of Certification **GEN-2** above, the project owner shall submit to the CBO for design review and approval the final plans, specifications, and calculations, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with the applicable LORS, and shall send the CPM a copy of the transmittal letter in the next Monthly Compliance Report.

The project owner shall transmit to the CPM, in the Monthly Compliance Report following completion of any inspection, a copy of the transmittal letter conveying the CBO's inspection approvals.

MECH-2 For all pressure vessels installed in the plant, the project owner shall submit to the CBO and California Occupational Safety and Health Administration (Cal-OSHA), prior to operation, the code certification papers and other documents required by 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 [CBC, Section 108.3, Inspection Requests].

The project owner shall:

1. Ensure that all boilers and fired and unfired pressure vessels are designed, fabricated, and installed in accordance with the appropriate section of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, or other applicable code. Vendor certification, with identification of applicable code, shall be submitted for prefabricated vessels and tanks; and
2. Have the responsible design engineer submit a statement to the CBO that the proposed final design plans, specifications, and calculations conform to all of the requirements set forth in the appropriate ASME Boiler and Pressure Vessel Code or other applicable codes.

Verification: At least 30 days (or project owner and CBO approved alternative timeframe) prior to the start of on-site fabrication or installation of any pressure vessel, the project owner shall submit to the CBO for design review and approval, the above

listed documents, including a copy of the signed and stamped engineer's certification, with a copy of the transmittal letter to the CPM.

The project owner shall transmit to the CPM, in the Monthly Compliance Report following completion of any inspection, a copy of the transmittal letter conveying the CBO's and/or Cal-OSHA inspection approvals.

MECH-3 The project owner shall submit to the CBO for design review and approval the design plans, specifications, calculations, and quality control procedures for any heating, ventilating, air conditioning (HVAC) or refrigeration system. Packaged HVAC systems, where used, shall be identified with the appropriate manufacturer's data sheets.

The project owner shall design and install all HVAC and refrigeration systems within buildings and related structures in accordance with the CBC and other applicable codes. Upon completion of any increment of construction, the project owner shall request the CBO's inspection and approval of 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 [CBC, Section 108.7, Other Inspections; Section 106.3.4, Architect or Engineer of Record].

Verification: At least 30 days (or project owner and CBO approved alternative timeframe) prior to the start of construction of any HVAC or refrigeration system, the project owner shall submit to the CBO the required HVAC and refrigeration calculations, plans, and specifications, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with the CBC and other applicable codes, with a copy of the transmittal letter to the CPM.

ELEC-1 Prior to the start of any increment of electrical construction for electrical equipment and systems 480 volts and higher, listed below, with the exception of underground duct work and any physical layout drawings and drawings not related to code compliance and life safety, the project owner shall submit, for CBO design review and approval, the proposed final design, specifications, and calculations [CBC, Section 106.3.2, Submittal documents]. Upon approval, the above listed plans, together with design changes and design change notices, shall remain on the site or at another accessible location for the operating life of the project. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS [CBC, Section 108.4, Approval Required, and Section 108.3, Inspection Requests]. All transmission facilities (lines, switchyards, switching stations, and substations) Conditions of Certification are addressed in the **Transmission System Engineering** section of this document.

A. Final plant design plans to include:

1. one-line diagrams for the 13.8 kV, 4.16 kV and 480 V systems; and
2. system grounding drawings.

B. Final plant calculations 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; and
7. lighting energy calculations.

C. The following activities shall be reported to the CPM in the Monthly Compliance Report:

1. Receipt or delay of major electrical equipment;
2. Testing or energization of major electrical equipment; and
3. A signed statement by the registered electrical engineer certifying that the proposed final design plans and specifications conform to requirements set forth in the Energy Commission Decision.

Verification: At least 30 days (or project owner and CBO approved alternative timeframe) prior to the start of each increment of electrical construction, the project owner shall submit to the CBO for design review and approval the above listed documents. The project owner shall include in this submittal a copy of the signed and stamped statement from the responsible electrical engineer attesting compliance with the applicable LORS, and shall send the CPM a copy of the transmittal letter in the next Monthly Compliance Report.

REFERENCES

CEC (California Energy Commission) 2002q. Report of conversation between Kristy Chew, CEC, and Kevin Hudson and Joseph Pennington, SMUD, regarding Winters compressor station. July 11, 2002. Docket date July 12, 2002.

SMUD 2001 a. Application for Certification for Cosumnes Power Plant Project Volume 1 and 2 (01-AFC-19). Submitted to the California Energy Commission on September 13, 2001.

SMUD (Sacramento Municipal Utility District) 2002aa. Informal Data Response, Set 2. July 01, 2002. Docket date July 02, 2002.

GEOLOGY, MINERAL RESOURCES, AND PALEONTOLOGY

Testimony of Janine W. Band, Ph.D., R.G.

INTRODUCTION

In this section, staff discusses the setting of the Sacramento Municipal Utility District's (SMUD) Cosumnes Power Plant (CPP) project (Phase 1 and Phase 2) and its potential impacts regarding geological hazards and geological (including mineral) and paleontological resources. The purpose of this analysis is to verify that the applicable laws, ordinances, regulations, and standards (LORS) have been identified and that the project can be designed and constructed in accordance with all applicable LORS, and in a manner that protects environmental quality and assures public health and safety. Energy Commission staff's objective is to ensure that there would be no significant adverse impacts to significant geological and paleontological resources during project construction, operation, and closure. The section concludes with staff's proposed monitoring and mitigation measures with respect to geological hazards and geological and paleontological resources.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The applicable LORS are listed in the Application for Certification (AFC), in Sections 8.15.2 (Geological Hazards), 8.16.2 (Paleontology), (SMUD 2001a, §8.15.2 and 8.16.2). A brief description of the LORS for geological hazards and mineralogical and paleontological resources follows.

FEDERAL

There are no applicable federal LORS for geological hazards and resources, or grading and erosion control for the proposed project.

STATE AND LOCAL

The California Building Code (CBC) 1998 edition is based upon the Uniform Building Code (UBC), 1997 edition, which was published by the International Conference of Building Officials. The CBC is a series of standards that are used for investigation, design (Chapters 16 and 18) and construction (including grading and erosion control as found in Appendix Chapter 33). The CBC supplements the UBC's grading and construction ordinances and regulations.

The California Environmental Quality Act (CEQA) Guidelines (Cal. Code Regs., title 14, Appendix G), provides a checklist of questions that a lead agency should normally address if relevant to a project's environmental impacts.

- Section (V) (c) asks if the project will directly or indirectly destroy a unique paleontological resource or site or unique geological feature.
- Section (VI) (a), (b), (c), (d), and (e) pose questions that are focused on whether or not the project would expose persons or structures to geological hazards.

- Section (X) (a) and (b) pose questions about the project's effect on mineral resources.
- Section 15064.5 (a)(3)(D) indicates "generally, a resource shall be considered historically significant if it has yielded, or may be likely to yield, information important in prehistory or history."

Further guidelines for the assessment and mitigation of paleontological resources are provided in the *Standard Procedures, Measures for Assessment and Mitigation of Adverse Impacts to Non-renewable Paleontologic Resources* (SVP, 1995). They were adopted in October 1994 by a national organization of vertebrate paleontologists (the Society of Vertebrate Paleontologists).

SETTING

The CPP is a proposed 1,000-megawatt (two 500 megawatt phases) combined-cycle generation, combustion turbine facility to be located on about 30 acres, about ½-mile south of the closed Rancho Seco Nuclear Plant and north of Clay East Road. Please see the **Project Description** section of this Final Staff Assessment for more information about components of the project.

The CPP facility is located along the eastern margin of the Central Valley, at an average elevation of 150 feet. The foothills of the Sierra Nevada begin about 6 miles to the east, while the low mountains of the Coast Ranges lie 40 to 80 miles to the west. The site is well above the floodplain of the major rivers. The site is underlain by consolidated silt, sand, and gravel of the alluvial deposits of the Laguna Formation, and is blanketed by arkosic, gravelly alluvium of the Modesto-Riverbank Formation that occupies the broad, shallow valley of Clay Creek (Wagner, et al., 1981). Clay Creek is an ephemeral (seasonal) stream that crosses north of the CPP site, draining to the west. Several ephemeral streams occupy shallow swales that drain north into Clay Creek; these unnamed streams include what have been termed the "east swale" and the "west swale" of the temporary construction laydown area south of Clay East Road as described in AFC Supplement D (SMUD 2002ax, p. 1-2, Figure 2). The east swale drains north along the east side of the project site north of Clay East Road, and joins Clay Creek near the northern margin of the proposed site. The small swales, as well as the larger one occupied by Clay Creek currently support vernal pools as observed during the site visit of January 23, 2002. The channel of Clay Creek has been modified where the access road between Clay East Road and Rancho Seco Nuclear Plant crosses it.

Rancho Seco Reservoir, an earthen dam reservoir built for storage of emergency cooling water for the Rancho Seco Nuclear Plant is located 1.2 miles east of the proposed site.

IMPACTS

There are two types of impacts considered in this section. The first type of impacts are geologic hazards that could impact proper functioning of the proposed facility and include faulting and seismicity, liquefaction, dynamic compaction, hydrocompaction,

subsidence, expansive soils, landslides, and tsunamis and seiches. The second are impacts the proposed facility could have on existing geologic, mineralogic, and paleonotologic resources in the area.

STAFF'S CRITERIA FOR DETERMINING IMPACT SIGNIFICANCE

There are no federal LORS with respect to geologic hazards and geologic and mineralogic resources; however, the CBC provides geotechnical and geological investigation and design guidelines which engineers must adhere to when designing a proposed facility. As a result, assessing geologic hazard impact significance includes evaluating each potential hazard in relation to being able to adequately design and construct the proposed facility.

With respect to impacts the proposed facility may have on existing geologic and mineralogic resources, geologic and mineral resource maps for the surrounding area are reviewed, in addition to any site-specific information provided by SMUD, to determine if geologic and mineralogic resources are present in the area. If present, construction and operation procedures of the proposed facility, in particular mass grading operations, are reviewed to determine if such operations could adversely impact such resources.

Based on CEQA Guidelines, staff reviews existing paleontologic information for the surrounding area, as well as any site-specific information provided by SMUD, in accordance with accepted assessment protocol (SVP, 1995) to determine if there are any known paleontologic resources in the general area. If any resources are present or likely to exist, staff recommends adoption of Conditions of Certification, which outline procedures required during construction to mitigate impacts to potential resources.

GEOLOGICAL HAZARDS

Faulting and Seismicity

Energy Commission staff reviewed the following publications of the California Division of Mines and Geology (CDMG): *Fault Activity Map of California and Adjacent Areas with Locations and Ages of Recent Volcanic Eruptions* (CDMG, 1994); *Geologic Map of California – Sacramento Sheet* (Wagner et al., 1981); *Probabilistic Seismic Hazard Map for California*, (CDMG, 1996); and *Seismic Shaking Hazard Maps of California, Map Sheet 48* (CDMG, 1999a). No active or potentially active faults are known to cross the power plant footprint or the associated linears. The project is located within Seismic Zone 3 as delineated on Figure 16-2 of the 1998 edition of the CBC. The closest known faults are those of the Foothills Fault System, located between 11 and 15 miles east and north of the project site. Together, the various faults of the Foothills system are 174 miles long, trending north to northwest. They separate several bedrock groups in the eastern Sierra with nearly vertical faults. In the vicinity of the CPP site, the faults are considered to be inactive, though 40 miles north, in Auburn, more recent fault activity (described as possibly Holocene) has been noted, (Mualchin, 1996).

The nearest known active faults are those associated with the San Andreas Fault system: the Greenville (53 miles west), Concord (58 miles west), Calaveras (65 miles west), Hayward (71 miles west), and the San Andreas proper (90 miles west). These

are all active, nearly vertical strike-slip faults associated with a plate boundary of the Pacific and North American Plates. Blind thrust faults along the Coast Range-Central Valley margin lie 44 to 62 miles west and southwest of the site. The thrust faults are poorly characterized, but in places have been described as west-dipping faults that allow displacement of western rocks toward the east. The primary surface expressions of these faults are anticlinal folds lying east of the front range of the Coast Ranges.

On January 23, 2002 Energy Commission staff visited the project location and did not observe any evidence of surface faulting. Previous investigations at the site (performed near the Rancho Seco Nuclear Plant) found no faults crossing the CPP site (EGC, 1993). The potential of surface rupture on a fault at the power plant footprint is considered to be very low, since no active faults are known to have ruptured the ground surface of the project site, no geomorphic evidence of ancient faults is recognized, and no microseismicity is known at the site (CDMG references listed above). No identified faults are mapped along the water, gas or transmission lines; thus, risk of fault rupture along these linears is also low.

SMUD refers to the CDMG report of Mualchin (1996) to characterize likely ground-shaking due to an earthquake. Mualchin estimates a magnitude 6.5 earthquake along the Foothills fault system would cause peak ground acceleration of up to 0.2 to 0.3g (gravity) near the site. These values are higher than those shown on the CDMG *Map Sheet 48* (CDMG, 1999a), which predicts a peak ground acceleration with a 10 percent chance of exceedance in 50 years of between 0.10 and 0.20g for the project area.

The seismic design criteria specified in the AFC simply identify the UBC sections that would be used when designing buildings and structures (UBC Section 10B3.6.1), (SMUD, 2001a, §8.15.2 and 8.16.2). Design and construction of the project should conform to the California Building Code (1998) requirements outlined in **Conditions of Certification GEN-1, GEN-5,** and **CIVIL-1** under **Facility Design** would reduce the impact of strong seismic ground shaking to less than significant.

Rancho Seco Reservoir is a small reservoir located 1.2 miles upstream of the CPP site, on Clay Creek. The reservoir has a maximum capacity of 2,850 acre-feet. The maximum dam height is approximately 60 feet, total length is 1,800 feet, and crest width is 28 feet. The side slopes were constructed at a 4:1 slope. The reservoir was designed to supply cooling water and fire-flow water to the Rancho Seco Nuclear Plant in the event of an emergency such as a loss-of-coolant accident, fire, or other emergency, including one resulting from a seismic event. The reservoir and dam were analyzed prior to its construction and approved by the Nuclear Regulatory Commission for the intended purposes (SMUD 2002a, Data Response 54). The dam is under the jurisdiction of the State of California, Division of Dam Safety, and as such, is designed and constructed to standards established by the State of California, which include consideration for earthquake and extreme flood.

SMUD indicates that the effects on the CPP from a dam failure or other sudden release of water have been investigated. An instantaneous break 50 feet wide and the full height of the dam occurring simultaneously with the peak flow from a design storm would not flood the CPP site. The top of the engineered construction pad is 150 feet

above mean sea level, as shown in Revised Informal Data Response Set 13 Sheets 1, 2 and 3 (SMUD 2003d).

Staff consulted with the Department of Water Resources' Division of Safety of Dams (DSOD) Engineer for Area 5 of the Central Region regarding the Rancho Seco Reservoir Dam. The most recent dam inspection report (dated January 12, 2002) indicated, "the dam, reservoir, and the appurtenances are judged satisfactory for continued use" (DWR-DSOD 2002). A complete dam appraisal was performed in 1986; no safety issues were identified at that time. The dam was built to code in 1972 and has been under DSOD jurisdiction since (SMUD 2002a, Data Response 54). Based on this information, and the fact that the design peak ground accelerations at this site are relatively low (0.2 g to 0.3 g), staff concludes the dam is unlikely to fail during the design earthquake, and the CPP site is at low risk of flooding from dam failure.

Liquefaction, Subsidence, and Expansive Soils

Liquefaction is a condition in which a cohesionless soil loses its shear strength due to a sudden increase in pore water pressure. The soils most prone to liquefaction during earthquakes are fine-grained, poorly graded, saturated sands and silts. CDMG (1997) states that if depth to groundwater is greater than 50 feet, and groundwater is not expected to become shallower, then the soils generally do not constitute a liquefaction hazard that would require mitigation.

The subsurface investigations of the geotechnical report included in Appendix 8.15A of the AFC were not performed at the CPP site, but 0.6 miles to the north at the Rancho Seco site (EGC, 1993). The subsurface conditions at the CPP site are likely to be different and, prior to construction; a new geotechnical and soils investigation should be performed at the CPP site per the Conditions of Certification **CIVIL-1** under **Facility Design**.

The previous investigation (0.6 miles north of the CPP site), found the groundwater to be about 150 feet below the surface. Also, most of the boreholes drilled to as much as 75 feet were dry when drilled in the spring of 1993 (when ground water would be expected to be rather high). This indicates the soils and sediments occurring in the vicinity of the CPP site are generally well drained, with groundwater levels significantly deeper than 50 feet – the threshold depth of liquefaction in unconsolidated materials. Therefore, staff's assessment is that the potential for liquefaction is low.

The potential impact of subsidence was not considered in the geotechnical report of 1993. Subsidence is the process of the loss of soil and alluvium volume upon the application or removal of water. Subsidence can occur where the water table is lowered through overly aggressive groundwater pumping, usually associated with agricultural wells. No large-scale agricultural pumps are active in the vicinity of the CPP site (DWR website, 2002). Also, the soils and sediment at the site are dense and relatively dry (ECG, 1993) so that the potential for subsidence is considered to be low. The potential for damage to the project linears from local subsidence is unknown and should be addressed in the geotechnical report as required in **Conditions of Certification GEN-5 and CIVIL-1** under **Facility Design**.

Soils that contain a high percentage of expansive clay minerals are prone to expansion if subjected to an increase in water content. Expansive soils are usually measured with an index test such as the expansive index potential. In order for a soil to be a candidate for testing, the soil must have a high clay content and the clay must have a high shrink-swell potential and a high plasticity index. Based on descriptions of two borings (EGC, 1993), sands, silts, and clays, with minor amounts of gravel are present to depths of 75 feet below the ground surface. Clay expansivity was not measured or discussed in the ECG report. Consequently, the potential for damage to the project facilities from expansive soils is incompletely characterized at this time, especially for the linears. Further investigation of the location, depth, and thickness of expansive soils at the CPP site should be considered before final design (see **GEN-5** under **Facility Design**).

Tsunami, Seiche

Earthquakes or undersea landslides can trigger seismic waves or tsunamis that can affect coastal areas. The site is not in an area that is subject to tsunamis. Earthquakes are also known to cause seiches, oscillating waves in a lake or bay that can cause damage to nearby low-lying development. The Rancho Seco Reservoir located upstream from the CPP site is not likely to produce seiche waves due to the small size and to the distance from major seismic sources.

Slope Failures

The potential for slope failures at the power plant site is considered to be low. The project is located on well-drained alluvium that has a slope of between 1 and 2 percent, and there are no significant slopes adjacent to the site. The ”east swale” that drains to Clay Creek on the east side of the CPP site would be relocated several tens of feet to the north, allowing the site to be built up at the northern edge. If not adequately engineered, this fill may have some potential to slump or settle. Close adherence to the soils engineering portions of the CBC (see **GEN-1** under **Facility Design**) would ensure that the engineered fill and banks would perform properly. The banks of all the ephemeral streams and swales are not likely to be potential locations of failure as they have very low slopes.

GEOLOGICAL, MINERALOGICAL, AND PALEONTOLOGICAL RESOURCES

The only potential geological and mineral resources on the site are placer gold, a potential aggregate source, and natural gas from the subsurface (CDMG, 1999). Dredge tailings east of the CPP site indicate that Clay Creek has been explored for placer gold in the past; the works have since been abandoned.

The mineral resources map of Sacramento County showed the CPP site zoned as MRZ-3, indicating the area is known to have aggregate resources but the significance of the resources has not been determined (CDMG, 1999). Loss of potential aggregate resources at the site in not considered a significant impact because the resource is publicly owned by SMUD and they are not required by law to recover aggregate resources. Additional lands in the general region have similar aggregate resources and may support aggregate resource recovery, if pursued by the property owner. Furthermore, the aggregate resources located on the project site may still be available for recovery once the project site is closed.

Natural gas is produced in the central and western parts of the Central Valley. The Galt and Lodi gas fields are located 8 to 10 miles south-southwest of the CPP site (DOGGR, 2002). Deposits from which gas is produced are not present or are too thin to be economic under the proposed CPP site as demonstrated by the presence of four plugged and abandoned dry wildcat wells just west of the town of Clay (DOGGR, 2002). No other significant mineralogical resources are known to exist in the project area.

SMUD (2001a, § 8.16.3) presented a thorough review of the geological units and the potential paleontological resources that underlie the proposed CPP site. The paleontological assessment included both an archival record search from the University of California, Berkeley, Museum of Paleontology and field surveys of the project site by qualified paleontologists in April and July of 2001 (SMUD 2001e; Fisk, 2001, respectively). The paleontologist's report is largely repeated in the AFC as Section 8.16, the other report was submitted as the confidential paleontology report (SMUD 2001e).

The archival search revealed no previously recorded fossil localities in the immediate project area. However, the Tertiary and Quaternary formations that underlie the CPP site are known to contain land mammal fossils in other locations (SMUD 2001a, § 8.16.3.7). Land mammal fossils are deemed scientifically and paleontologically important and significant according to SVP (1995) criteria. During the field survey, the paleontologist found fossil remains at several locations at and in the vicinity of the proposed project site. The paleontologist concluded that the stratigraphic units present at the CPP site all qualify as high sensitivity and that there is a high potential for finding fossil remains similar to those found in the vicinity at other established fossil sites (SMUD 2001a, § 8.16.3.7.4).

The following fossiliferous units are known to be present at the CPP site (SMUD 2001a, § 8.16.3.7):

- Laguna Formation (Pliocene age) – high sensitivity, potential for scientifically important and significant finds during construction.
- Riverbank Formation (Pleistocene age) - known to contain fossil vertebrates; high sensitivity, high probability of adverse impacts on paleontological resources resulting from ground disturbance during construction.
- Modesto Formation (Pleistocene to Holocene age) – high sensitivity.

The proposed CPP site and the proposed natural gas supply line both traverse units designated as having a high paleontologic sensitivity. Proposed mitigation measures include paleontological resource monitoring during any project-related ground-disturbing activity, emergency discovery procedures, sampling and data recovery, museum storage of collected specimens or data, pre-construction coordination, and reports. A plan for monitoring and collecting should be developed and presented as the Paleontologic Resource Monitoring and Mitigation Plan (PRMMP). Paleontological **Conditions of Certification PAL-1** through **PAL-7** would mitigate any potential impacts to less than significant levels.

SITE SPECIFIC IMPACTS

Excavations, drilling, clearing and brushing operations, and grading of the fill and alluvium at the CPP site associated with construction of the project are considered to present a potential impact to paleontological resources. The site was deemed paleontologically highly sensitive by the consulting paleontologist (SMUD 2001a, §8.16.3; Fisk 2001). Monitoring of excavations during project construction may reveal paleontological resources through discovery of fossils that would not have been normally exposed. The adoption and implementation of the proposed **Conditions of Certification PAL-1** through **PAL-7** should mitigate any potential adverse impacts to paleontological resources, should such resources be encountered during construction of the project and associated linear facilities.

No known geological, mineralogical, or paleontological resources would be significantly impacted by the construction and operation of the proposed project.

CUMULATIVE IMPACTS

It is staff's opinion that the potential for significant adverse cumulative impacts on paleontological resources or geological resources is low if the CPP is constructed in accordance with the proposed conditions of certification. This opinion is based on the fact that the site is not known to have significant geological or mineralogical resources and adequate procedures would be in place to recover significant fossils if and when they are found with the adoption of staff's proposed conditions.

There are no geological hazards at or in the vicinity of the CPP site; therefore, the construction of the CPP project would not result in a cumulative impact to the region with respect to geological hazards.

FACILITY CLOSURE

A definition and general approach to closure is presented in the **General Conditions** section of this document. Facility closure activities are not anticipated to impact geological or paleontological resources. This is due to the fact that no significant geological resources are known to exist at the power plant site and that closure would not involve additional ground disturbance that would impact paleontological resources.

CONCLUSION AND RECOMMENDATIONS

Based upon the literature and archives search, field surveys, known vertebrate fossils in the area, and the preliminary geotechnical investigation for the project, Energy Commission staff believes that there is a high probability that vertebrate fossils could be encountered during construction of the project. Therefore, staff recommends monitoring and mitigation measures outlined in the **Conditions of Certification PAL-1** through **PAL-7** be followed during the construction of the power plant and related facilities to preserve this resource. These measures will ensure that any impacts are mitigated to a level that is not significant.

Conditions of Certification will allow the Energy Commission Compliance Project Manager (CPM) to ensure compliance with LORS applicable to geological hazards and geological, mineralogical, and paleontological resources for the project. Because the applicant is likely able to comply with applicable LORS, the project should have no adverse impact with respect to geological, mineralogical, and paleontological resources. Similarly, the impacts of the geologic hazards on project facilities should be less than significant, if the design and construction of all project facilities complies with the applicable LORS.

PROPOSED CONDITIONS OF CERTIFICATION

General Conditions of Certification with respect to Geology are covered under Conditions of Certification **GEN-1, GEN-5**, and **CIVIL-1** in the **Facility Design** section. Conditions of Certification for Paleontology are as follows:

PAL-1 The project owner shall provide the CPM with the résumé and qualifications of its Paleontological Resource Specialist (PRS) for review and approval. If the approved PRS is replaced prior to completion of project mitigation and submittal of the Paleontological Resources Report, the project owner shall obtain CPM approval of the replacement PRS. The project owner shall submit to the CPM to keep on file, résumés of the qualified Paleontological Resource Monitors (PRMs). If a PRM is replaced, the résumé of the replacement PRM shall also be provided to the CPM.

The PRS résumé shall include the names and phone numbers of references. The résumé shall also demonstrate to the satisfaction of the CPM, the appropriate education and experience to accomplish the required paleontological resource tasks.

As determined by the CPM, the PRS shall meet the minimum qualifications for a vertebrate paleontologist as described in the Society of Vertebrate Paleontologists (SVP) guidelines of 1995. The experience of the PRS shall include the following:

1. institutional affiliations or appropriate credentials and college degree;
2. ability to recognize and collect fossils in the field;
3. local geological and biostratigraphic expertise;
4. proficiency in identifying vertebrate and invertebrate fossils; and
5. at least three years of paleontological resource mitigation and field experience in California, and at least one year of experience leading paleontological resource mitigation and field activities.

The project owner shall ensure that the PRS obtains qualified PRMs to monitor as he or she deems necessary on the project. PRMs shall have the equivalent of the following qualifications:

1. BS or BA degree in geology or paleontology and one year experience monitoring in California; or
2. AS or AA in geology, paleontology or biology and four years experience monitoring in California; or
3. Enrollment in upper division classes pursuing a degree in the fields of geology or paleontology and two years of monitoring experience in California.

Verification: (1) At least 60 days prior to the start of ground disturbance, the project owner shall submit a résumé and statement of availability of its designated PRS for on-site work.

(2) At least 20 days prior to ground disturbance, the PRS or project owner shall provide a letter with résumés naming anticipated monitors for the project and stating that the identified monitors meet the minimum qualifications for paleontological resource monitoring required by the condition. If additional monitors are obtained during the project, the PRS shall provide additional letters and résumés to the CPM. The letter shall be provided to the CPM no later than one week prior to the monitor beginning on-site duties.

(3) Prior to the termination or release of a PRS, the project owner shall submit the résumé of the proposed new PRS to the CPM for review and approval.

PAL-2 The project owner shall provide to the PRS and the CPM, for approval, maps and drawings showing the footprint of the power plant, construction laydown areas and all related facilities. Maps shall identify all areas of the project where ground disturbance is anticipated. If the PRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the PRS and CPM. The site grading plan and the plan and profile drawings for the utility lines would normally be acceptable for this purpose. The plan drawings should show the location, depth, and extent of all ground disturbances and can be at a scale of 1 inch = 40 feet to 1 inch = 100 feet range. If the footprint of the power plant or linear facility changes, the project owner shall provide maps and drawings reflecting these changes to the PRS and CPM.

If construction of the project will proceed in phases, maps and drawings may be submitted prior to the start of each phase. A letter identifying the proposed schedule of each project phase shall be provided to the PRS and CPM. Prior to work commencing on affected phases, the project owner shall notify the PRS and CPM of any construction phase scheduling changes.

At a minimum, the project owner shall ensure that the PRS or PRM consults weekly with the project superintendent or construction field manager to confirm area(s) to be worked during the next week, until ground disturbance is completed.

Verification: (1) At least 30 days prior to the start of ground disturbance, the project owner shall provide the maps and drawings to the PRS and CPM.

(2) If there are changes to the footprint of the project, revised maps and drawings shall be provided to the PRS and CPM at least 15 days prior to the start of ground disturbance.

(3) If there are changes to the scheduling of the construction phases, the project owner shall submit a letter to the CPM within 5 days of identifying the changes.

PAL-3 The project owner shall ensure that the PRS prepares, and the project owner shall submit to the CPM for review and approval, a Paleontological Resources Monitoring and Mitigation Plan (PRMMP) to identify general and specific measures to minimize potential impacts to significant paleontological resources. Approval of the PRMMP by the CPM shall occur prior to any ground disturbance. The PRMMP shall function as the formal guide for monitoring, collecting and sampling activities and may be modified with CPM approval. This document shall be used as a basis for discussion in the event that on-site decisions or changes are proposed. Copies of the PRMMP shall reside with the PRS, each monitor, the project owner's on-site manager, and the CPM.

The PRMMP shall be developed in accordance with the guidelines of the Society of the Vertebrate Paleontologists (SVP, 1995) and shall include, but not be limited to, the following:

1. Assurance that the performance and sequence of project-related tasks, such as any literature searches, pre-construction surveys, worker environmental training, fieldwork, flagging or staking; construction monitoring; mapping and data recovery; fossil preparation and collection; identification and inventory; preparation of final reports; and transmittal of materials for curation will be performed according to the PRMMP procedures;
2. Identification of the person(s) expected to assist with each of the tasks identified within the PRMMP and the Conditions of Certification;
3. A thorough discussion of the anticipated geologic units expected to be encountered, the location and depth of the units relative to the project when known, and the known sensitivity of those units based on the occurrence of fossils either in that unit or in correlative units;
4. An explanation of why, how, and how much sampling is expected to take place and in what units. Include descriptions of different sampling procedures that shall be used for fine-grained and coarse-grained units;
5. A discussion of the locations where the monitoring of project construction activities is deemed necessary, and a proposed plan for the monitoring;
6. A discussion of the procedures to be followed in the event of a significant fossil discovery, halting construction, resuming construction, and how notifications will be performed;
7. A discussion of equipment and supplies necessary for collection of fossil materials and any specialized equipment needed to prepare, remove,

load, transport, and analyze large-sized fossils or extensive fossil deposits;

8. Procedures for inventory, preparation, and delivery for curation into a retrievable storage collection in a public repository or museum, which meets the Society of Vertebrate Paleontologists standards and requirements for the curation of paleontological resources;
9. Identification of the institution that has agreed to receive any data and fossil materials collected, requirements or specifications for materials delivered for curation and how they will be met, and the name and phone number of the contact person at the institution; and
10. A copy of the paleontological Conditions of Certification.

Verification: At least 30 days prior to ground disturbance, the project owner shall provide a copy of the PRMMP to the CPM. The PRMMP shall include an affidavit of authorship by the PRS, and acceptance of the PRMMP by the project owner evidenced by a signature.

PAL-4 Prior to ground disturbance and for the duration of construction, the project owner and the PRS shall prepare and conduct weekly CPM-approved training for all project managers, construction supervisors, and workers who are involved with or operate ground disturbing equipment or tools. Workers shall not excavate in sensitive units prior to receiving CPM-approved worker training. Worker training shall consist of an initial in-person PRS-directed training during the project kick-off for those mentioned above. Following initial training, a CPM-approved video or in-person training may be used for new employees. The training program may be combined with other training programs prepared for cultural and biological resources, hazardous materials, or any other areas of interest or concern.

The Worker Environmental Awareness Program (WEAP) shall address the potential to encounter paleontological resources in the field, the sensitivity and importance of these resources, and the legal obligations to preserve and protect such resources.

The training shall include:

1. A discussion of applicable laws and penalties under the law;
2. Good quality photographs or physical examples of vertebrate fossils shall be provided for project sites containing units of high paleontologic sensitivity;
3. Information that the PRS or PRM has the authority to halt or redirect construction in the event of a discovery or unanticipated impact to a paleontological resource;
4. Instruction that employees are to halt or redirect work in the vicinity of a find and to contact their supervisor and the PRS or PRM;

5. An informational brochure that identifies reporting procedures in the event of a discovery;

6. A Certification of Completion of WEAP form signed by each worker indicating that they have received the training; and

7. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

Verification: (1) At least 30 days prior to ground disturbance, the project owner shall submit the proposed WEAP including the brochure with the set of reporting procedures the workers are to follow.

(2) At least 30 days prior to ground disturbance, the project owner shall submit the script and final video to the CPM for approval if the project owner is planning on using a video for interim training.

(3) If the owner requests an alternate paleontological trainer, the résumé and qualifications of the trainer shall be submitted to the CPM for review and approval prior to installation of an alternate trainer. Alternate trainers shall not conduct training prior to CPM authorization.

(4) In the Monthly Compliance Report (MCR) the project owner shall provide copies of the WEAP Certification of Completion forms with the names of those trained and the trainer or type of training (in-person or video) offered that month. The Monthly Compliance Report shall also include a running total of all persons who have completed the training to date.

PAL-5 The project owner shall ensure that the PRS and PRM(s) monitor consistent with the PRMMP all construction-related grading, excavation, trenching, and augering in areas where potentially fossil-bearing materials have been identified, both at the site and along any constructed linear facilities associated with the project. In the event that the PRS determines full time monitoring is not necessary in locations that were identified as potentially fossil-bearing in the PRMMP, the project owner shall notify and seek the concurrence of the CPM.

The project owner shall ensure that the PRS and PRM(s) have the authority to halt or redirect construction if paleontological resources are encountered.

The project owner shall ensure that there is no interference with monitoring activities unless directed by the PRS. Monitoring activities shall be conducted as follows:

1. Any change of monitoring different from the accepted schedule presented in the PRMMP shall be proposed in a letter or email from the PRS and the project owner to the CPM prior to the change in monitoring. The letter or email shall include justification for the change in monitoring and submitted to the CPM for review and approval.

2. The project owner shall ensure that the PRM(s) keeps a daily log of monitoring of paleontological resource activities. The PRS may informally discuss paleontological resource monitoring and mitigation activities with the CPM at any time.

3. The project owner shall ensure that the PRS immediately notifies the CPM of any incidents of non-compliance with any paleontological resources conditions of certification. The PRS shall recommend corrective action to resolve the issues or achieve compliance with the Conditions of Certification.

4. For any significant paleontological resources encountered, either the project owner or the PRS shall notify the CPM immediately (no later than the following morning after the find, or Monday morning in the case of a weekend) of any halt of construction activities.

The project owner shall ensure that the PRS prepares a summary of the monitoring and other paleontological activities that will be placed in the Monthly Compliance Reports. The summary will include the name(s) of PRS or PRM(s) active during the month, general descriptions of training and monitored construction activities and general locations of excavations, grading, etc. A section of the report will include the geologic units or subunits encountered; descriptions of sampling within each unit; and a list of identified fossils. A final section of the report will address any issues or concerns about the project relating to paleontologic monitoring including any incidents of non-compliance and any changes to the monitoring plan that have been approved by the CPM. If no monitoring took place during the month, the project shall include an explanation in the summary as to why monitoring was not conducted.

Verification: The project owner shall ensure that the PRS submits the summary of monitoring and paleontological activities in the MCR. When feasible, the CPM shall be notified 10 days in advance of any proposed changes in monitoring different from the plan identified in the PRMMP. If there is an unforeseen change in monitoring, the notice shall be given as soon as possible prior to implementation of the change.

PAL-6 The project owner, through the designated PRS, shall ensure that all components of the PRMMP are adequately performed including collection of fossil materials, preparation for analysis, analysis of fossils, identification and inventory of fossils, the preparation of fossils for curation, and the delivery for curation of all significant paleontological resource materials encountered and collected during project construction.

Verification: The project owner shall maintain in their compliance file copies of signed contracts or agreements with the designated PRS and other qualified research specialists. The project owner shall maintain these files for a period of three years after completion and approval of the CPM-approved Paleontological Resources Report (PRR)(see **PAL-7**). The project owner shall be responsible to pay any curation fees charged by the museum for fossils collected and curated as a result of paleontological mitigation. A copy of the letter of transmittal submitting the fossils to the curating institution shall be provided to the CPM.

PAL-7 The project owner shall ensure preparation of a Paleontological Resources Report (PRR) by the designated PRS. The PRR shall be prepared following completion of the ground disturbing activities. The PRR shall include an analysis of the collected fossil materials and related information and submitted to the CPM for review and approval.

The report shall include, but is not limited to, a description and inventory of recovered fossil materials; a map showing the location of paleontological resources encountered; determinations of sensitivity and significance; and a statement by the PRS that project impacts to paleontological resources have been mitigated.

Verification: Within 90 days after completion of ground disturbing activities, including landscaping, the project owner shall submit the Paleontological Resources Report under confidential cover to the CPM.

REFERENCES

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Certification of Completion
Worker Environmental Awareness Program
Cosumnes Power Plant (Docket #01-AFC-19)

This is to certify these individuals have completed a mandatory California Energy Commission-approved Worker Environmental Awareness Program (WEAP). The WEAP includes pertinent information on Cultural, Paleontology and Biological Resources for all personnel (i.e., construction supervisors, crews and plant operators) working on-site or at related facilities. By signing below, the participant indicates that they understand and shall abide by the guidelines set forth in the Program materials. Include this completed form in the Monthly Compliance Report.

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Cul Trainer: _____ Signature:_____ Date: ___/___/____

PaleoTrainer: _____ Signature:_____ Date: ___/___/____

Bio Trainer: _____ Signature:_____ Date: ___/___/____

POWER PLANT EFFICIENCY

Testimony of Steve Baker and Kevin Robinson

INTRODUCTION

The Energy Commission is required to make a finding as to whether energy use by the Cosumnes Power Plant (CPP) would result in significant adverse impacts on the environment, as defined in the California Environmental Quality Act (CEQA). If the Energy Commission finds that the CPP's consumption of energy creates a significant adverse impact, it must determine whether there are any feasible mitigation measures that could eliminate or minimize the impacts. In this analysis, staff addresses the issue of inefficient and unnecessary consumption of energy.

In order to support the Energy Commission's findings, this analysis will:

- examine whether the facility will likely present any adverse impacts upon energy resources;
- examine whether these adverse impacts are significant; and if so,
- examine whether feasible mitigation measures exist that would eliminate the adverse impacts, or reduce them to a level of insignificance.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

FEDERAL

No federal laws apply to the efficiency of this project.

STATE

California Environmental Quality Act Guidelines

CEQA Guidelines state that the environmental analysis "…shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy" (Cal. Code Regs., tit. 14, § 15126.4(a)(1)). Appendix F of the Guidelines further suggests consideration of such factors as the project's energy requirements and energy use efficiency; its effects on local and regional energy supplies and energy resources; its requirements for additional energy supply capacity; its compliance with existing energy standards; and any alternatives that could reduce wasteful, inefficient and unnecessary consumption of energy (Cal. Code regs., tit. 14, § 15000 et seq., Appendix F).

LOCAL

No local or county ordinances apply to power plant efficiency.

SETTING

SMUD proposes to construct and operate the 1,000 MW (nominal gross output) combined cycle CPP to generate baseload and load following power, providing power to SMUD customers and selling energy via contract or on the spot power market (SMUD 2001a, AFC §§ 1.1, 2.1, 2.2.16, 9.5.1, 10.2.2). (Note that this nominal rating is based upon preliminary design information and generating equipment manufacturers' guarantees. The project's actual maximum generating capacity may differ from this figure.) The CPP would consist of two 500 MW phases. The first phase would consist of two General Electric (GE) Frame 7FA combustion gas turbines with evaporative cooling (SMUD 2002am), two multi-pressure heat recovery steam generators (HRSGs), and one three-pressure, reheat, condensing steam turbine generator, arranged in a two-on-one combined cycle train, totaling approximately 500 MW. The remaining 500 MW would be built at a later date with equivalent or better equipment. The remainder of this efficiency analysis will address the entire 1,000 MW project. The gas turbines and HRSGs would be equipped with dry low-NOx combustors and selective catalytic reduction to control air emissions (SMUD 2001a, AFC §§ 1.1, 2.1, 2.2.2, 2.2.3, 2.2.4.1, 2.4.2.1.1). Natural gas would be delivered from the existing Pacific Gas & Electric (PG&E) gas transmission Lines 400 and 401 via SMUD's existing Line 700 natural gas pipeline, and a new 26-mile segment of 24-inch diameter pipeline extending from Line 700's current terminus at the Carson Ice-Gen cogeneration plant to the CPP project site (SMUD 2001a, AFC §§ 1.1, 2.1, 2.4.3, 6.0, 6.1, 10.2.1).

ANALYSIS

ADVERSE IMPACTS ON ENERGY RESOURCES

The inefficient and unnecessary consumption of energy, in the form of non-renewable fuels such as natural gas and oil, constitutes an adverse environmental impact. An adverse impact can be considered significant if it results in:

- adverse effects on local and regional energy supplies and energy resources;
- a requirement for additional energy supply capacity;
- noncompliance with existing energy standards; or
- the wasteful, inefficient, and unnecessary consumption of fuel or energy.

Project Energy Requirements and Energy Use Efficiency

Any power plant large enough to fall under Energy Commission siting jurisdiction will consume large amounts of energy. Under normal conditions, the CPP would burn natural gas at a nominal rate of 6.8 billion Btu per hour, lower heating value (LHV) (SMUD 2002a, Data Response 153). This is a substantial rate of energy consumption, and holds the potential to impact energy supplies. Under expected project conditions, electricity would be generated at a full load efficiency of approximately 55.1 percent LHV with no duct burning (SMUD 2001a, AFC Figure 2.2-4). The average fuel

efficiency of a typical utility company baseload power plant is approximately 35 percent LHV.

Adverse Effects On Energy Supplies and Resources

Natural gas for the CPP would be supplied from the existing PG&E system via PG&E's Lines 400 and 401 near Winters, CA. Lines 400 and 401 are capable of providing the required quantity of gas to the CPP (SMUD 2001a, AFC §§ 1.1, 2.1, 2.4.3, 6.0, 10.2.1). Furthermore, the PG&E gas supply infrastructure is extensive, offering access to vast reserves of gas. This source represents far more gas than would be required for a project this size. It is therefore highly unlikely that the project could pose a substantial increase in demand for natural gas in California.

Additional Energy Supply Requirements

Natural gas fuel would be transported to the project from PG&E's existing lines 400 and 401 via SMUD's existing 51-mile, 20-inch diameter Line 700 gas pipeline that terminates at the Carson Ice-Gen cogeneration plant, then through a new 26-mile, 24-inch diameter pipeline to the CPP site (SMUD 2001a, AFC §§ 1.1, 2.1, 2.4.3, 6.0, 6.1, 10.2.1). In order to maintain adequate pressure in the SMUD-owned pipelines, gas compressor stations are required for operation of Phase 2 where Line 700 taps into the PG&E lines near Winters, and where the new line originates adjacent to the Carson Ice-Gen plant (SMUD 2002a, Data Response 89). This would provide an adequately reliable connection to the PG&E gas supply system. There is no real likelihood that the CPP would require the development of additional energy supply capacity.

Compliance With Energy Standards

No standards apply to the efficiency of the CPP or other non-cogeneration projects.

Alternatives to Reduce Wasteful, Inefficient and Unnecessary Energy Consumption

The CPP could be deemed to create significant adverse impacts on energy resources if alternatives existed that would reduce the project's use of fuel. Evaluation of alternatives to the project that could reduce wasteful, inefficient, or unnecessary energy consumption first requires examination of the project's energy consumption. Project fuel efficiency, and therefore its rate of energy consumption, is determined by the configuration of the power producing system and by the selection of equipment used to generate power.

Project Configuration

The CPP would be configured as a combined cycle power plant, in which electricity is generated by four gas turbines, and additionally by two reheat steam turbines that operate on heat energy recuperated from the gas turbines' exhaust (SMUD 2001a, AFC §§ 1.1, 2.1, 2.2.2, 9.4). By recovering this heat, which would otherwise be lost up the exhaust stacks, the efficiency of any combined cycle power plant is increased considerably from that of either gas turbines or steam turbines operating alone. Such a configuration is well suited to the large, steady loads met by a baseload plant, intended to supply energy efficiently for long periods of time.

The dual two-train gas turbine/HRSG configuration also allows for high efficiency during unit turndown because one gas turbine generator can be shut down, leaving one fully loaded, efficiently operating gas turbine generator instead of having two, each operating at an inefficient 50 percent load.

Equipment Selection

Modern gas turbines embody the most fuel-efficient electric generating technology available today. Currently available, large combustion turbine models can be grouped into three categories; conventional, advanced, and next generation. Advanced combustion turbines offer significant advantages for the CPP. Their higher firing temperatures offer higher efficiencies than conventional turbines. They offer proven technology with numerous installations and extensive run time in commercial operation. Emission levels are also proven, and guaranteed emission levels have been reduced based on operational experience and design optimization by the manufacturers. The F-class of advanced gas turbines to be employed in the CPP represent some of the most modern and efficient machines now available. The applicant proposes to employ four General Electric (GE) Frame 7FA gas turbine generators in dual two-on-one combined cycle power trains (SMUD 2001a, AFC §§ 1.1, 2.1, 2.2.2, 2.2.4, 9.4). This configuration is nominally rated at 1,060 MW and 56.5 percent efficiency LHV at ISO conditions (GTW 2000). The machines will be installed in two phases, each comprising one two-on-one combined cycle train. Plant efficiency will remain the same with either or both phases in operation.

One possible alternative machine is the Alstom Power ABB KA24, a gas turbine nominally rated at 260 MW with an identical efficiency rating of 56.5 percent LHV at ISO conditions (GTW 2000).

Another alternative is the Siemens-Westinghouse 501F, nominally rated in a dual two-on-one train combined cycle configuration at 1,100 MW and 55.8 percent efficiency LHV at ISO conditions (GTW 2000).

Any differences among the GE 7FA, ABB KA24, and W501F in actual operating efficiency are insignificant. Selecting among these machines is thus based on other factors, such as generating capacity, cost, commercial availability, and ability to meet air pollution limitations. The ABB machine, for instance, is available only in one-on-one power trains, with one gas turbine and one steam turbine paired on a single shaft, generating a nominal 260 MW. The GE and Siemens-Westinghouse machines, which can be configured more flexibly, offer an advantage.

Efficiency Of Alternatives To The Project

The project objectives include generation of baseload or load following electricity for SMUD's customers, with excess capacity to be sold via contract or on the spot market, as market conditions dictate (SMUD 2001a, AFC §§ 1.1, 2.2.16, 2.4.1, 9.5.1, 10.2.2, 10.3).

Alternative Generating Technologies

Alternative generating technologies for the CPP are considered in the AFC (SMUD 2001a, AFC §§ 1.4, 9.4, 9.5). Fossil fuels, nuclear, solar, biomass, hydroelectric, geothermal, municipal solid waste, ocean energy conversion and windpower are all considered. Given the project objectives, location, and air pollution control requirements, staff agrees with the applicant that only natural gas-burning technologies are feasible.

Natural Gas-Burning Technologies

Fuel consumption is one of the most important economic factors in selecting an electric generator; fuel typically accounts for over two-thirds of the total operating costs of a fossil-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 lowest available fuel costs, but at the same time sells for the lowest per-kilowatt capital cost.

One possible alternative to an F-class gas turbine is a next generation G-class machine, such as the Siemens-Westinghouse 501G gas turbine generator, which employs partial steam cooling to allow slightly higher temperatures, yielding rated efficiency of 58.0 percent (GTW 2000). The 501G is still relatively new; the first such machines began operation in April, 2001 at Lakeland (Florida) Electric and Water's McIntosh Power Plant, and at PG&E National Energy's Millennium project in Charlton, Massachusetts (GTW 2001). Given the minor efficiency improvement promised by the G-class turbine and the lack of a proven track record for the 501G, the applicant's decision to purchase F-class machines is a reasonable one.

Another possible alternative to the F-class advanced gas turbine is an H-class next generation machine with a claimed fuel efficiency of 60 percent LHV at ISO conditions. This high efficiency is achieved through a higher pressure ratio and higher firing temperature, made possible by cooling the initial turbine stages with steam instead of air. This first Frame 7H application is not expected to enter service until the end of 2002 at Sithe Energy's Heritage Station in Scriba, NY (ME 2002). Given the lack of proven performance, staff agrees with the applicant's decision to employ F-class machines.

Inlet Air Cooling

A further choice of alternatives involves the selection of gas turbine inlet air cooling methods. The two commonly used techniques are the evaporative cooler or fogger, and the chiller; both devices increase power output by cooling the gas turbine inlet air. A mechanical chiller can offer greater power output than the evaporative cooler on hot, humid days, but consumes electric power to operate its refrigeration process, thus slightly reducing overall net power output and, thus, overall efficiency. An absorption chiller uses less electric power, but necessitates the use of a substantial inventory of ammonia. An evaporative cooler or a fogger boosts power output best on dry days; it uses less electric power than a mechanical chiller, possibly yielding slightly higher operating efficiency. The difference in efficiency among these techniques is relatively insignificant.

The applicant proposes to employ evaporative cooling (SMUD 2002am). Given the climate at the project site and the relative lack of clear superiority of one system over the other, staff agrees that the applicant's approach would not yield significant adverse energy impacts.

In conclusion, the project configuration (combined cycle) and generating equipment ("F-class" gas turbines) chosen appear to represent the most efficient combination to satisfy the project objectives. There are no alternatives that could significantly reduce energy consumption.

CUMULATIVE IMPACTS

There are no nearby power plant projects that hold the potential for cumulative energy consumption impacts when aggregated with the project. Staff knows of no other projects that could result in cumulative energy impacts.

Staff believes that construction and operation of the project would not bring about indirect impacts, in the form of additional fuel consumption, that would not have occurred but for the project. The older, less efficient power plants consume more natural gas to operate than the new, more efficient plants such as the CPP. Since natural gas would be burned by the power plants that are most competitive on the spot market, the most efficient plants would likely run the most. The high efficiency of the proposed CPP should allow it to compete very favorably, running at a high capacity factor, replacing less efficient power generating plants in the market, and therefore not impacting or even reducing the cumulative amount of natural gas consumed for power generation.

FACILITY CLOSURE

Closure of the facility, whether planned or unplanned, would not influence, nor would it be influenced by, project efficiency. Any efficiency impacts due to closure of the project would be on the electric system as a whole. Yet the vast size of the electric system serving California, the number of generating plants offering to sell power into it, and the

existence of the California Independent System Operator to ensure the efficient management of the system, all lend assurance that closure of this facility would not produce significant adverse impacts on efficiency.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The project, if constructed and operated as proposed, would generate a nominal 1,000 MW of electric power at an overall project fuel efficiency of approximately 55.1 percent LHV. While it will consume substantial amounts of energy, it would do so in the most efficient manner practicable. It would not create significant adverse effects on energy supplies or resources, would not require additional sources of energy supply, and would not consume energy in a wasteful or inefficient manner. No energy standards apply to the project. Staff therefore concludes that the project would present no significant adverse impacts upon energy resources.

No cumulative impacts on energy resources are likely. Facility closure would not likely present significant impacts on electric system efficiency.

RECOMMENDATION

No Conditions of Certification are proposed.

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POWER PLANT RELIABILITY

Testimony of Steve Baker and Kevin Robinson

INTRODUCTION

In this analysis, Energy Commission staff addresses the reliability issues of the project by determining whether the Cosumnes Power Plant (CPP) is likely to be built in accordance with typical industry norms for reliability of power generation. Staff uses this level of reliability as a benchmark because it ensures that the resulting project would likely not degrade the overall reliability of the electric system it serves (see **Setting** below).

The scope of this power plant reliability analysis covers:

- equipment availability;
- plant maintainability;
- fuel and water availability; and
- power plant reliability in relation to natural hazards.

Staff examined the project design criteria to determine if the project is likely to be built in accordance with typical industry norms for reliability of power generation. While SMUD has predicted a 92 to 98 percent availability for the Cosumnes Power Plant Project (see below), staff uses the benchmark identified in the first paragraph, rather than SMUD's projection, to evaluate the project's reliability.

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 Energy Commission must make findings as to the manner in which the project is to be designed, sited, and operated to ensure safe and reliable operation (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 (see **Setting** below).

SETTING

In the regulated monopoly electric industry of past decades, the utility companies assured overall system reliability, in part, by maintaining a "reserve margin." This amounted to having on call, at all times, sufficient generating capacity, in the form of standby power plants, to quickly handle unexpected outages of generating or transmission facilities. The utilities generally maintained a seven- to ten-percent reserve margin, meaning that sufficient capacity was on call to quickly replace from

seven to ten percent of total system resources. This margin proved adequate, in part because of the reliability of the power plants that constituted the system.
In the current competitive electric power industry, the responsibility for maintaining system reliability falls largely to the California Independent System Operator (Cal-ISO), an entity that purchases, dispatches, and sells electric power throughout the state. How Cal-ISO will ensure system reliability is still being determined; protocols are being developed and put in place that will, it is anticipated, allow sufficient reliability to be maintained under the competitive market system. "Must-run" power purchase agreements and "participating generator" agreements are two mechanisms being employed to ensure an adequate supply of reliable power (Mavis 1998, pers. comm.).

The Cal-ISO also requires those power plants selling ancillary services, as well as those holding reliability must-run contracts, to fulfill certain requirements, including:

- filing periodic reports on plant reliability;
- reporting all outages and their causes; and
- scheduling all planned maintenance outages with the Cal-ISO (Detmers 1999, pers. comm.).

The Cal-ISO's mechanisms to ensure adequate power plant reliability apparently have been devised under the assumption that the individual power plants that compete to sell power into the system will each exhibit a level of reliability similar to that of power plants of past decades. However, there is cause to believe that, under free market competition, financial pressures on power plant owners to minimize capital outlays and maintenance expenditures may act to reduce the reliability of many power plants, both existing and newly constructed (McGraw-Hill 1994). It is possible that, if significant numbers of power plants 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 thoroughly 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 are accustomed.

SMUD proposes to operate the 1,000 MW (nominal output) Cosumnes Power Plant (CPP), providing power to SMUD's customers and selling excess energy via contract or on the spot power market (SMUD 2001a, AFC §§ 1.1, 2.1, 2.2.16, 9.5.1). The project is expected to operate at an overall availability in the range of 92 to 98 percent (SMUD 2001a, AFC §§ 2.2.2, 2.2.16, 2.4.1, 10.2.2), and at a capacity factor, over the life of the plant, of 92 percent of base load (SMUD 2001a, AFC § 10.3).

ANALYSIS

The availability factor for a power plant is the percentage of the time that it is available to generate power; both planned and unplanned outages subtract from its availability.

Measures of power plant reliability are based on its actual ability to generate power when it is considered available and are based on starting failures and unplanned, or forced, outages. For practical purposes, reliability can be considered a combination of these two industry measures, making a reliable power plant one that is available when called upon to operate. Throughout its intended 30-year life (SMUD 2001a, AFC §§ 2.4.1, 10.2.2), the CPP would be expected to perform reliably. Power plant systems must be able to operate for extended periods without shutting down for maintenance or repairs. Achieving this reliability is accomplished by ensuring adequate levels of equipment availability, plant maintainability with scheduled maintenance outages, fuel and water availability, and resistance to natural hazards. Staff examines these factors for the project and compares them to industry norms. If they compare favorably, staff can conclude that the CPP would be as reliable as other power plants on the electric system, and would therefore not degrade system reliability.

EQUIPMENT AVAILABILITY

Equipment availability would be ensured by use of appropriate quality assurance/ quality control (QA/QC) programs during design, procurement, construction and operation of the plant, and by providing for adequate maintenance and repair of the equipment and systems (discussed below).

Quality Control Program

SMUD describes a QA/QC program (SMUD 2001a, AFC §§ 2.4.5, 2.4.5.2) typical of the power industry. Equipment would be purchased from qualified suppliers, based on technical and commercial evaluations. Suppliers' personnel, production capability, past performance, QA programs and quality history would be evaluated. The project owner would perform receipt inspections, test components, and administer independent testing contracts. Staff expects implementation of this program to yield typical reliability of design and construction. To ensure such implementation, staff has proposed appropriate conditions of certification under the portion of this Staff Assessment entitled **Facility Design**.

PLANT MAINTAINABILITY

Equipment Redundancy

A generating facility called on to operate in baseload service for long periods of time must be capable of being maintained while operating. A typical approach for achieving this is to provide redundant examples of those pieces of equipment most likely to require service or repair.

SMUD plans to provide appropriate redundancy of function for the project (SMUD 2001a, AFC §§ 2.2.5.3, 2.2.5.4, 2.2.13.3, 2.4.2; Table 2.4-1). The fact that both phases of the project consist of two trains of gas turbine generators/HRSGs and one steam turbine generator and condenser provides inherent reliability. Failure of a non-redundant component of one train should not cause the other train to fail, thus allowing the plant to continue to generate (at reduced output). Further, the plant's distributed control system (DCS) would be built with typical redundancy. Emergency

DC and AC power systems would be supplied by redundant batteries, chargers, and inverters. Other plant equipment would be provided with redundant equipment as follows:

- two 100 percent boiler feed water pumps per HRSG;
- three 50 percent condensate pumps per condenser;
- three 50 percent circulating water pumps per condenser;
- four 100 percent auxiliary cooling water pumps; and
- two 100 percent air compressors.

With this opportunity for continued operation in the face of equipment failure, staff believes that equipment redundancy would be sufficient for a project such as this.

Maintenance Program

SMUD proposes to establish a preventive plant maintenance program typical of the industry (SMUD 2001a, AFC §§ 2.4.1, 2.4.5.2, 6.5, 10.2.2). SMUD's operating experience with its three existing cogeneration power plants lends confidence that the maintenance plan developed for the CPP would result in a plant adequately maintained to ensure acceptable reliability.

FUEL AND WATER AVAILABILITY

For any power plant, the long-term availability of fuel and of water for cooling or process use is necessary to ensure reliability. The need for reliable sources of fuel and water is obvious; lacking long-term availability of either source, the service life of the plant may be curtailed, threatening the supply of power as well as the economic viability of the plant.

Fuel Availability

The CPP would burn natural gas from the Pacific Gas and Electric Company (PG&E) gas transmission system. Gas would be transmitted from PG&E's Lines 400 and 401 near Winters, CA, to the plant via SMUD's existing 51-mile, 20-inch diameter Line 700 and a new 26-mile, 24-inch diameter pipeline connecting the existing Carson Ice-Gen cogeneration plant to the CPP site (SMUD 2001a, AFC §§ 1.1, 2.1, 2.4.3, 6.0, 6.1, 10.2.1). New gas compressor stations near Winters and adjacent to the Carson Ice-Gen plant would maintain sufficient pressure in the SMUD lines for Phase 2 (SMUD 2002a, Data Response 89). The PG&E natural gas system represents a resource of considerable capacity. This system offers access to adequate supplies of gas (SMUD 2001a, AFC § 2.4.3). Staff agrees with the applicant's prediction that there would be adequate natural gas supply and pipeline capacity to meet the project's needs.

Water Supply Reliability

The CPP proposes to obtain water from the federal Bureau of Reclamation via the Folsom-South Canal for plant cooling, process makeup, general plant service, stored

firewater and potable water needs (SMUD 2001a, AFC §§ 1.1, 2.1, 2.4.4, 7.1, 7.4, 10.2.2; Appendix 7A). While this should provide an adequately reliable source of water, Energy Commission staff questions the propriety of using vast quantities of fresh water for cooling the project. Please see the **Water and Soil Resources** section of this Staff Assessment.

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) would not likely represent a hazard for this project, but flooding and seismic shaking (earthquake) present credible threats to reliable operation.

Flooding

The project site lies at an elevation of approximately 150 feet above mean sea level, with approximately 15% (the northeastern corner) of the site lying within the 100-year floodplain. With sufficient preventive measures taken to ensure that the 100-year floodplain does not affect the CPP site, staff believes that flooding presents no credible threat to the project. For further discussion, see the **Water and Soil Resources** section of this Staff Assessment.

Seismic Shaking

The site lies within Seismic Zone 3 (SMUD 2001a, AFC § 2.3.1); see that portion of this document entitled **Geology, Mineral Resources, and Paleontology**. The project would be designed and constructed to the latest appropriate LORS (SMUD 2001a, AFC § 2.3.1; Table 10.4-1; Appendices 10B, 10G). 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 upgraded. By virtue of being built to the latest seismic design LORS, this project would likely perform at least as well as, and perhaps better than, existing plants in the electric power system. Staff has proposed conditions of certification to ensure this; see that portion of this document entitled **Facility Design**. In light of the historical performance of California power plants and the electrical system in seismic events, staff believes there is no special concern with power plant functional reliability affecting the electric system's reliability due to seismic events.

COMPARISON WITH EXISTING FACILITIES

Industry statistics for availability factors (as well as many other related reliability data) are kept by the North American Electric Reliability Council (NERC). NERC continually polls utility companies throughout the North American continent on project reliability data through its Generating Availability Data System (GADS), and periodically summarizes and publishes the statistics on the Internet (http://www.nerc.com). NERC reports the following summary generating unit statistics for the years 1996 through 2000 (NERC 2001):

For Combined Cycle units (All MW sizes)

Availability Factor = 90.96 percent

The gas turbines that would be employed in the project have been on the market for several years now, and can be expected to exhibit typically high availability. The applicant's prediction of an annual availability factor in the 92 to 98 percent range (SMUD 2001a, AFC §§ 2.2.2, 2.2.16, 2.4.1, 10.2.2) appears reasonable compared to the NERC figure for similar plants throughout North America (see above). In fact, these new, large machines can well be expected to outperform the fleet of various (mostly older and smaller) gas turbines that make up the NERC statistics. Further, since the plant would consist of four parallel gas turbine generator trains and two parallel steam turbine generators, maintenance can be scheduled during those times of year when the full plant output is not required to meet market demand, typical of industry standard maintenance procedures. The applicant's estimate of plant availability therefore appears realistic. The stated procedures for assuring design, procurement, and construction of a reliable power plant appear to be in keeping with industry norms, and staff believes they are likely to yield an adequately reliable plant.

FACILITY CLOSURE

Closure of the facility, whether planned or unplanned, cannot impact power plant reliability. Reliability impacts on the electric system from facility closure, should there be any, are dealt with in the **Transmission System Engineering** section of this document.

CONCLUSION

SMUD predicts an equivalent availability factor in the 92 to 98 percent range, which staff believes is achievable in light of the industry norm of 91.5 percent for this type of plant. Based on a review of the proposal, staff concludes that the plant would be built and operated in a manner consistent with industry norms for reliable operation. This should provide an adequate level of reliability. No Conditions of Certification are proposed.

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TRANSMISSION SYSTEM ENGINEERING

Testimony of Henry Zaininger, Laiping Ng, and Al McCuen

SUMMARY OF CONCLUSIONS

Staff concludes that the proposed Cosumnes Power Plant switchyard, outlet lines, and termination are acceptable and would comply with all applicable laws, ordinances, regulations, and standards (LORS) assuming the proposed conditions of certification **TSE-1** through **TSE-4** are implemented. No additional new transmission facilities, other than those proposed by the applicant, are required for the interconnection of the 500 MW (Phase 1) of the Cosumnes Power Plant (CPP). No analysis has been performed on Phase 2. That analysis will be completed at a future date based on the Sacramento Municipal Utility District's (SMUD) future filing.

INTRODUCTION

The Transmission System Engineering (TSE) analysis identifies whether the transmission facilities associated with the proposed project conform to all applicable laws, ordinances, regulations, and standards required for safe and reliable electric power transmission. It also assesses whether the applicant has accurately identified all interconnection facilities required as a result of the project.

Staff evaluated the power plant switchyard, outlet line, termination and downstream facilities identified by the applicant, and provides proposed conditions of certification to ensure the project complies with applicable LORS during the design review, construction, operation, and potential closure of the project.

Additionally, under the California Environmental Quality Act (CEQA), the Energy Commission must conduct an environmental review of the "whole of the action," that may include facilities not licensed by the Energy Commission (California Code of Regulations (CCR), Title 14, §15378). Therefore, staff evaluated whether any new or modified transmission facilities are required for the project's interconnection to the electric grid and also 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.

Because the Sacramento Municipal Utility District (SMUD) system is not a part of the California Independent System Operator (Cal-ISO) grid, the Cal-ISO is not directly responsible for ensuring electric system reliability for the generator interconnection and will not provide analysis and testimony for this project. Staff therefore has increased responsibility to evaluate the system reliability impacts of the project and provide conclusions and recommendations to the Energy Commission.

This analysis is provided in support of the Energy Commission's consideration of a license for the first 500 MW phase. The analysis also includes a general discussion of potential impacts associated with the second 500 MW phase of the project. However, because the actual impacts of the second phase depends on both its exact timing and the status of other projects that are currently uncertain, it would be premature to reach

any final conclusions about the second phase in this part of the proceeding. Therefore, a precise identification of impacts and mitigation measures for the second 500 MW would be provided during the AFC proceeding for the second phase of the project.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

- California Public Utilities Commission (CPUC) General Order 95 (GO-95), "Rules for Overhead Electric Line Construction," formulates uniform requirements for construction of overhead lines. Compliance with this order ensures adequate service and safety to persons engaged in the construction, maintenance, operation, or use of overhead electric lines and to the public in general.
- Western Electricity Coordinating Council (WECC) Reliability Criteria provide the performance standards used in assessing the reliability of the interconnected system. These Reliability Criteria require the continuity of service to loads as the first priority and preservation of interconnected operation as a secondary priority. The WECC Reliability Criteria include the Reliability Criteria for Transmission System Planning, Power Supply Design Criteria, and Minimum Operating Reliability Criteria. Analysis of the WECC system is based to a large degree on WECC Section 4 "Criteria for Transmission System Contingency Performance" which requires that the results of power flow and stability simulations verify established performance levels. Performance levels are defined by specifying the allowable variations in voltage, frequency and loading that may occur on systems other than the one in which a disturbance originated. Levels of performance range from no significant adverse effect outside a system area during a minor disturbance (loss of load or facility loading outside emergency limits) to a performance level that only seeks to prevent system cascading and the subsequent blackout of islanded areas. While controlled loss of generation, load, or system separation is permitted in extreme circumstances, their uncontrolled loss is not permitted (WECC 1998).
- 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 WECC's Criteria for Transmission System Contingency Performance. The NERC planning standards provide for acceptable system performance under normal and contingency conditions. The NERC planning standards apply not only to interconnected system operation but also to individual service areas (NERC 1998).
- Cal-ISO's Reliability Criteria also provide policies, standards, principles, and guides to assure the adequacy and security of the electric transmission system. With regard to power flow and stability simulations, these Planning Standards are similar to WECC's Criteria for Transmission System Contingency Performance and the NERC Planning Standards. The Cal-ISO Reliability Criteria incorporate the WECC Criteria and NERC Planning Standards. However, the Cal-ISO Reliability Criteria also provide some additional requirements that are not found in the WECC Criteria or the NERC Planning Standards. The Cal-ISO Reliability Criteria apply to all existing and proposed facilities interconnecting to the Cal-ISO controlled grid. It also

applies when there are any impacts to the Cal-ISO grid due to facilities interconnecting to adjacent controlled grids not operated by the Cal-ISO.

PROJECT DESCRIPTION

The CPP would be constructed in two phases, each consisting of a nominal 500 MW generating capacity. The first phase is to be installed in the first quarter of 2005, and the second phase is proposed to be installed two years later in 2007. At buildout, the generating facility would consist of four combustion turbines (CTG), two condensing steam turbines (STG), and four heat recovery steam generators (HRSG) providing a nominal total generating capacity of 1,000 MW (SMUD 2001a, pages 2-1 and 2-2).

The applicant would use General Electric 7FA CTGs. Each CTG would generate approximately 170 MW at baseload under average ambient conditions. The CTG exhaust gases would be used to generate steam in the HRSGs. No duct firing would be used. Steam from the HRSGs would be admitted to a condensing steam turbine generator. Approximately 190 MW would be produced by the steam turbine when the CTGs are operating at base load at average ambient conditions.

CPP SWITCHYARD

The four CTGs and two STGs would each be connected to a dedicated 3-phase 18/230 kV step-up transformer that would be connected to the plant's 230-kV switchyard (SMUD 2001a, pages 2-5 and 5-7, Figures 2.2-5, 5.3-2, and 5.3-3).

A new 0.4-mile 230-kV double circuit line and a single circuit line would interconnect between the CPP switchyard and the Rancho Seco Plant (RSP) switchyard as shown in SMUD 2002p, Figure 1-9. The applicant would own and operate both switchyards and the transmission outlets.

The CPP switchyard would consist of 230-kV SF6 insulated circuit breakers and manually operated disconnect switches on each side of each breaker. A breaker-and-a-half arrangement would be used in the switchyard to obtain a high level of service reliability. The switchyard and all equipment would be designed for a 63-kiloampere (kA) interrupting capacity. The main buses would be designed for 4,000-amp continuous current. The bays would be designed for 2,000-amp continuous current. Strain bus would be used for the main buses. Either rigid aluminum bus structures or strain bus structures would be used for the interconnecting buses in the bays. Each generator would be provided with an independent tie to the switchyard.

TRANSMISSION LINE

SMUD proposes to install three overhead circuits. The three-circuits would exit the CPP switchyard and align due north, parallel to and approximately 80 feet to the east of the existing PG&E easement, for approximately 0.3 mile, where it would bear northeast 0.1 mile toward the dead-end structure at the south end of the RSP switchyard.

The three overhead circuits would be constructed between the CPP switchyard and the RSP switchyard. The circuits would be carried on one set of double-circuit steel pole

structures and one set of single-circuit single pole structures. The route of the lines is shown in **Project Description Figure 7** (SMUD 2002p).

The overhead transmission line would use self-supporting tubular steel pole structures to hold the conductors (SMUD 2001a, page 5-8, Figures 5.3-4a and 5.3-4b). The steel poles are proposed to be 100 to 125 feet tall (125 feet maximum). Each circuit would exit the CPP switchyard in a slack-span configuration from the dead-end structures. The maximum height of the dead-end structure would be 85 feet.

Because the total output of the CPP switchyard is expected to be in the range of 3,000 to 4,000 amps, at least 2 of the 3 lines must be in service to transmit the full capacity of the facility to the RSP switchyard. If one circuit is out for maintenance, or should one circuit fail, the remaining two circuits would not limit the plant's operation.

The RSP switchyard currently has three existing positions that can accept the three lines from CPP, requiring no modification to the existing switchyard structure as shown in SMUD 2002p, Figures 1-10 and 1-11. The existing breaker ratings at the RSP switchyard vary from 2,000 amps to 3,000 amps. These existing RSP breaker ratings are compatible with the 2,000 amp continuous current ratings of the eleven breakers at the CPP switchyard.

EXISTING FACILITIES AND RELATED SYSTEMS

The CPP would deliver power into the Northern California region transmission system at the existing RSP substation as shown in SMUD 2001a, Figure 5.1-1. Three existing 230 kV double circuit lines connect the RSP switching station into the Northern California region transmission system. Two SMUD 230-kV double circuit transmission lines connect the RSP substation to the SMUD transmission system. These SMUD lines originate at the RSP switchyard and continue in a westerly direction. In the city of Elk Grove, one double circuit line turns north and connects to the Elk Grove substation, then continues again northward to the Hedge substation. The second double circuit line runs farther west of Elk Grove, then turns north at the town of Franklin where it connects to the Pocket substation. The third PG&E 230-kV double circuit transmission line originates at the RSP switchyard and runs southerly to the Bellotta substation. Currently, SMUD generates about 30% of its total load and imports power for the remaining 70%.

ANALYSIS

SYSTEM RELIABILITY

Introduction

A System Impact Study (SIS) for connecting a new power plant to the existing power system grid is performed to determine the alternate and preferred interconnection facilities to the grid, downstream transmission system impacts, and mitigation measures to conform with system performance levels as required in utility reliability criteria, NERC planning standards, WECC reliability criteria, and Cal-ISO reliability criteria. The study

determines both positive and negative impacts, and for the reliability criteria violation cases (for the negative impacts) determines the alternate and preferred additional transmission facilities or other mitigation measures. The study is conducted with and without the new generation project and its interconnection facilities by using the computer model base case for the year the generator project would come on-line. The study normally includes a Load Flow study, Transient Stability study, Post-transient Load Flow study, and Short Circuit study. The study is focused on thermal overloads, voltage deviations, system stability (evaluating excessive oscillations in generators and transmission system, voltage collapse, loss of loads or cascading outages), and short circuit duties. The study must be conducted under the normal condition (N-0) of the system and also for all credible contingency/emergency conditions, which include the loss of a single system element (N-1) such as a transmission line, transformer, or a generator and the simultaneous loss of two system elements (N-2), such as two transmission lines or a transmission line and a generator. In addition to the above analysis, the studies may be performed to verify whether sufficient active or reactive power is available in the area system or area sub-system to which the new generator project would be interconnected. The SIS is followed by supplemental studies conducted by the transmission owner with details provided in a Final Facility Study (FS).

Any new transmission facilities such as a power plant switchyard, the outlet line, and downstream facilities required for connecting a project to the grid are considered part of the project and are subject to the Application for Certification review process in accordance with CEQA.

Transmission System Impact Study/Transmission System Impact Sensitivity Study Summary

Thermal contingency analysis was performed in the SIS (SMUD 2001d) with and without CPP for 2005 heavy summer and spring conditions. No significant negative impacts with CPP operating at 1,000 MW were identified for heavy summer normal and contingency operation conditions, with or without the Rio Linda/Elverta plant[1] (01-AFC-1) (which has been withdrawn by the applicant) operating at 560 MW. Thus, adding the first 500 MW phase of CPP would not cause overloads.[2]

The following adverse impacts due to overloads with CPP operating at 1,000 MW on-line were identified for light spring conditions:

- Under normal conditions with no outages, with the CPP operating at 1,000 MW, the flow on the Riverbank Junction to Manteca 115 kV line increases from 76.4% to 100.1% of its normal rating, as shown in Table 15 of the SIS. Thus adding the first 500 MW phase of CPP would not cause an overload of this line. Staff will conduct a detailed analysis of the impacts of the second 500 MW phase when it is filed.
- The Hurley to Proctor, Hedge to Proctor, Westley to Tracy, and both Hurley to Tracy 230 kV Western Area Power Authority (Western) lines overload for a double

[1] The Rio Linda/Elverta Plant was a proposed 560 MW power plant that was withdrawn by the applicant.

[2] Although staff is analyzing the CPP project for both 500 and 1,000 MW output, because system conditions in 2007 are highly uncertain, staff performed a detailed analysis only of the first 500 MW phase.

contingency outage of both Rancho Seco to Bellotta 230 kV lines when CPP is operated at 1,000 MW as shown in Tables 17 and 18 of the SIS. Further explanation is provided in SMUD PSA Comments, Set 4 (SMUD 2002at, Page 2). These overloads are not a concern when the first 500 MW phase of CPP is added as summarized on Page 15 of the SIS.

Additional thermal contingency analysis was performed in a sensitivity analysis (SMUD 2002aq) to study impacts of CPP operating at 1000 MW on the existing Northern California transmission system for selected 500 kV line outages during both summer and spring conditions. No overloads attributable to CPP were identified when CPP is operated at 1000 MW. Thus adding the first 500 MW phase of CPP would not cause overloads for the 500 kV line outages studied.

In summary, no significant adverse impacts due to overloads during heavy summer or spring normal operation conditions were identified when the first 500 MW phase of CPP is added.

The stability study results (SMUD 2002ad) indicate no stability criteria violations would occur with 1,000 MW added at CPP. Thus, adding the first 500 MW phase of CPP would not cause stability criteria violations.

The fault duty impact study results (SMUD 2002ad, Table 1) show that adding the first 500 MW phase at CPP causes fault currents at the Hedge circuit breakers (#54 and #60) to exceed breaker fault duty capability. These two breakers would need to be replaced before the first 500 MW phase is added at CPP. When 1,000 MW is added at CPP, fault currents at seven Hedge circuit breakers exceed breaker fault duty capability, and must be replaced. These breaker replacements are within the existing fence line of the Hedge switchyard and therefore replacement of the breakers would not result in any environmental impacts.

A Sacramento Area voltage support study was performed as part of the SIS (SMUD 2001d) and a further sensitivity analysis was performed in Data Response Set 4A (SMUD 2002ad). Both studies show that adding local generation at CPP tends to improve local area voltage support, and would not cause adverse voltage support impacts. The provision of dynamic voltage support in the SMUD area is considered a local system benefit by staff.

CUMULATIVE IMPACTS

The January 25, 2002 CPP Transmission System Impact Sensitivity Study (SMUD 2002e, Attachment TSE-86) investigated cumulative impacts with the Roseville Energy Facility, Rio Linda/Elverta Power Project, and the Colusa Power Project. Thermal power flow analysis was performed during heavy summer and spring conditions with all four plants on-line at rated output. The Rio Linda/Elverta Power Project (560 MW), Roseville Energy Facility (900 MW), and the Colusa Power Plant Project (500MW) have been withdrawn by the respective applicants.

The only proposed power plant in Northern California currently being reviewed by the Energy Commission remaining that may cause cumulative impacts in conjunction with

the CPP is the East Altamont Energy Center Project (01-AFC-4). The East Altamont Energy Center Project is proposed to be connected to the Western transmission system near the Tracy substation, which would be south of the CPP.

To reflect recent changes in proposed new Northern California power plant additions, a sensitivity study (SMUD 2002ay) was performed starting with the powerflow base case used in the January 25, 2002 system impact sensitivity study (SMUD 2002e, Attachment TSE-86). In this new study, the Roseville Energy Facility, Rio Linda/Elverta Power Project, and the Colusa Power Project were removed and the East Altamont Energy Center Project was added to reflect the recent power plant project changes being proposed Northern California as discussed above. No significant negative impacts were attributed to CPP when dispatched at 500 MW (first phase) or 1,000 MW (second phase) during projected 2005 heavy summer normal conditions and during the single and double contingencies studied.

TRANSMISSION ALTERNATIVES

TRANSMISSION LINE ROUTE ALTERNATIVES

No transmission alternatives were investigated in the original AFC (SMUD 2001a). In Supplement B of the AFC (SMUD 2002p) SMUD proposed to build three lines, one single circuit and one double circuit line between CPP and the RSP switchyard. Staff concludes this configuration is acceptable.

INTERCONNECTION ALTERNATIVES

In the original AFC (SMUD 2001a) two new 230 kV bays would be added to the RSP switchyard to connect the two 230 kV circuits from CPP. In AFC Supplement B (SMUD 2002p), the three circuits from CPP are connected to existing Rancho Seco 230 kV switchyard bays. Staff concludes this configuration is acceptable.

FACILITY CLOSURE

PLANNED CLOSURE

Planned closure occurs in a planned and orderly manner at the end of its useful economic or mechanical life, or due to gradual obsolescence. Under such circumstances, the owner is required to provide a closure plan 12 months prior to closure, which in conjunction with applicable LORS, is considered sufficient to provide adequate safety and reliability. For instance, a planned closure provides time for the owner to coordinate with the transmission owner to assure (as one example) that the transmission owner's system would not be closed into the outlet thus energizing the project substation. Alternatively, the owner may coordinate with the transmission owner to maintain some power service via the outlet line to supply critical station service equipment or other loads.[3]

[3] These are merely examples, many more exist.

UNEXPECTED TEMPORARY CLOSURE

Unexpected temporary closure occurs when the facility is closed suddenly and/or unexpectedly for a short term due to unforeseen circumstances such as a natural or other disaster or emergency. During such a closure the facility cannot insert power into the utility system. Closures of this sort can be accommodated by establishing an on-site contingency plan (see **General Conditions Including Compliance Monitoring and Closure Plan**).

UNEXPECTED PERMANENT CLOSURE

Unexpected permanent closure occurs when the project owner abandons the facility. This is considered to be a permanent closure. This includes unexpected closure where the owner remains accountable for implementing the on-site contingency plan. It can also include unexpected closure where the project owner is unable to implement the contingency plan, and the project is essentially abandoned. An on-site contingency plan, that is in place and approved by the Energy Commission's Compliance Project Manager (CPM) prior to the beginning of commercial operation of the facilities, would be developed to assure safety and reliability (see **General Conditions Including Compliance Monitoring and Closure Plan**).

RESPONSES TO PUBLIC AND AGENCY COMMENTS

No agency or public comments relating to TSE have been received.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

- No significant criteria violations under normal operation of the 500 MW (Phase 1) CPP project would occur.
- No significant adverse impacts due to overloads during heavy summer or spring conditions were identified when the first 500 MW phase of the CPP is added.
- Adding local generation at the CPP tends to improve local area voltage support, which is a local system benefit, and does not cause adverse voltage support impacts.
- Adding the first 500 MW phase of CPP would not cause stability criteria violations.
- Two breakers at Hedge would exceed fault duty ratings and would need to be replaced before the first 500 MW phase is added at CPP.
- The proposed power plant switchyard, outlet lines, and termination are acceptable and would comply with LORS assuming the proposed conditions of certification are implemented.
- Staff concludes that no additional new transmission facilities, other than those proposed by the applicant, are required for the interconnection of the first 500 MW phase of the CPP.

RECOMMENDATIONS

- If the Energy Commission approves the CPP, staff recommends the following Conditions of Certification. Because the power plant switchyard would be owned and operated by a utility (SMUD), the following Conditions of Certification differ from those which are typically recommended by staff for a private developer. This is because of SMUD's extensive expertise and their responsibility to provide safe and reliable facilities.
- Staff does not recommend approval of the second 500 MW phase. As part of the licensing process for the second 500 MW phase, the applicant must return to the Energy Commission with a completed SIS that evaluates that phase.

CONDITIONS OF CERTIFICATION

TSE-1 The owner of the power plant switchyard and outlet facilities shall ensure that the design, construction, and operation of the proposed transmission facilities will conform to all applicable LORS including the requirements a) through g) listed below. The substitution of Compliance Project Manager (CPM) approved "equivalent" equipment and an equivalent substation configuration is acceptable.

a) The CPP switchyard shall consist of 230 kV SF6 insulated circuit breakers and manually operated disconnect switches on each side of each breaker. A breaker-and-a half arrangement shall be used in the switchyard.

b) The power plant switchyard and outlet lines shall meet or exceed the electrical, mechanical, civil, and structural requirements of SMUD interconnection standards, CPUC General Orders 95 (GO-95) or National Electric Safety Code (NESC), Title 8 of the California Code and Regulations, Articles 35, 36, and 37 of the "High Voltage Electric Safety Orders", National Electric Code (NEC), and related industry standards.

c) Breakers and buses in the power plant switchyard and other switchyards, where applicable, shall be sized to comply with a short-circuit analysis.

d) Outlet line crossings and line parallels with transmission and distribution facilities shall be coordinated with the transmission line owner and comply with the owner's standards.

e) Termination facilities at the plant switchyard shall comply with applicable SMUD interconnection standards.

f) The project conductors shall be sized to accommodate the full output from the project.

g) The owner of the power plant switchyard and outlet facilities shall provide:

   i) Any modified Detailed Facility Interconnection Study (DFIS) including a description of facility upgrades, operational mitigation measures, and/or Remedial Action Scheme (RAS) or Special Protection System (SPS) sequencing and timing if applicable,

Verification: At least 60 days prior to the start of rough grading of transmission facilities, the owner of the power plant switchyard and outlet facilities shall submit to the CPM for approval:

a) Electrical one line diagrams signed and sealed by a registered professional electrical engineer in responsible charge (or other approval acceptable to the CPM), a route map, and an engineering description of equipment and the configurations covered by the requirements a) through g) above.

b) The Detailed Facilities Study (if modified) (if it has not otherwise previously been provided to the Energy Commission) and a signed letter from the owner of the power plant Switchyard and Outlet facilities stating that the mitigation measures are acceptable. Substitution of equipment and substation configurations shall be identified and justified by the project owner for CPM approval.

TSE-2 The owner of the power plant switchyard and outlet facilities shall request approval to implement any changes that may not conform to the requirements a) through g) of **TSE-1**, and have not received CPM approval. A detailed description of the proposed change and complete engineering, environmental, and economic rationale for the change shall accompany the request. Construction involving changed equipment or substation configurations shall not begin without prior written approval of the changes by the CPM.

Verification: At least 60 days prior to the construction of transmission facilities, the owner of the power plant switchyard and outlet facilities shall inform the CPM of any impending changes that may not conform to requirements a) through g) of **TSE-1** and request approval to implement such changes.

TSE-3 The project owner shall provide notice to the Cal-ISO prior to synchronizing the facility with the California Transmission system:

a) At least one week prior to synchronizing the facility with the grid for testing, provide the Cal-ISO a letter stating the proposed date of synchronization; and

b) At least one business day prior to synchronizing the facility with the grid for testing, provide telephone notification to the Cal-ISO Outage Coordination Department.

Verification: The project owner shall provide copies of the Cal-ISO letter to the CPM when it is sent to the Cal-ISO one week prior to initial synchronization with the grid. The project owner shall contact the Cal-ISO Outage Coordination Department, Monday through Friday, between the hours of 0700 and 1530 at (916) 351-2300 at least one business day prior to synchronizing the facility with the grid for testing. A report of conversation with the Cal-ISO Outage Coordination Department shall be provided electronically to the CPM one day before synchronizing the facility with the California transmission system for the first time.

TSE-4 The owner of the power plant switchyard and outlet facilities shall be responsible for the inspection of the transmission facilities during and after project construction, and any subsequent CPM approved changes thereto, to ensure conformance with CPUC GO-95 or NESC, Title 8 of the California Code

of Regulations, Articles 35, 36, and 37 of the "High Voltage Electric Safety Orders", Western's interconnection standards, NEC, related industry standards and these conditions. In case of non-conformance, the project owner shall inform the CPM in writing, within 10 days of discovering such non-conformance, and describe the proposed corrective actions.

Verification: Within 60 days after first synchronization of the project, the project owner shall transmit to the CPM:

a) "As built" engineering description(s) and one-line drawings of the electrical portion of the facilities signed and sealed by the registered electrical engineer in responsible charge. A statement attesting to conformance with CPUC GO-95 or NESC, Title 8, California Code of Regulations, Articles 35, 36 and 37 of the, "High Voltage Electric Safety Orders", and applicable interconnection standards, NEC, related industry standards, and these conditions shall be provided concurrently.

b) An "as built" engineering description of the mechanical, structural, and civil portion of the transmission facilities signed and sealed by the registered engineer in responsible charge or acceptable alternative verification. "As built" drawings of the mechanical, structural, and civil portion of the transmission facilities shall be maintained at the power plant and made available, if requested, for CPM audit as set forth in the "Compliance Monitoring Plan".

c) A summary of inspections of the completed transmission facilities, and identification of any nonconforming work and corrective actions taken, signed and sealed by the responsible registered engineer in charge.

REFERENCES

NERC (North American Electric Reliability Council). 1998. NERC Planning Standards, September 1997.

SMUD (Sacramento Municipal Utility District) 2001a. Application for Certification, Volumes 1 and 2 (01-AFC-19). Submitted to the California Energy Commission on September 13, 2001. Docket date September 13, 2001.

SMUD (Sacramento Municipal Utility District) 2002e. Data Response, Set 1C. February 4, 2002. Docket date February 5, 2002.

SMUD (Sacramento Municipal Utility District) 2001d. Data Adequacy Supplemental Information for the SMUD Cosumnes Power Plant. November 13, 2001. Docket date November 16, 2001.

SMUD (Sacramento Municipal Utility District) 2002p. AFC Supplement B. April 15, 2002. Docket date April 15, 2002.

SMUD (Sacramento Municipal Utility District) 2002ad. Data Response, Set 4A – Response to Data Requests 254-257. May 10, 2002. Docket date May 10, 2002.

SMUD (Sacramento Municipal Utility District) 2002aq. Data Response, Set 4B – Response to Data Request 254. September 25, 2002. Docket date September 25, 2002.

SMUD (Sacramento Municipal Utility District) 2002at. Preliminary Staff Assessment Comments, Set 4. October 15, 2002. Docket date October 15, 2002

SMUD (Sacramento Municipal Utility District) 2002ay. Informal Data Response, Set 8 – Transmission System Impact Study, No. 2. November 4, 2002. Docket date November 4, 2002.

WECC (Western Electricity Coordinating Council) 2001. NERC/WECC Planning Standards, June 2001.

DEFINITION OF TERMS

AAC All Aluminum conductor.

Ampacity Current-carrying capacity, expressed in amperes, of a conductor at specified ambient conditions, at which damage to the conductor is nonexistent or deemed acceptable based on economic, safety, and reliability considerations.

Ampere The unit of current flowing in a conductor.

Bundled Two wires, 18 inches apart.

Bus Conductors that serve as a common connection for two or more circuits.

Conductor The part of the transmission line (the wire) which carries the current.

Congestion Management
Congestion management is a scheduling protocol, which provides that dispatched generation and transmission loading (imports), would not violate criteria.

Emergency Overload
See Single Contingency. This is also called an L-1.

Kcmil or kcm
Thousand circular mil. A unit of the conductor's cross sectional area, when divided by 1,273, the area in square inches is obtained.

Kilovolt (kV)
A unit of potential difference, or voltage, between two conductors of a circuit, or between a conductor and the ground.

Loop An electrical cul de sac. A transmission configuration which interrupts an existing circuit, diverts it to another connection and returns it back to the interrupted circuit, thus forming a loop or cul de sac.

Megavar One megavolt ampere reactive.

Megavars Mega-volt-Ampere-Reactive. One million Volt-Ampere-Reactive. Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system.

Megavolt ampere (MVA)
A unit of apparent power, equals the product of the line voltage in kilovolts, current in amperes, the square root of 3, and divided by 1000.

Megawatt (MW)

A unit of power equivalent to 1,341 horsepower.

Multiple Contingencies
A condition that occurs when more than one major transmission element (circuit, transformer, circuit breaker, etc.) or more than one generator is out of service

Normal Operation/ Normal Overload
When all customers receive the power they are entitled to without interruption and at steady voltage, and no element of the transmission system is loaded beyond its continuous rating.

N-1 Condition
See Single Contingency.

Outlet Transmission facilities (circuit, transformer, circuit breaker, etc.) linking generation facilities to the main grid.

Power Flow Analysis
A power flow analysis is a forward looking computer simulation of essentially all generation and transmission system facilities that identifies overloaded circuits, transformers and other equipment and system voltage levels.

Reactive Power
Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system. An adequate supply of reactive power is required to maintain voltage levels in the system.

Remedial Action Scheme (RAS)
A remedial action scheme is an automatic control provision, which, for instance, would trip a selected generating unit upon a circuit overload.

SF6 Sulfur hexafluoride is an insulating medium.

Single Contingency
Also known as emergency or N-1 condition, occurs when one major transmission element (circuit, transformer, circuit breaker, etc.) or one generator is out of service.

Solid dielectric cable
Copper or aluminum conductors that are insulated by solid polyethylene type insulation and covered by a metallic shield and outer polyethylene jacket.

Switchyard A power plant switchyard (switchyard) is an integral part of a power plant and is used as an outlet for one or more electric generators.

Thermal rating
: See ampacity.

TSE
: Transmission System Engineering.

Undercrossing
: A transmission configuration where a transmission line crosses below the conductors of another transmission line, generally at 90 degrees.

Underbuild
: A transmission or distribution configuration where a transmission or distribution circuit is attached to a transmission tower or pole below (under) the principle transmission line conductors.

GENERAL CONDITIONS
INCLUDING
COMPLIANCE MONITORING AND CLOSURE PLAN

Testimony of Jeri Scott

INTRODUCTION

The project General Conditions Including Compliance Monitoring and Closure Plan (Compliance Plan) have been established as required by Public Resources Code section 25532. The plan provides a means for assuring that the facility is constructed, operated, and closed in compliance with air and water quality, public health and safety, environmental and other applicable regulations, guidelines, and conditions adopted or established by the California Energy Commission (Energy Commission) and specified in the written decision on the Application for Certification or otherwise required by law.

The Compliance Plan is composed of elements that:

- set forth the duties and responsibilities of the Compliance Project Manager (CPM), the project owner, delegate agencies, and others;
- set forth the requirements for handling confidential records and maintaining the compliance record;
- state procedures for settling disputes and making post-certification changes;
- state the requirements for periodic compliance reports and other administrative procedures that are necessary to verify the compliance status for all Energy Commission approved conditions;
- establish requirements for facility closure plans; and
- specify conditions of certification that follow each technical area that contain the measures required to mitigate any and all potential adverse project impacts associated with construction, operation, and closure to an insignificant level. Each specific condition of certification also includes a verification provision that describes the method of assuring that the condition has been satisfied.

GENERAL CONDITIONS OF CERTIFICATION

DEFINITIONS

To ensure consistency, continuity, and efficiency, the following terms, as defined, apply to all technical areas, including Conditions of Certification:

SITE MOBILIZATION

Site mobilization is defined as moving trailers and related equipment onto the site, usually accompanied by min or ground disturbance, grading for the trailers and limited vehicle parking, trenching for construction utilities, installing utilities, grading for an access corridor, and other related activities. Ground disturbance, grading, etc. for site mobilization are limited to the portion of the site necessary for placing the trailers and

providing access and parking for the occupants. Site mobilization is for temporary facilities and is, therefore, not considered construction.

GROUND DISTURBANCE

Ground disturbance is an onsite activity that results in the removal of soil or vegetation, boring, trenching, or alteration of the site surface. This does not include driving or parking a passenger vehicle, pickup truck, or other light vehicle, or walking on the site.

GRADING

Grading is an onsite activity conducted with earth-moving equipment that results in alteration of the topographical features of the site such as leveling, removal of hills or high spots, or moving of soil from one area to another.

CONSTRUCTION

[From section 25105 of the Warren-Alquist Act] Construction is onsite work to install permanent equipment or structures for any facility. Construction does **not** include the following:

a. the installation of environmental monitoring equipment;

b. a soil or geological investigation;

c. a topographical survey;

d. any other study or investigation to determine the environmental acceptability or feasibility of the use of the site for any particular facility; or

e. any work to provide access to the site for any of the purposes specified in a., b., c., or d.

START OF COMMERCIAL OPERATION[1]

For compliance monitoring purposes, "commercial operation" is that phase of project development which begins after the completion of start-up and commissioning, where the power plant has reached steady-state production of electricity with reliability at the rated capacity.

COMPLIANCE PROJECT MANAGER RESPONSIBILITIES

A Compliance Project Manager (CPM) will oversee the compliance monitoring and shall be responsible for:

1. ensuring that the design, construction, operation, and closure of the project facilities are in compliance with the terms and conditions of the Energy Commission Decision;

2. resolving complaints;

3. processing post-certification changes to the conditions of certification, project description, and ownership or operational control;

[1] A different definition of "Start of Commercial Operation," may be included in the Air Quality (AQ) section (per District Rules or Federal Regulations). In that event, the definition included in the AQ section would only apply to that section.

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 Commission and will consult with appropriate responsible agencies and the Energy Commission when handling disputes, complaints, and amendments.

All project compliance submittals are submitted to the CPM for processing. Where a submittal required by a condition of certification requires CPM approval, the approval will involve all appropriate staff and management.

The Energy Commission has established a toll free compliance telephone number of **1-800-858-0784** for the public to contact the Energy Commission about power plant construction or operation-related questions, complaints or concerns.

Pre-Construction and Pre-Operation Compliance Meeting

The CPM may schedule pre-construction and pre-operation compliance meetings prior to the projected start-dates of construction, plant operation, or both. The purpose of these meetings will be to assemble both the Energy Commission's and the project owner's technical staff to review the status of all pre-construction or pre-operation requirements contained in the Energy Commission's conditions of certification to confirm that they have been met. In addition, these meetings shall ensure, to the extent possible, that Energy Commission conditions will not delay the construction and operation of the plant due to oversight and to preclude any last minute, unforeseen issues from arising. Pre-construction meetings held during the certification process must be publicly noticed unless they are confined to administrative issues and processes.

Energy Commission Record

The Energy Commission shall maintain as a public record, in either the Compliance file or Docket file, for the life of the project (or other period as required):

- all documents demonstrating compliance with any legal requirements relating to the construction and operation of the facility;
- all monthly and annual compliance reports filed by the project owner;
- all complaints of noncompliance filed with the Energy Commission; and
- all petitions for project or condition changes and the resulting staff or Energy Commission action.

PROJECT OWNER RESPONSIBILITIES

It is the responsibility of the project owner to ensure that the general compliance conditions and the conditions of certification are satisfied. The general compliance conditions regarding post-certification changes specify measures that the project owner must take when requesting changes in the project design, compliance conditions, or ownership. Failure to comply with any of the conditions of certification or the general compliance conditions may result in reopening of the case and revocation of Energy

Commission certification, an administrative fine, or other action as appropriate. A summary of the General Conditions of Certification is included as **Compliance Table 1** at the conclusion of this section.

COM-1, Unrestricted Access

The CPM, responsible Energy Commission staff, and delegate agencies or consultants, shall be guaranteed and granted unrestricted access to the power plant site, related facilities, project-related staff, and the files and records maintained on site, for the purpose of conducting audits, surveys, inspections, or general site visits. Although the CPM will normally schedule site visits on dates and times agreeable to the project owner, the CPM reserves the right to make unannounced visits at any time. All visitors must follow SMUD's standard safety requirements such as wearing appropriate equipment and observing safety rules when inspecting the site.

COM-2, Compliance Record

The project owner shall maintain project files onsite, or at an alternative site approved by the CPM, for the life of the project unless a lesser period of time is specified by the conditions of certification. The files shall contain copies of all "as-built" drawings, all documents submitted as verification for conditions, and all other project-related documents.

COM-3, Compliance Verification Submittals

Each condition of certification is followed by a means of verification. The verification describes the Energy Commission's procedure(s) to ensure post-certification compliance with adopted conditions. A variety of procedures are used, including:

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. providing appropriate letters from delegate agencies verifying compliance;
3. Energy Commission staff audits of project records; and/or
4. Energy Commission staff inspections of mitigation or other evidence of mitigation.

A cover letter from the project owner or authorized agent is required for all compliance submittals and correspondence pertaining to compliance matters. **The cover letter subject line shall identify the involved condition(s) of certification by condition number and include a brief description of the subject of the submittal**. The project owner shall also identify those submittals **not** required by a condition of certification with a statement such as: "This submittal is for information only and is not required by a specific condition of certification." When submitting supplementary or corrected information, the project owner shall reference the date of the previous submittal.

The project owner is responsible for the delivery and content of all verification submittals to the CPM, whether such condition was satisfied by work performed by the project owner or an agent of the project owner.

All submittals shall be addressed as follows:

Compliance Project Manager
Cosumnes Power Plant Project (01-AFC-19)
California Energy Commission
1516 Ninth Street (MS-2000)
Sacramento, CA 95814

If the project owner desires Energy Commission staff action by a specific date, the owner shall so state in their submittal and include a detailed explanation of the effects on the project if this date is not met.

COM-4, Pre-Construction Matrix and Tasks Prior to Start of Construction

The project owner shall submit to the CPM, prior to commencing construction, a compliance matrix addressing only those conditions that must be fulfilled before the start of construction. This matrix shall be included with the project owner's **first** compliance submittal, and shall be submitted prior to the first pre-construction meeting, if one is held. It will be in the same format as the compliance matrix referenced below.

Construction shall not commence until the pre-construction matrix is submitted, all pre-construction conditions have been complied with, and the CPM has issued a letter to the project owner authorizing construction. Various lead times (e.g., 30, 60, 90 days) for submittal of compliance verification documents to the CPM for conditions of certification are established to allow sufficient staff time to review and comment and, if necessary, allow the project owner to revise the submittal in a timely manner. This will ensure that project construction may proceed according to schedule.

Failure to submit compliance documents within the specified lead-time may result in delays in authorization to commence various stages of project construction.

Verification lead times (e.g., 90, 60 and 30-days) associated with start of construction may require the project owner to file submittals during the certification process, particularly if construction is planned to commence shortly after certification.
It is important that the project owner understand that the submittal of compliance documents prior to project certification is at the owner's own risk. In such a situation, any approval by Energy Commission staff is subject to change based upon the Commission Decision

COMPLIANCE REPORTING

There are two different compliance reports that the project owner must submit to assist the CPM in tracking activities and monitoring compliance with the terms and conditions of the Commission Decision. During construction, the project owner or authorized agent shall submit Monthly Compliance Reports. During operation, an Annual Compliance Report must be submitted. These reports, and the requirement for an accompanying compliance matrix, are described below. The majority of the conditions of certification require that compliance submittals be submitted to the CPM in the monthly or annual compliance reports.

COM-5, Compliance Matrix

A compliance matrix shall be submitted to the CPM with each monthly and annual compliance report. The compliance matrix is intended to provide the CPM with the current status of all 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 or submittal required by the condition;
4. the date the submittal is required (e.g., 60 days prior to construction, after final inspection, etc.);
5. the expected or actual submittal date;
6. the date a submittal or action was approved by the Chief Building Official (CBO), CPM, or delegate agency, if applicable;
7. the compliance status of each condition (e.g., "not started," "in progress" or "completed" (include the date); and
8. the project's preconstruction and construction milestones, including dates and status (if milestones are required).

Satisfied conditions do not need to be included in the compliance matrix after they have been identified as satisfied in at least one monthly or annual compliance report.

COM-6, Monthly Compliance Report

The first Monthly Compliance Report is due one month following the Energy Commission business meeting date on which the project was approved, unless otherwise agreed to by the CPM. The first Monthly Compliance Report shall include an initial list of dates for each of the events identified on the **Key Events List. The Key Events List form is found at the end of this section.**

During pre-construction and construction of the project, the project owner or authorized agent shall submit an original and five copies (or amount specified by CPM) of the Monthly Compliance Report within 10 working days after the end of each reporting month to the CPM. Monthly Compliance Reports shall be clearly identified for the month being reported. The reports shall contain, at a minimum:

1. a summary of the current project construction status, a revised/updated schedule if there are significant delays, and an explanation of any significant changes to the schedule;
2. documents required by specific conditions to be submitted along with the Monthly Compliance Report. Each of these items must be identified in the transmittal letter, 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;
4. a list of conditions that have been satisfied during the reporting period, and a description or reference to the actions which satisfied the condition;

5. a list of any submittal deadlines that were missed accompanied by an explanation and an estimate of when the information will be provided;
6. a cumulative listing of any approved changes to conditions of certification;
7. a listing of any filings with, or permits issued by, other governmental agencies during the month;
8. a projection of project compliance activities scheduled during the next two months. The project owner shall notify the CPM as soon as any changes are made to the project construction schedule that would affect compliance with conditions of certification;
9. a listing of the month's additions to the on-site compliance file;
10. any requests, with justification, to dispose of items that are required to be maintained in the project owner's compliance file; and
11. a listing of complaints, notices of violation, official warnings, and citations received during the month, a description of the resolutions of any resolved complaints, and the status of any unresolved complaints.

COM-7, Annual Compliance Report

After construction is complete, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports. The reports are for each year of commercial operation and are due to the CPM each year at a date agreed to by the CPM. Annual Compliance Reports shall be submitted over the life of the project unless otherwise specified by the CPM. Each Annual Compliance Report shall identify the reporting period 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 Energy Commission or cleared by the CPM;
5. an explanation for any submittal deadlines that were missed, accompanied by an estimate of when the information will be provided;
6. a listing of filings made to, or permits issued by, other governmental agencies during the year;
7. a projection of project compliance activities scheduled during the next year;
8. a listing of the year's additions to the on-site compliance file;
9. an evaluation of the on-site contingency plan for unplanned facility closure, including any suggestions necessary for bringing the plan up to date [see General Conditions for Facility Closure addressed later in this section]; and

10. a listing of complaints, notices of violation, official warnings, and citations received during the year, a description of the resolution of any resolved complaints, and the status of any unresolved complaints.

COM-8, Construction and Operation Security Plan

Thirty (30) days prior to commencing construction, a site-specific Security Plan for the construction phase shall be developed and maintained at the project site. At least 60 (60) days prior to the initial receipt of hazardous materials on-site, a site-specific Security Plan and Vulnerability Assessment for the operational phase shall be developed and maintained at the project site. The project owner shall notify the CPM in writing that the Plan is available for review and approval at the project site.

Construction Security Plan

The Construction Security Plan must address:

1. site fencing enclosing the construction area;
2. use of security guards;
3. check-in procedure or tag system for construction personnel and visitors;
4. protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency; and
5. evacuation procedures.

Operation Security Plan

The Operations Security Plan must address:

1. permanent site fencing and security gate;
2. use of security guards;
3. security alarm for critical structures;
4. protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency;
5. evacuation procedures;
6. perimeter breach detectors and on-site motion detectors;
7. video or still camera monitoring system;
8. fire alarm monitoring system;
9. site personnel background checks; and
10. site access for vendors and requirements for hazardous materials vendors to conduct personnel background security checks.

In addition, the project owner shall prepare a Vulnerability Assessment and implement site security measures addressing hazardous materials storage and transportation consistent with U.S. EPA and U.S. Department of Justice guidelines.

The CPM may authorize modifications to these measures, or may require additional measures depending on circumstances unique to the facility, and in response to industry-related security concerns.

COM-9, Confidential Information

Any information that the project owner deems confidential shall be submitted to the Energy Commission's Docket with an application for confidentiality pursuant to Title 20, California Code of Regulations, section 2505(a). Any information, that is determined to be confidential shall be kept confidential as provided for in Title 20, California Code of Regulations, section 2501 et. seq.

COM-10, Department of Fish and Game Filing Fee

Pursuant to the provisions of Fish and Game Code Section 711.4, the project owner shall pay a filing fee in the amount of $850. The payment instrument shall be provided to the Energy Commission's Project Manager (PM), not the CPM, at the time of project certification and shall be made payable to the California Department of Fish and Game. The PM will submit the payment to the Office of Planning and Research at the time of filing of the notice of decision pursuant to Public Resources Code Section 21080.5.

COM-11, Reporting of Complaints, Notices, and Citations

Prior to the start of construction, the project owner must send a letter to property owners living within one mile of the project site and the linear facilities notifying them of a telephone number to contact project representatives with questions, complaints, or concerns. If the telephone is not staffed 24 hours per day, it shall include automatic answering system with date and time stamp recording. All recorded inquiries shall be responded to within 24 hours. The telephone number shall be posted at the project site and made easily visible to passersby during construction and operation. The telephone number shall be provided to the CPM who will post it on the Energy Commission's web page at:

http://www.energy.ca.gov/sitingcases/power_plants_contacts.html

Any changes to the telephone number shall be submitted immediately to the CPM who will update the web page.

In addition to the monthly and annual compliance reporting requirements described above, the project owner shall report and provide copies of all complaint forms, notices of violation, notices of fines, official warnings, and citations, within 10 days of receipt to the CPM. Complaints shall be logged and numbered. Noise complaints shall be recorded on the form provided in the **NOISE** conditions of certification. All other complaints shall be recorded on the complaint form (**Attachment A**).

FACILITY CLOSURE

At some point in the future, the project will cease operation and close down. At that time, it will be necessary to ensure that the closure occurs in such a way that public health and safety and the environment are protected from adverse impacts. Although

the project setting for this project does not appear, at this time, to present any special or unusual closure problems, it is impossible to foresee what the situation will be in 30 years or more when the project ceases operation. Therefore, provisions must be made that provide the flexibility to deal with the specific situation and project setting that exist at the time of closure. Known laws, ordinances, regulations and standards (LORS) pertaining to facility closure are identified in each technical analysis section of the Commission Decision. Facility closure will be consistent with LORS in effect at the time of closure.

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

CLOSURE DEFINITIONS

Planned Closure

A planned closure occurs at the end of a project's life, when the facility is closed in an anticipated, orderly manner, at the end of its useful economic or mechanical life, or due to gradual obsolescence.

Unplanned Temporary Closure

An unplanned temporary closure occurs when the facility is closed suddenly and/or unexpectedly, on a short-term basis, due to unforeseen circumstances such as a natural disaster or an emergency.

Unplanned Permanent Closure

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

GENERAL CONDITIONS FOR FACILITY CLOSURE

COM-12, Planned Closure

In order to ensure that a planned facility closure does not create adverse impacts, a closure process that provides for careful consideration of available options and applicable LORS and local/regional plans in existence at the time of closure, will be undertaken. To ensure adequate review of a planned project closure, the project owner shall submit a proposed facility closure plan to the Energy Commission for review and approval at least 12 months prior to commencement of closure activities (or other period of time agreed to by the CPM). The project owner shall file 120 copies (or other number of copies agreed upon by the CPM) of a proposed facility closure plan with the Energy Commission.

The plan shall:

1. identify and discuss any impacts and mitigation to address significant adverse impacts associated with proposed closure activities and to address facilities, equipment, or other project related remnants that will remain at the site;
2. identify a schedule of activities for closure of the power plant site, transmission line corridor, and all other appurtenant facilities constructed as part of the project;
3. identify any facilities or equipment intended to remain on site after closure, the reason, and any future use; and
4. address conformance of the plan with all applicable laws, ordinances, regulations, standards, local/regional plans in existence at the time of facility closure, and applicable conditions of certification.

In the event that there are significant issues associated with the proposed facility closure plan's approval, or the desires of local officials or interested parties are inconsistent with the plan, the CPM shall hold one or more workshops. The Energy Commission may also hold public hearings as part of the approval procedure for the facility closure plan.

In addition, prior to submittal of the proposed facility closure plan, a meeting shall be held between the project owner and the Energy Commission CPM for the purpose of discussing the specific contents of the plan.

As necessary, prior to or during the closure plan process, the project owner shall take appropriate steps to eliminate any immediate threats to public health and safety and the environment, but shall not commence any other closure activities until Energy Commission approval of the facility closure plan is obtained.

COM-13, Unplanned Temporary Closure/On-Site Contingency Plan

In order to ensure that public health and safety and the environment are protected in the event of an unplanned temporary facility closure, it is essential to have an on-site contingency plan in place. The on-site contingency plan will help to ensure that all necessary steps to mitigate public health and safety impacts and environmental impacts are taken in a timely manner.

The project owner shall submit an on-site contingency plan for CPM review and approval. The plan shall be submitted no less than 60 days (or other time agreed to by the CPM) prior to commencement of commercial operation. The approved plan must be in place prior to commercial operation of the facility and shall be kept at the site at all times.

The project owner, in consultation with the CPM, shall update the on-site contingency plan as necessary. The CPM may require revisions to the on-site contingency plan over the life of the project. In the annual compliance reports submitted to the Energy Commission, the project owner shall review the on-site contingency plan and recommend changes to bring the plan up to date. Any changes to the plan must be approved by the CPM.

The on-site contingency plan shall provide for taking immediate steps to secure the facility from trespassing or encroachment. In addition, for closures of more than 90 days, unless other arrangements are agreed to by the CPM, the plan shall provide for removal of hazardous materials and hazardous wastes, draining of all chemicals from storage tanks and other equipment, and the safe shutdown of all equipment. (Also see specific conditions of certification for the technical areas of Hazardous Materials Management and Waste Management.)

The nature and extent of insurance coverage, and major equipment warranties must also be included in the on-site contingency plan. In addition, the status of the insurance coverage and major equipment warranties must be updated in the annual compliance reports.

In the event of an unplanned temporary closure the project owner shall notify the CPM, as well as other responsible agencies, by telephone, fax, or e-mail, within 24 hours and shall take all necessary steps to implement the on-site contingency plan. The project owner shall keep the CPM informed of the circumstances and expected duration of the closure.

If the CPM determines that an unplanned temporary closure for either Phase I or II is likely to be permanent, or for a duration of more than 12 months, a closure plan consistent with the requirements for a planned closure shall be developed. The plan shall be submitted to the CPM within 90 days of the CPM's determination (or other period of time agreed to by the CPM).

COM-14, Unplanned Permanent Closure/On-Site Contingency Plan

The on-site contingency plan required for unplanned temporary closure shall also cover unplanned permanent facility closure for both phases of the project. All of the requirements specified for unplanned temporary closure shall also apply to unplanned permanent closure.

In addition, the on-site contingency plan shall address how the project owner will ensure that all required closure steps will be successfully undertaken in the event of abandonment of either phase.

In the event of an unplanned permanent closure of either phase, the project owner shall notify the CPM, as well as other responsible agencies, by telephone, fax, or e-mail, within 24 hours and shall take all necessary steps to implement the on-site contingency plan. The project owner shall keep the CPM informed of the status of all closure activities.

A closure plan for either Phase I or II, consistent with the requirements for a planned closure, shall be developed and submitted to the CPM within 90 days of the permanent closure (or another period of time agreed to by the CPM).

CBO DELEGATION AND AGENCY COOPERATION

In performing construction monitoring of the project, Commission staff acts as, and has the authority of, the Chief Building Official (CBO). Commission staff may delegate CBO responsibility to either an independent third party contractor or the local building official. Commission staff retains CBO authority when selecting a delegate CBO including enforcing and interpreting state and local codes, and use of discretion, as necessary, in implementing the various codes and standards.

Commission staff may also seek the cooperation of state, regional, and local agencies that have an interest in environmental protection when conducting project monitoring.

ENFORCEMENT

The Energy Commission's legal authority to enforce the terms and conditions of its Decision is specified in Public Resources Code sections 25534 and 25900. The Energy Commission may amend or revoke the certification for any facility, and may impose a civil penalty for any significant failure to comply with the terms or conditions of the Energy Commission Decision. The specific action and amount of any fines the Energy Commission may impose would take into account the specific factors identified in Public Resources Code section 25534.1(e). Moreover, to ensure compliance with the terms and conditions of certification and applicable LORS, delegate agencies are authorized to take any action allowed by law in accordance with their statutory authority, regulations, and administrative procedures.

NONCOMPLIANCE COMPLAINT PROCEDURES

Any person or agency may file a complaint alleging noncompliance with the conditions of certification. Such a complaint will be subject to review by the Energy Commission pursuant to Title 20, California Code of Regulations, section 1230 et seq. In many instances the noncompliance can be resolved by using the informal dispute resolution process. Both the informal and formal complaint procedure, as described in current State law and regulations, are described below. They shall be followed unless superseded by future laws or regulations.

Informal Dispute Resolution Procedure

The following procedure is designed to informally resolve disputes concerning the interpretation of compliance with the requirements of this compliance plan. The project owner, the Energy Commission, or any other party, including members of the public, may initiate this procedure for resolving a dispute. Disputes may pertain to actions or decisions made by any party including the Energy Commission's delegate agents.

This procedure may precede the more formal complaint and investigation procedure specified in Title 20, California Code of Regulations, section 1230 et seq., but is not intended to be a substitute for, or prerequisite to it. This informal procedure may not be used to change the terms and conditions of certification as approved by the Energy Commission, although the agreed upon resolution may result in a project owner, or in some cases the Energy Commission staff, proposing an amendment.

The procedure encourages all parties involved in a dispute to discuss the matter and to reach an agreement resolving the dispute. If a dispute cannot be resolved, then the matter must be referred to the full Energy Commission for consideration via the complaint and investigation process. The procedure for informal dispute resolution is as follows:

Request for Informal Investigation

Any individual, group, or agency may request that the Energy Commission conduct an informal investigation of alleged noncompliance with the Energy Commission's terms and conditions of certification. All requests for informal investigations shall be made to the designated CPM.

Upon receipt of a request for informal investigation, the CPM shall promptly notify the project owner of the allegation by telephone and letter. All known and relevant information of the alleged noncompliance shall be provided to the project owner and to the Energy Commission staff. The CPM will evaluate the request and the information to determine if further investigation is necessary. If the CPM finds that further investigation is necessary, the project owner will be asked to promptly investigate the matter and, within seven (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 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 Energy Commission staff is not satisfied with the project owner's report, investigation of the event, or corrective measures undertaken, either party may submit a written request to the CPM for a meeting with the project owner. Such request shall be made within 14 days of the project owner's filing of its written report. Upon receipt of such a request, the CPM shall:

1. immediately schedule a meeting with the requesting party and the project owner, to be held at a mutually convenient time and place;
2. secure the attendance of appropriate Energy Commission staff and staff of any other agencies with expertise in the subject area of concern, as necessary;
3. conduct such meeting in an informal and objective manner so as to encourage the voluntary settlement of the dispute in a fair and equitable manner; and
4. after the conclusion of such a meeting, promptly prepare and distribute copies to all in attendance and to the project file, a summary memorandum which fairly and accurately identifies the positions of all parties and any conclusions reached. If an agreement has not been reached, the CPM shall inform the complainant of the formal complaint process and requirements provided under Title 20, California Code of Regulations, section 1230 et seq.

Formal Dispute Resolution Procedure-Complaints and Investigations

If either the project owner, Energy Commission staff, or the party requesting an investigation is not satisfied with the results or the progress of the informal dispute resolution process, such party may file a complaint or a request for an investigation with the Energy Commission's General Counsel. Disputes may pertain to actions or decisions made by any party including the Energy Commission's delegate agents. Requirements for complaint filings and a description of how complaints are processed are in Title 20, California Code of Regulations, section 1230 et seq.

The Energy Commission Chairperson, 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 Energy Commission shall have the authority to consider all relevant facts involved and make any appropriate orders consistent with its jurisdiction (Cal. Code Regs., tit. 20, §§ 1232-1236).

POST CERTIFICATION CHANGES TO THE ENERGY COMMISSION DECISION: AMENDMENTS, INSIGNIFICANT PROJECT CHANGES, AND VERIFICATION CHANGES

The project owner shall petition the Energy Commission, pursuant to Title 20, California Code of Regulations, section 1769, when proposing modifications to project design, operation, or performance requirements. The petition requesting a modification should be submitted to the Energy Commission's Docket in accordance with Title 20, California Code of Regulations, section 1209.

AMENDMENTS

If a proposed modification results in 1) a change or deletion of a condition of certification, 2) a significant effect on the environment, or 3) causes the project not to comply with applicable LORS, the petition shall be processed as a formal amendment to the final decision. The full Commission must approve formal amendments. The project owner shall file a petition in accordance with Title 20, California Code of Regulations, section 1769 (a).

Change of ownership or operational control also requires that the project owner files a petition, and obtains full Commission approval, pursuant to section 1769 (b).

INSIGNIFICANT PROJECT CHANGES

If staff determines that a proposed modification **will not** result in 1) a change or deletion to a condition of certification, 2) have a significant effect on the environment, and 3) complies with all applicable LORS, then commission approval is **not** needed pursuant to section 1769 (a) (2). The CPM shall file a statement that staff has made such a determination with the Commission Docket and mail a copy of the statement to every person on the project's post-certification mailing list.

Any person may file an objection to staff's determination within 14 days of service on the grounds that the modification does not meet the criteria in section 1769 (a) (2). If an objection is received, the petition must be processed as a formal amendment to the final

decision and must be approved by the full Commission at a noticed business meeting or hearing.

VERIFICATION CHANGES

Pursuant to section 1769 (d), verification provisions may also be modified as necessary to enforce the conditions of certification without requesting an amendment to the final decision, provided that the verification change does not conflict with the condition of certification. The staff may initiate verification changes, or the project owner may request changes.

COM-6, KEY EVENTS LIST

PROJECT: **Cosumnes Power Plant Project**

DOCKET #:**01-AFC-19**

COMPLIANCE PROJECT MANAGER:

EVENT DESCRIPTION	DATE
Certification Date/Obtain Site Control	
Online Date	
POWER PLANT SITE ACTIVITIES	
Start Site Mobilization	
Start Ground Disturbance	
Start Grading	
Start Construction	
Begin Pouring Major Foundation Concrete	
Begin Installation of Major Equipment	
Completion of Installation of Major Equipment	
First Combustion of Gas Turbine	
Start Commercial Operation	
Complete All Construction	
TRANSMISSION LINE ACTIVITIES	
Start T/L Construction	
Synchronization with Grid and Interconnection	
Complete T/L Construction	
FUEL SUPPLY LINE ACTIVITIES	
Start Gas Pipeline Construction and Interconnection	
Complete Gas Pipeline Construction	
WATER SUPPLY LINE ACTIVITIES	
Start Water Supply Line Construction	
Complete Water Supply Line Construction	

TABLE 1
COMPLIANCE SECTION
SUMMARY OF GENERAL CONDITIONS OF CERTIFICATION

CONDITION NUMBER	PAGE #	SUBJECT	DESCRIPTION
COM-1	4	Unrestricted Access	The project owner shall grant Energy Commission staff and delegate agencies or consultants unrestricted access to the power plant site.
COM-2	4	Compliance Record	The project owner shall maintain project files on-site. Energy Commission staff and delegate agencies shall be given unrestricted access to the files.
COM-3	4	Compliance Verification Submittals	The project owner is responsible for the delivery and content of all verification submittals to the CPM, whether the condition was satisfied by work performed by the project owner or his agent.
COM-4	5	Pre-construction Matrix and Tasks Prior to Start of Construction	Construction shall not commence until all of the following activities/submittals have been completed: ▪ property owners living within one mile of the project have been notified of a telephone number to contact for questions, complaints or concerns; ▪ a pre-construction matrix has been submitted identifying only those conditions that must be fulfilled before the start of construction; ▪ all pre-construction conditions have been complied with; and ▪ the CPM has issued a letter to the project owner authorizing construction.
COM-5	6	Compliance Matrix	The project owner shall submit a compliance matrix (in a spreadsheet format) with each monthly and annual compliance report which includes the status of all compliance conditions of certification.
COM-6	6	Monthly Compliance Report (including a Key Events List)	During construction, the project owner shall submit Monthly Compliance Reports (MCRs) which include specific information. The first MCR is due the month following the Commission business meeting date on which the project was approved and shall include an initial list of dates for each of the events identified on the Key Events List.

CONDITION NUMBER	PAGE #	SUBJECT	DESCRIPTION
COM-7	7	Annual Compliance Reports	After construction ends and throughout the life of the project, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports.
COM-8	8	Security Plans	Thirty days prior to commencing construction, the project owner shall submit a Security Plan for the construction phase. Sixty days prior to initial receipt of hazardous material on site, the project owner shall submit an Security Plan & Vulnerability Assessment for the operational phase.
COM-9	9	Confidential Information	Any information the project owner deems confidential shall be submitted to the Dockets Unit with an application for confidentiality.
COM-10	9	Dept of Fish and Game Filing Fee	
COM-11	9	Reporting of Complaints, Notices and Citations	The project owner shall report to the CPM, within 10 days of receipt, all notices, complaints, and citations.
COM-12	10	Planned Facility Closure	The project owner shall submit a closure plan to the CPM at least twelve months prior to commencement of a planned closure.
COM-13	11	Unplanned Temporary Facility Closure	To ensure that public health and safety and the environment are protected in the event of an unplanned temporary closure, the project owner shall submit an on-site contingency plan no less than 60 days prior to commencement of commercial operation.
COM-14	12	Unplanned Permanent Facility Closure	To ensure that public health and safety and the environment are protected in the event of an unplanned permanent closure, the project owner shall submit an on-site contingency plan no less than 60 days prior to commencement of commercial operation.

ATTACHMENT A

COMPLAINT REPORT/RESOLUTION FORM

PROJECT NAME: **Cosumnes Power Plant Project** AFC Number: 01-AFC-19
COMPLAINT LOG NUMBER _____ Complainant's name and address: Phone number:
Date and time complaint received: Indicate if by telephone or in writing (attach copy if written): Date of first occurrence:
Description of complaint (including dates, frequency, and duration):
Findings of investigation by plant personnel: Indicate if complaint relates to violation of Energy Commission requirement: Date complainant contacted to discuss findings:
Description of corrective measures taken or other complaint resolution: Indicate if complainant agrees with proposed resolution: If not, explain: Other relevant information:
If corrective action necessary, date completed: Date first letter sent to complainant: _____(copy attached) Date final letter sent to complainant: _____(copy attached)
This information is certified to be correct. Plant Manager's Signature: _____ Date:

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

COSUMNES PLANT PROJECT
FSA PREPARATION TEAM
(Part 1)

Executive Summary	Kristy Chew
Introduction	Kristy Chew
Project Description	Kristy Chew
Response to Public and Agency Comments	Kristy Chew
Air Quality	Tuan Ngo, P.E.
Cultural Resources	Judy McKeehan and Dorothy Torres
Hazardous Materials	Alvin Greenberg, Ph.D. and Rick Tyler
Land Use	James Adams
Noise and Vibration	Jim Buntin
Public Health	Alvin Greenberg, Ph.D.
Socioeconomics	Negar Vahidi
Traffic and Transportation	James Fore and Eileen Allen
Transmission Line Safety and Nuisance	Obed Odoemelam, Ph.D.
Visible Plumes	Dale Edwards, Will Walters, P.E., and Lisa Blewitt
Visual Resources	Michael Clayton
Waste Management	Alvin Greenberg, Ph.D.
Worker Safety and Fire Protection	Alvin Greenberg, Ph.D. and Rick Tyler
Facility Design	Shahab Khoshmashrab, Al McCuen, and Steve Baker, P.E.
Geology, Mineral Resources, and Paleontology	Janine Band, Ph.D., R.G.
Power Plant Efficiency	Kevin Robinson and Steve Baker, P.E.
Power Plant Reliability	Kevin Robinson and Steve Baker, P.E.
Transmission System Engineering	Henry Zaininger, Laiping Ng, and Al McCuen
General Conditions	Jeri Scott
Project Assistant	Evelyn Johnson
Support Staff	Angie Hockaday, Raquel Rodriguez