Environmental

Assessment

AIR QUALITY

Testimony of Tuan Ngo, P.E.

SUMMARY OF CONCLUSIONS

Staff finds that, with the inclusion of the Conditions of Certification, the proposed project would be in compliance with all applicable laws, ordinances, regulations, and standards and would not result in any significant air quality-related impacts. Staff also finds that:

- The project ozone precursor emissions (oxides of nitrogen and volatile organic compounds) would be mitigated to a level of less than significant by the surrender of emission reduction credits (offsets);
- The project would incorporate Best Available Control Technology in accordance with the Bay Area Air Quality Management District New Source Review requirements;
- The project will not cause new violations of any nitrogen dioxide, sulfur dioxide, or carbon monoxide ambient air quality standards, and therefore, its emission impacts are not significant for those pollutants;
- The project's particulate matter emissions contribution will be mitigated to a level that is less than significant by the implementation of a local street sweeping program; and
- The project's fine particulate matter emission contribution will be mitigated to a level of less than significant by the implementation of the local street sweeping and the woodstove/fireplace replacement or modification programs; or the surrender of sulfur oxides emission reduction credits.

INTRODUCTION

This analysis addresses the potential air quality impacts resulting from criteria air pollutant emissions created by the construction and operation of the San Francisco Electric Reliability Project (SFERP). Criteria air pollutants are those for which a state or federal ambient air quality 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 (PM2.5) and less than 10 microns in diameter (PM10) and their precursors (NO_x, VOC, SO_2), and lead (Pb). Non-criteria air pollutants (those without ambient standards) are addressed in the **Public Health** Section of this document.

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

- whether the project is likely to conform with applicable Federal, State, and District air quality Laws, Ordinances, Regulations, and Standards (LORS) as required by Title 20, California Code of Regulations, sections 1744(b) and 1748(c);
- 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 1744(b) and 1748(i); and
- whether the mitigation proposed for the project is adequate to lessen potential significant impacts to less than significant levels as required by Title 20, California Code of Regulations, sections 1742.5 and 1742(b).

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

AIR QUALITY Table 1 summarizes the applicable LORS, which are described in further detail below.

AIR QUALITY Table 1
Laws, Ordinances, Regulations, and Standards

Applicable LORS	Description
Federal	New Source Review : Best Available Control Technology (BACT) and Offset requirements
	Title IV: Acid Rain
	Title V: Federal operating permit program
	New Source Performance Standard: 75 ppm NO_x and 150 ppm SO_x @15% oxygen (O_2).
State	California Health and Safety Code: Permitting of source needs to be consistent with approved Clean Air Plan
Local	New Source Review: BACT and offsets
	Acid Rain: Requires continuous emission monitoring system
	Particulate Matter and Visible Emissions: Emissions shall not be darker than Ringelmann No. 1 for a continuous three-minutes, and no more than 0.15 grains PM per standard dry cubic foot.
	Nitrogen Oxides from Stationary Gas Turbines. 9 ppm NO_x@15%O_2.

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). Its requirements differ depending on the attainment status of air contaminants in the area where the major facility is to be located. The NSR requirements apply to areas that have not been able to demonstrate compliance with national ambient air quality standards. Prevention

of Significant Deterioration (PSD) requirements apply in areas that are in attainment of the national ambient air quality standards. It should be noted that the SFERP is exempt from the federal PSD review due to its emissions.

Title V of the federal Clean Air Act requires states to implement and administer an operating permit program. Stationary 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 that affect an individual project.

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

The SFERP'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

The federal Clean Air Act is implemented by the California Air Resources Board (CARB) and each local air district. CARB, under authority granted by the Mulford-Carrell Air Resources Act, is required to adopt state ambient air quality standards for criteria air contaminants that can be, and often are, more stringent than those adopted by the U.S. EPA. For instance, the state has its own ambient air quality standards for PM10, PM2.5, and ozone, among others. The local air districts are required to prepare air quality plans and promulgate specific air quality regulations that are approved by CARB, in order to seek and maintain compliance with the state ambient air quality standards (California Health and Safety Code, Part 3, Chapter 10). When power plants are licensed by the Energy Commission, the local air district's permit is part of that license, as the license incorporates the conditions the local air district would otherwise have required for compliance with state law.

LOCAL

Bay Area Air Quality Management District

As part of the licensing process, in lieu of issuing a construction permit for the SFERP facility, the District will prepare a Determination of Compliance (DOC). This document evaluates whether and under what conditions the proposed project will comply with the District's applicable rules and regulations. The Energy Commission staff coordinated its air quality analysis with the District staff as they

prepared the DOC, and has incorporated the Final DOC recommended conditions of certification in this Final Staff Assessment (FSA).

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

Regulation 2

Rule 1 - General Requirements. This rule contains general requirements, definitions, and a requirement that an applicant submit an application for an authority to construct and permit to operate.

Rule 2 - New Source Review. This rule applies to all new and modified sources. The following sections of Rule 2 are the regulations that are applicable to this project.

- Section 2-2-301 - BACT Requirement: This rule requires that BACT be applied for each pollutant which is emitted in excess of 10.0 pounds per day.
- Section 2-2-302 - Offset Requirement, Precursor Organic Compounds and Nitrogen Oxides. This section applies to projects with an emissions increase of 50 tons per year or more of organic compounds and/or NO_x. Offsets shall be provided at a ratio of 1.15 tons of emission reduction credits for each 1.0 ton of proposed project permitted emissions.
- Emission reductions of nitrogen oxides and/or sulfur dioxide may be used to offset increased emissions of PM10 at offset ratios deemed appropriate by the Air Pollution Control Officer.
- A facility that emits less than 100 tons of any pollutant may voluntarily provide emission offsets for all, or any portion, of their PM10 or sulfur dioxide emissions increases.
- Section 2-2-606 - Emission Calculation Procedures, Offsets. This section requires that emission offsets be provided from the District's Emissions Bank, and/or from contemporaneous actual emission reductions.

Rule 7-Acid Rain. This rule applies the requirements of Title IV of the federal Clean Air Act, which are spelled out in Title 40, Code of Federal Regulations, section 72. The Title IV requirements will include the installation of continuous emission monitors to monitor acid deposition precursor pollutants.

Regulation 6

Particulate Matter and Visible Emission. The purpose of this regulation is to limit the quantity of particulate matter in the atmosphere. The following two sections of Regulation 6 are directly applicable to this project:

- Section 301 - Ringelmann No. 1 Limitation: This rule limits visible emissions to no darker than Ringelmann No. 1 for periods greater than three minutes in any hour.

- Section 310 - Particulate Weight Limitation: This rule limits source particulate matter emissions to no greater than 0.15 grains per standard dry cubic foot.

Regulation 9

Rule 1 - Limitations

- Section 301: Limitations on Ground Level Sulfur Dioxide Concentration. This section requires that emissions of sulfur dioxide shall not impact at ground level in excess of 0.5 ppm for 3 consecutive minutes, or 0.25 ppm averaged over 60 minutes, or 0.05 ppm averaged over 24 hours.
- Section 302: General Emission Limitation. This rule limits the sulfur dioxide concentration from an exhaust stack to no greater than 300 ppm dry.

Rule 9 - Nitrogen Oxides from Stationary Gas Turbines. Effective January 1, 1997, this rule limits gaseous fired, SCR equipped, combustion turbines rated greater than 10 MW to 9 ppm@15%O_2.

SETTING

CLIMATE AND METEOROLOGY

The project is proposed to be located in the eastern part of San Francisco. The site is a few feet above sea level and is adjacent to the San Francisco Bay. The climate of the San Francisco area is dominated by a semi-permanent, high pressure system off the Pacific Coast, known as the Pacific High. During the summer months, the Pacific High extends to and often over the western United States, causing low pressure systems to pass north of the Pacific High into Canada. The relatively colder temperatures of the Pacific Ocean cause coastal stratus and fog to form. Brisk westerly winds blow throughout the afternoon and evening hours, which carry fog inland in the late afternoon and evening. The fog can often persist through mid-morning.

During the winter months, the Pacific High moves south, allowing low pressure systems to move through California. Cloud cover, precipitation, and generally strong winds prevail during this period.

About 80 percent of the average annual rainfall (approximately 20 inches) in the area occurs between the months of November and March. Between storms, skies are fair, winds are light, and temperatures are moderate.

Temperatures in the general area of the site are moderated due to their proximity to the ocean and to the San Francisco Bay. The temperatures range from the mid-50s to low-70s in the summer, fall and spring, and from the mid-40s to low-60s during the winter.

Pacific Gas and Electric (PG&E) collects meteorological data at the Potrero power plant site, about a quarter of a mile north of the proposed site. The data collected include wind directions, wind speed, temperature, and atmospheric stability class. The District has determined that the collected meteorological data are representative of the area's meteorology, and that it is appropriate to use for air quality dispersion modeling analysis for this project.

Quarterly wind roses, which are graphic representations showing wind speeds and directions based on data collected in 1992, are shown in Figures 8.1-5a to 5e (SFPUC 2005a). At the project site, the winds blow predominately from the west from April through September. From October through February, the wind directions are more variable, with winds blowing predominately from the north, southeast and west. Mixing heights in the area, which represent the altitudes to which different air masses mix together, have been estimated to range from a low of approximately 80 meters in the morning to a high of 2,300 meters in the afternoon. High mixing heights, normally associated with unstable conditions, can lead to greater dispersion of air contaminants (Smith et al. 1984). When the mixing height is low and the wind is calm, air contaminants can be trapped near the ground.

AMBIENT AIR QUALITY STANDARDS

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 CARB, are typically lower (more protective) than the federal AAQS, which are established by the U.S. EPA. The state and federal air quality standards are listed in **AIR QUALITY Table 2**. As indicated in **AIR QUALITY Table 2**, 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 or $\mu g/m^3$, respectively).

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 District includes all or portions of nine counties in the Bay Area: all of San Francisco, San Mateo, Santa Clara, Alameda, Contra Costa, Napa and Marin Counties, and the southwest portion of Solano County and the southern portion of Sonoma County.

AIR QUALITY Table 2
Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	Federal Standards	
			Primary	Secondary
Ozone(O_3)	1-hour	0.09 ppm (180 μg/m^3)	0.12 ppm (235 μg/m^3)	Same as primary
Particulate Matter (PM10)	Ann.Geo. Mean	20 μg/m^3	---	Same as primary
	24-hour	50 μg/m^3	150 μg/m^3	
	Ann.Arit. Mean	---	50 μg/m^3	
Fine Particulate Matter (PM2.5)	24-hour	No separate standard	65 μg/m^3	Same as primary
	Ann.Arit. Mean	12 μg/m3	15 μg/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 μg/m^3)	---	Same as primary
	Ann.AritMean	---	0.053 ppm (100 μg/m^3)	
Lead(Pb)	30-day	1.5 μg/m^3	---	Same as primary
	Cal. Quarter	---	1.5 μg/m^3	
Sulfur Dioxide (SO_2)	Ann.Arit. Mean	---	0.03 ppm (80 μg/m^3)	---
	24-hour	0.04 ppm (105 μg/m^3)	0.147 ppm (365 μg/m^3)	---
	3-hour	---	---	0.5 ppm (1300 μg/m^3)
	1-hour	0.25 ppm (655 μg/m^3)	---	---
Sulfates	24-hour	25 μg/m^3	No federal standard	
H_2S	1-hour	0.03 ppm (42 μg/m^3)	No federal standard	

Source: California Air Resources Board

EXISTING AMBIENT AIR QUALITY

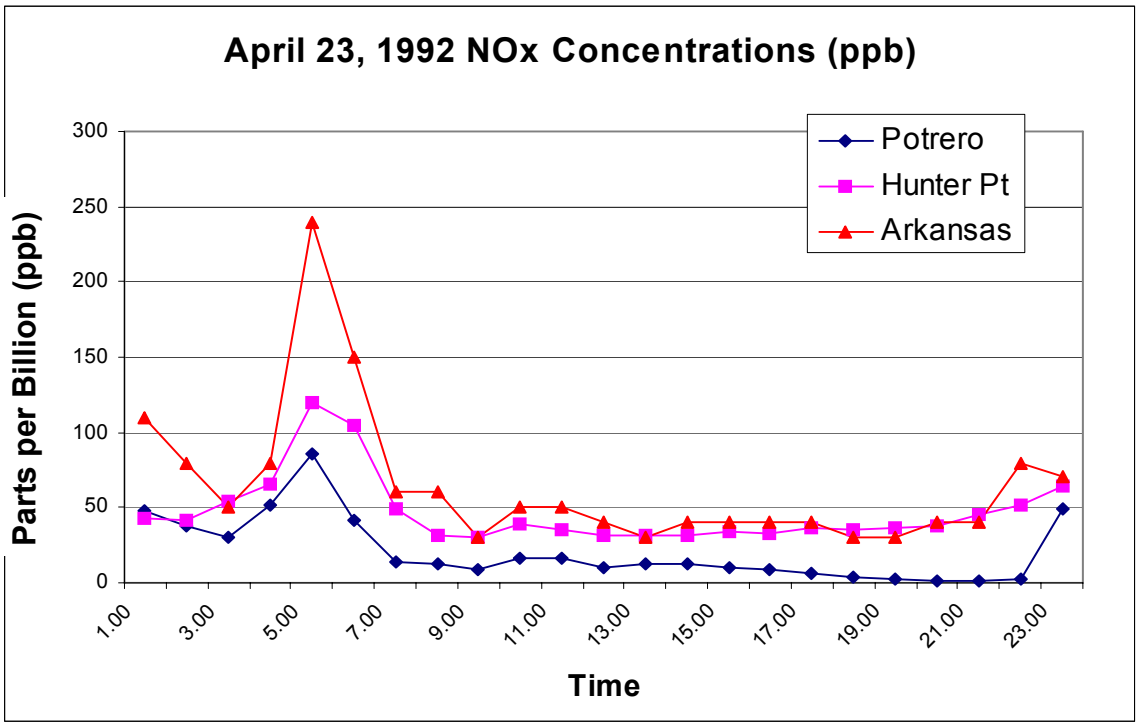
Currently, the District and the CARB measure ambient air quality concentrations for NO_x, VOC, CO, PM10, PM2.5 and SO_2 (lead, sulfates and H2S are not measured at this monitoring station because the responsible regulatory agencies believe that the area is attainment for these air contaminants) at the Arkansas Street monitoring station. This monitoring station is located about one-half mile

northwest of the proposed facility location. Questions arose from the community during various workshops and meetings regarding whether the data collected at the Arkansas monitoring station represents the actual ambient air quality in the Potrero and Hunters Point communities. The residents of these two communities expressed concern that the air quality conditions measured at the Arkansas monitoring station may not represent the conditions in the Potrero and Hunters Point communities.

Does the Arkansas Street data represent site conditions?

Ambient air monitoring data measured in 1992 by PG&E, using standard methods, at the Potrero and Hunters Point power plants provide evidence that Arkansas Street data represent the site conditions. Staff randomly picked a date in 1992 and compared the measured hourly NO_x ambient concentrations at three sites (Arkansas Street, the Potrero power plant, and the Hunters Point power plant). The results are presented in **AIR QUALITY FIGURE 1**.

AIR QUALITY FIGURE 1



Source: Arkansas monitoring data extracted from CARB ambient air quality data, and Potrero and Hunter Point data extracted from PG&E own measurements in 1992.

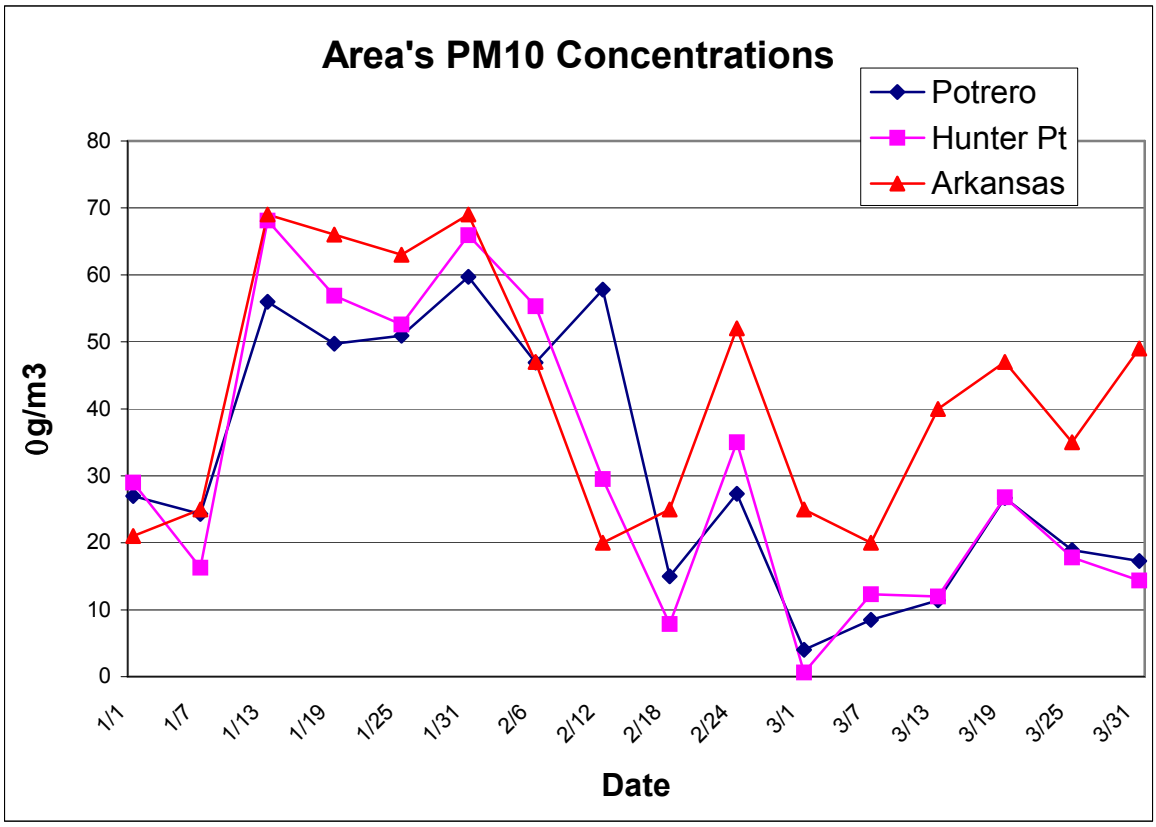
The ambient concentrations of NO_x that were measured at all three sites show a consistent pattern of peak and bottoms at all three sites. More importantly, the measured NO_x concentrations in Potrero and Hunters Point are generally lower than those measured at the Arkansas monitoring station. Therefore, staff believes that the Arkansas Street monitoring station data represent the local

ambient air quality, and the use of these data would be more conservative to assess the impacts and mitigation for the proposed SFERP facility.

Staff also compared the entire winter quarter's PM10 data at all three locations above and presented them in **AIR QUALITY FIGURE 2**.

Similar to the measured NO_x concentrations, the measured PM10 concentrations from all three monitoring stations show a consistent behavior and the same order of magnitude concentrations for PM10. Staff believes that the use of the current Arkansas monitoring station data would be appropriate to assess the impacts and mitigation for the proposed SFERP facility.

AIR QUALITY FIGURE 2



Source: Arkansas Street data extracted from the ARB ambient air quality data.
Potrero and Hunters Point data extracted from PG&E measurements in 1992.

Discussion of existing ambient air quality conditions

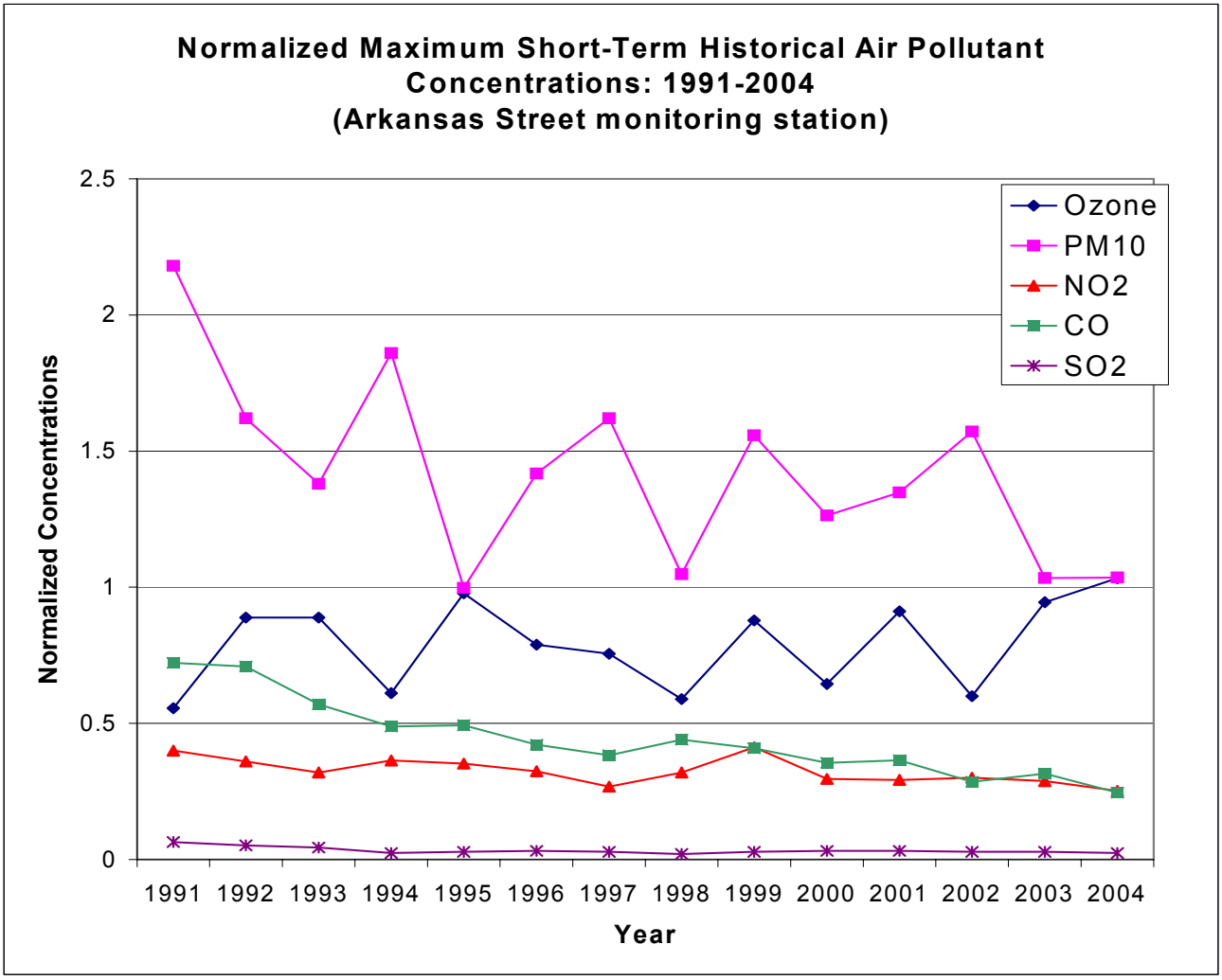
AIR QUALITY FIGURE 3 summarizes the historical air quality data for the project location for PM10, CO, SO_2, O_3, and NO_2. In **AIR QUALITY FIGURE 3**, the normalized concentrations represent the ratio of the highest measured concentrations in a given year to the most stringent applicable national or state ambient air quality standard. Therefore, normalized concentrations lower than one indicate that the measured concentrations were lower than the most stringent ambient air quality standard. Based on the ambient concentration data

collected, the area is consistently below the most stringent ambient air quality standards for all criteria pollutants except for PM10. Below is an in-depth discussion of ambient air quality conditions in the area for O_3, NO_2, CO and PM10.

Ozone

Ozone is not directly emitted from stationary or mobile sources, but is formed as the result of chemical reactions in the atmosphere between nitrogen oxides and volatile organic compounds in the presence of sunlight. The ambient ozone concentrations recorded between 1991 and 2004 have ranged from 5 to 9 parts per hundred millions (pphm). The entire bay area air basin is classified as serious non-attainment for the state 1-hour ozone air quality standard; however, the local area did not experience any violations of either the state or federal ozone air quality standards.

AIR QUALITY FIGURE 3



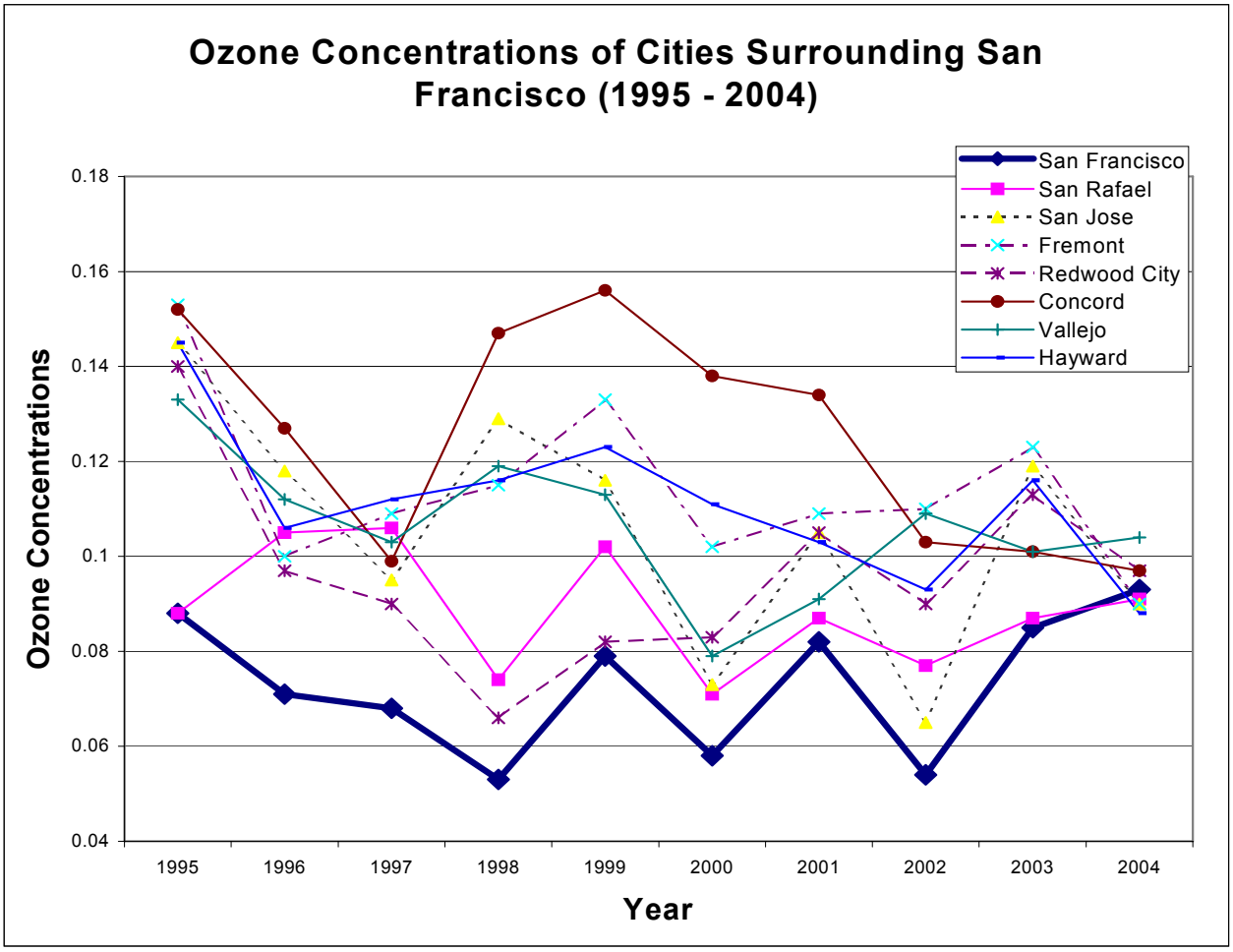
Source: CARB ambient air quality data.

AIR QUALITY FIGURE 4 represents the ozone concentrations of the area (between 1995 to 2004) compared to other cities surrounding the site. This figure shows that the area, during that time period, did not experience a violation of any ozone air quality standard. It also shows that its ambient ozone concentrations are lower than in other surrounding cities.

Nitrogen Dioxide

The entire Bay Area air basin is classified as attainment for the state 1-hour NO_2 standard. The NO_2 levels in the area are no more than half of the most stringent NO_2 ambient air quality standards, as shown in **AIR QUALITY FIGURE 3**. 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 and not in the winter when atmospheric conditions favor the trapping of ground level releases but lack significant photochemical activity (less sun light). In the summer the conversion rates of NO to NO_2 are high, but the relatively high temperatures and windy

AIR QUALITY FIGURE 4



Source: CARB ambient concentration data.

conditions disperse pollutants, preventing the accumulation of NO_2 to levels approaching the one-hour ambient air quality standard.

Carbon Monoxide

The area is classified as attainment for the state 1-hour and 8-hour CO standards. Indeed, the highest CO concentration levels measured in the area are at least 30 percent lower than the most stringent California ambient air quality standard and are on a slight downward trend (see **AIR QUALITY FIGURE 3**). 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

The entire Bay Area air basin is classified as non-attainment for the state 24-hour PM10 air quality standards. But, as shown in **AIR QUALITY FIGURE 3**, PM10 concentrations measured at the Arkansas Street site show a declining trend in the last thirteen years. The highest PM10 concentrations are normally measured in the winter, especially during evening and night hours (Bay Area 2000 Clean Air Plan). During wintertime when high PM10 episodes occur, the main sources of PM10 are wood smoke, combustion of fossil fuels, and entrained dust particles. On an annual basis, since 1995, the area has experienced one to six violations of the state 24-hour PM10 air quality standard during late fall and early winter.

AIR QUALITY FIGURE 5 represents the PM10 concentrations in the area (between 1995 to 2004) compared to other cities surrounding the site. This figure shows that the area's measured PM10 concentrations correspond to the same levels measured at the surrounding sites in the Bay Area.

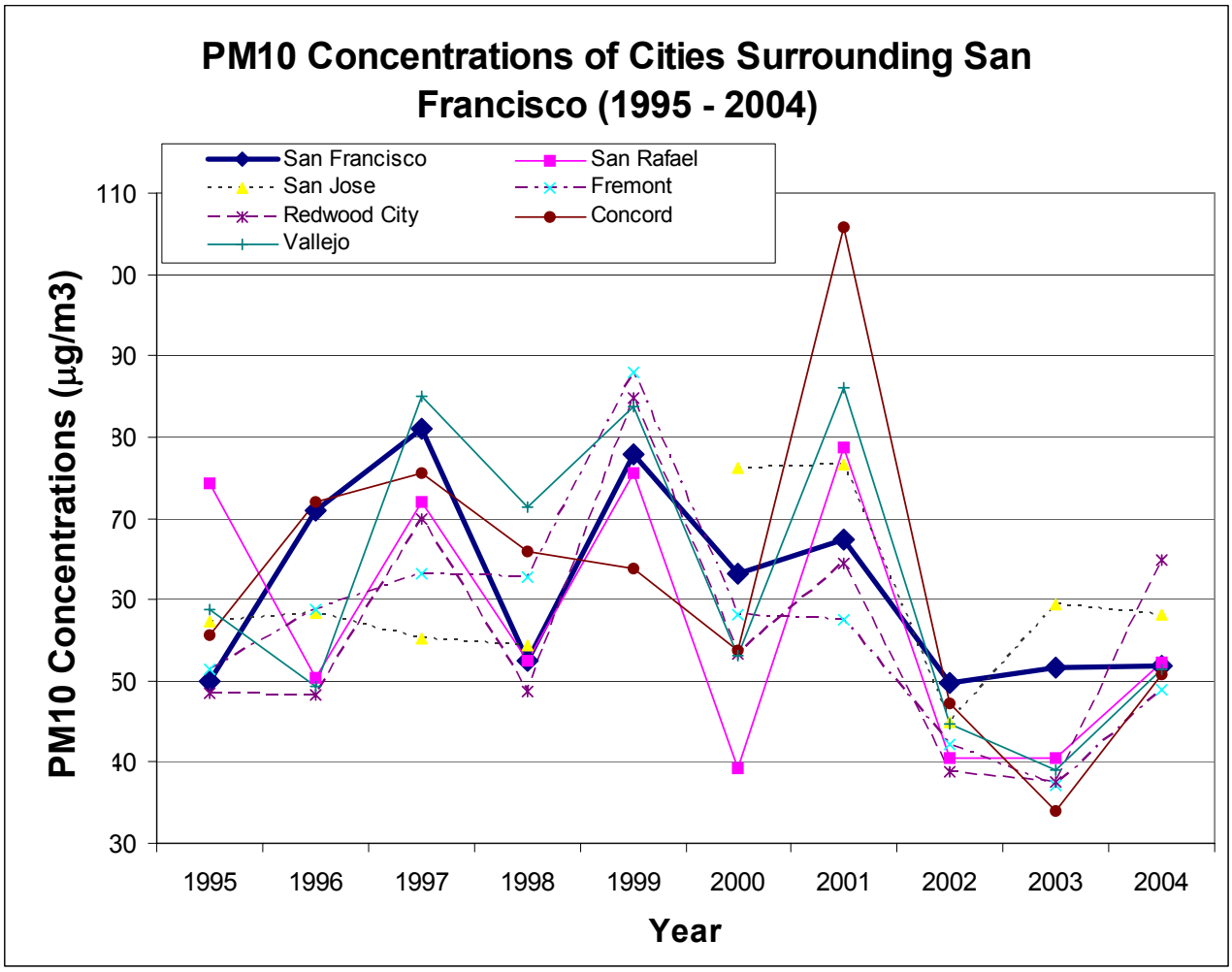
Fine Particulate Matter

Fine particulate matter, or PM2.5 (particulate matter less than 2.5 microns in diameter), 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. PM2.5 consists mostly of sulfates, nitrates, ammonium, elemental carbon, and a small portion of organic and inorganic compounds.

The U.S. EPA has promulgated a 65 $\mu g/m^3$ 24-hour PM2.5 standard and a 15 $\mu g/m^3$ annual PM2.5 standard, and has recently classified the district as attainment for both the federal annual and 24-hour PM2.5 standards.

The ARB recently adopted a new annual PM2.5 standard of 12 μg/m3, but has not determined the attainment status of any district. The ARB also considered adopting a new 24-hour PM2.5 standard, but deferred the adoption of such a standard until a later date.

AIR QUALITY FIGURE 5



Source: CARB ambient air quality data.

AIR QUALITY FIGURE 6 shows the highest measurements of PM2.5 and particulates that are nitrate-, sulfate-, ammonium- and chlorine-based. These measurements were taken at the Arkansas Street monitoring station in 1999 and 2000. **AIR QUALITY FIGURE 6** shows that the PM2.5 portion (which is generally caused by combustion processes from industrial, mobile sources and domestic activities) typically corresponds to and remains within 40 to 50 percent of the measured PM10. It should be noted, however, that chlorine-based particulates (sea salts) can account for between 3 to 30 percent of the ambient PM10 measured. Staff believes that spray salts can influence the measured PM10 at monitoring stations located near the ocean.

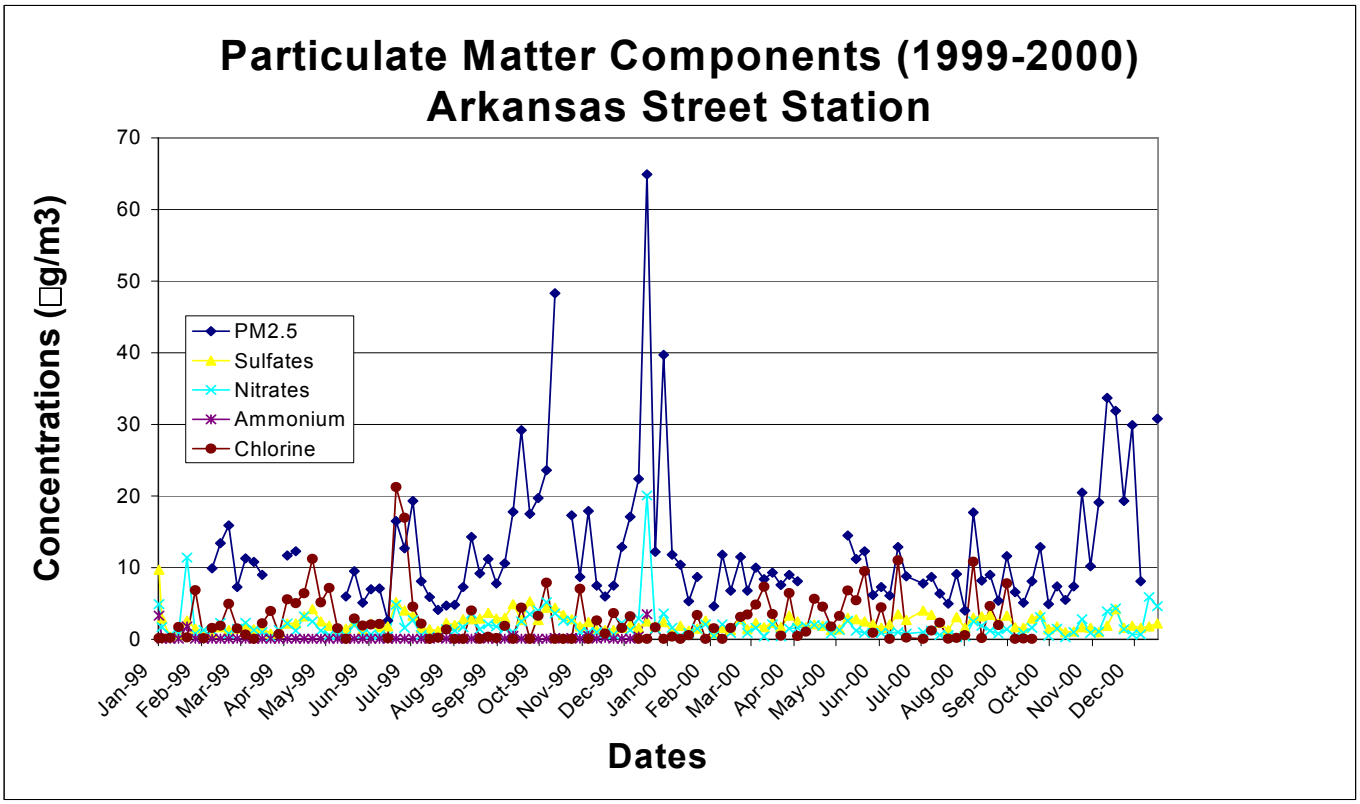
Nitrates and Sulfates

PM nitrate (mainly ammonium nitrate) is formed in the atmosphere from the reaction of NO_x and ammonia. NO_x, as emitted from combustion sources, is mainly in the form of nitric oxide (NO). NO converts to NO_2 primarily by reacting with ozone in the ambient air. The formed NO_2 can convert back to NO, which

sustains the ozone formation. NO_2 can also form organic nitrates, or be oxidized to nitric acid by available hydroxyl (OH) radicals in the ambient air. Nitric acid reacts with ammonia in ambient air to form ammonium nitrate. Ammonium nitrate, in its particulate form, can remain suspended in the ambient air and/or be transported long distance downwind as PM2.5.

Ammonium nitrate, under certain conditions of heat and humidity, breaks down to NO_x and starts a new ozone cycle again. The wintertime nitrates concentrations can range from 5 to 40 percent of the total PM2.5 and could be a major contributor to PM2.5.

AIR QUALITY FIGURE 6



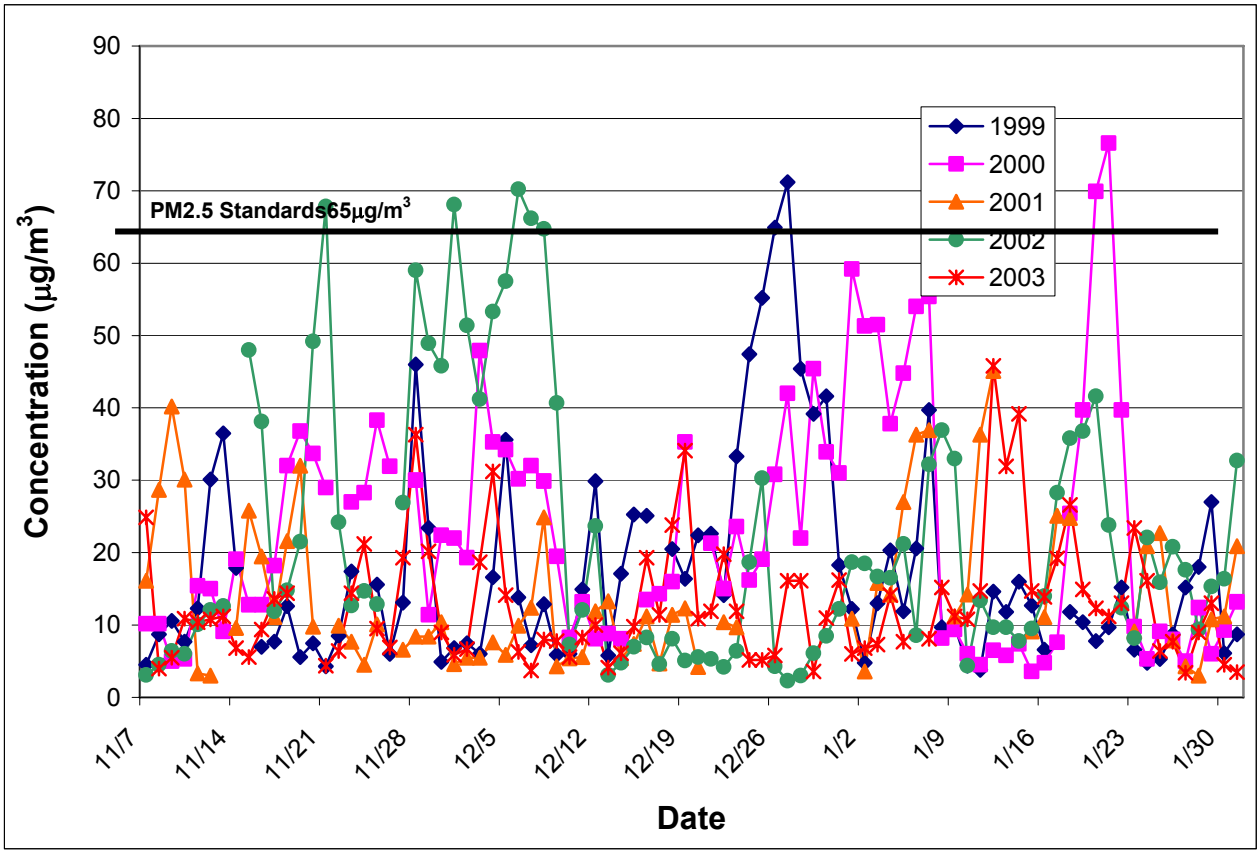
Source: CARB Ambient Air Quality Data.

PM sulfate (mainly ammonium sulfate) is formed in the atmosphere from the oxidation of SO_2 and subsequent neutralization by ammonia in the atmosphere. The oxidation of SO_2 depends on many factors, which include: the availability of hydroxyl (OH), hydroperoxy (HO_2) and methylperoxy (CH_3OH) radicals, and humidity. The sulfate portion can range from 5 to 70 percent of the total PM2.5 measured.

AIR QUALITY Figure 7 shows the measured PM2.5 concentrations for the period of November to January for the five years 1999 to 2003. This figure shows that the area exceeded the federal 24-hour PM2.5 standards for 2 to 7 days in

1999, 2000, and 2002. No violation of the federal PM2.5 standard was detected for the years 2001 and 2003.

AIR QUALITY FIGURE 7
Measured PM2.5 Concentrations (1999-2003)
Arkansas Street Station



Source: CARB ambient air quality data.

PROJECT DESCRIPTION

The proposed project consists of three natural gas-fired LM6000 Sprint combustion turbines and a two-cell cooling tower.

The turbines would be operating in simple cycle mode to produce approximately 145 MW of electricity. The three turbines combined would operate up to 12,000 hours per year (SFERP2005a, pp. 8.1-21). The applicant (City) proposes to equip each combustion turbine with water injection and selective catalytic reduction (SCR) systems to limit the NO_x emissions to 2.5 ppm@15 percent O_2. The City also proposes to install a CO oxidation catalyst system on each turbine to maintain CO emissions to no more than 4 ppm (SFERP2005a, pp. 8.1-28).

The City requests that the project be analyzed with the assumption of 250 hours of start-up and shutdowns for each turbine each year (SFERP2005a, pp. 8.1-29).

Using the proposed normal operation hours (12,000 hours per year) and the proposed start-up and shut down hours (250 hours per year, per turbine), the City has provided an estimate of the facility's emissions. The facility's expected maximum hourly, daily and annual emissions for NO_x, VOC, PM10, SO_x and CO are tabulated in **AIR QUALITY Table 3** below.

AIR QUALITY TABLE 3
Facility's Maximum Hourly, Daily and Annual Emissions

Equipment	NO_x	VOC	SO_x	CO	PM10[1]
Maximum Hourly Emissions (lb/hr)					
Turbine (start-up)[2]	120	6	1.3	30	9
Turbine (normal operation)	13.2	6	1.3	30	9
Cooling Towers	-	-	-	-	<0.1
Total Hourly	**120**	**6**	**1.3**	**30**	**9**
Maximum Daily Emissions (lb/day)					
Turbine[3]	744	97.8	32.3	378	216
Cooling Towers[4]	-	-	-	-	1
Total Daily	**744**	**98**	**32.3**	**378**	**217**
Maximum Annual (ton/year)					
Turbine[5]	39.8	7.7	2.7	27.9	18
Cooling Towers	-	-	-	-	0.2
Total Annual Emissions	**39.8**	**7.7**	**2.7**	**27.9**	**18.2**

Notes:
1. All PM10 emissions from natural gas-fired turbines are treated as PM2.5 (California Emission Inventory and Reporting System, CARB).
2. The turbine hourly emissions occur during start up, which is approximately 40 lbs/hr per turbine.
3. The turbine daily emissions include 4 hours of start-up and shut down for each turbine ((4*120)+ 20(13.2))=744.
4. Cooling tower emissions were estimated using 24 hour day operational schedule.
5. The turbine annual emissions include 750 hours of startup/shutdown and 12,000 hours of normal operation.

Source: AFC Section 8.1.5 (SFERP2005a).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff assesses three kinds of impacts: construction, operation, and cumulative effects. As the name implies, construction impacts result from the emissions occurring during the construction of the project. The operation impacts result from the emissions of the proposed project during operation. Cumulative impacts analysis assesses the impacts that result from the proposed project's incremental effect viewed over time, together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project. (Pub. Resources Code § 21083; Cal. Code Regs., tit. 14, §§ 15064(h), 15065(c), 15130, and15355.)

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

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 City has used an EPA-approved ISCST3 model to estimate the impacts of the project's NO_x, PM10, CO, and SO_x emissions resulting from project construction and operation. A description of the modeling analysis and its results are provided in Section 8.1.5.3 of the AFC (SFERP2005a). 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.

The ambient air quality standards that staff uses as a basis for determining project significance are health-based standards. They are set at levels to adequately protect the health of all members of the public, including those most sensitive to adverse air quality impacts, such as the aged, people with existing illnesses, and infants and children, while providing a margin of safety.

In general, the 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 a quarter mile north of the project site.

CONSTRUCTION IMPACTS

The results of the project's construction impacts analysis are presented in **AIR QUALITY Table 4**. The modeling analysis included both the fugitive dust and vehicle exhaust emissions, which include PM10, NO_x, and CO. In **AIR QUALITY Table 4**, the first and second columns list the air contaminant, i.e., NO_2, PM10, 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 further exacerbate existing violations of the state 24-hour PM10, the state annual PM2.5 and the federal 24-hour PM2.5 standards.

a) 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.	97.1	141	238	470	50%
CO	8-hr.	73.8	3644	3,718	10,000	37%
PM10	24-hr.	14.2	74	88	50	**180%**

Source: AFC, Appendix 8.1D, Table 8.1D-4 (SFERP2005a).

Staff reviewed the modeling and finds that construction of the facility would result in unavoidable short-term PM10 impacts. Because the area is non-attainment for the state's annual and 24-hr PM10 standards, the impacts from construction of the project are significant.

MITIGATION

To mitigate the impacts due to construction of the facility, the City has proposed the following mitigation measures:

a) All unpaved roads and disturbed areas in the project and linear construction sites will be watered until sufficiently wet to ensure that no visible dust plumes leave the project site.

b) Vehicle speeds will be limited to 15 miles per hour within the construction site.

c) All construction equipment vehicle tires will be washed or cleaned free of dirt prior to entering paved roadways.

d) Gravel ramps will be provided at the tire washing/cleaning station.

e) All entrances to the construction site will be graveled or treated with water or dust soil stabilization compounds.

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

g) All paved roads within the construction site will be swept twice daily when construction activity occurs.

h) At least the first 500 feet of any public roadway exiting from the construction site will be swept at least twice daily on days when construction activity occurs, and twice daily on any other day when dirt or runoff from the construction site is visible on the public roadways.

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

j) All vehicles that are used to transport solid bulk material on public roadways and that have potential to cause visible emissions will be provided with a

cover, or the materials will be sufficiently wetted and loaded onto the trucks in a manner to provide at least one foot of freeboard.

k) Wind erosion control techniques such as windbreaks, water, chemical dust suppressants, and vegetation will be used on all construction areas that may be disturbed. Any windbreaks used will remain in place until the soil is stabilized or permanently covered with vegetation.

l) Any construction activities that may cause excessive fugitive dust will cease when the wind exceeds 25 miles per hour unless water, chemical dust suppressants, or other measures have been applied to reduce dust such that no visible dust leaves the project site.

To reduce the impacts from the construction of the proposed project, staff recommends the implementation of mitigation measures contained in Conditions of Certification **AQ-SC1 to AQ-SC5**. These conditions include all of the City's proposed mitigation measures. In addition, staff's proposed Condition of Certification **AQ-SC3** requires the City to erect an eight-foot high temporary fence surrounding the construction site and laydown area to lessen the PM impact due to construction of the facility. This fence should be lined with material (such as solid construction tarp) to prevent transport of fugitive dust to publicly accessible areas. This fence can be removed after the end of the facility's construction period. Staff's proposed Condition of Certification **AQ-SC5** requires the use of ultra-low sulfur diesel fuel, low emission diesel engines and, if appropriate, soot filters on diesel-fueled construction equipment during construction.

OPERATION IMPACTS

The City has provided a modeling analysis using the EPA-approved ISCST3 model to estimate the impacts of the project's NO_x, PM10, CO, and SO_x emissions resulting from project operation (SFERP2005a).

Similar to the assessment of construction impacts, staff added the modeled impacts to the available highest ambient background concentrations recorded during the previous three years from nearby monitoring stations to assess the project operational impacts.

Staff tabulated the results of the modeling analysis for turbines and cooling tower, including steady state and start-up events in **AIR QUALITY Table 5**. The analysis shows that the project does not cause any new violations of NO_2, CO or SO_2 air quality standards, even with worst case ambient concentrations recorded. The project, however, would contribute to existing violations of the state 24-hour and annual PM10, and the federal 24-hour PM2.5 air quality standards. The project's impacts on the area's PM2.5 and PM10 air quality are significant.

AIR QUALITY Table 5
Project 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)	111.3	141	252	470[1]	54%
	1-hour (steady state)	8.3	141	149	470[1]	32%
	Annual	0.1	38	38	100[2]	38%
SO_2	1-hour	1.1	138	139	655[1]	21%
	24-hour	0.1	21	21	105[1]	20%
CO	1-hour (start up)	27.8	6,875	6,904	23,000[1]	30%
	8-hour	5.2	3,644	3,649	10,000[1]	36%
PM10	24-hour	1.2	74	75.2	50[1]	**150%**
	Annual	0.1	24.7	24.8	20[1]	**124%**
PM2.5	24-hour	1.2	77	78.2	65[2]	**120%**
	Annual	0.1	N/A	N/A	12[1]	N/A

[1] State standards
[2] Federal standards
Source: AFC Section 8.1 (SFPUC 2005a).

MITIGATION

Ozone Precursors

Because the project ozone precursor emissions can contribute to violations of the ozone air quality standards, the City proposes to mitigate the project's ozone precursors (NO_x and VOC) contribution with 47.5 tons of NO_x emission reduction credits (certificate number 896). These credits originated from the Potrero power plant site, which is one-quarter of a mile north of the proposed site. The amount of emission reduction credits would evenly offset the new ozone precursors emissions generated by the operation of the facility. Therefore, the project contribution to the ozone concentration is mitigated to a level of less than significance.

PM10

The City proposes to mitigate the project's PM10 contribution to the existing violations of the particulate matter standards in the area by increasing the use of high-efficiency street sweepers in southeast San Francisco to reduce road dust entrainment in the area. The City estimated that this control measure would generate up to 24 tons per year (TPY) of PM10 (3 TPY of which are PM2.5) emission reduction credits to mitigate the project emissions contribution. Therefore, the project's PM10 contribution to existing violations is mitigated to a level of less than significance.

PM2.5

The City has estimated that the project's PM2.5 emissions to be as much as 18 TPY. As such, a minimum of 18 TPY of PM2.5 emission reduction credits would be needed to fully mitigate the project's contribution. As mentioned above, the City's proposed implementation of high-efficiency street sweepers can only generate about three tons of PM2.5 emission reduction credits. The City proposes to implement another program to subsidize area homeowners to replace existing wood stoves and fireplaces with natural gas or propane fueled units. The emission reductions from this measure would be used to mitigate the project's 5 tons of fine particulate matter contribution during wintertime, based on the annual shortfall of 15 tons prorated for the four winter months (November through February) when the PM2.5 violations occur. Staff estimates that the City would have to subsidize replacement or modification of approximately 107 wood stoves (93 lbs/unit) or 961 fireplaces (10.4 lbs/unit) to generate 5 TPY of PM2.5.

The City proposes that in case the City does not want to go forward with the proposed woodstove replacement program, the City will provide SOx emission reduction credits to mitigate the project's remaining annual PM2.5 emission liability. The City has proposed a "3 to 1 ratio", i.e., for every pound of PM2.5 emissions from the proposed facility, three pounds of SOx are purchased to offset such increase. This offset ratio is consistent with the District Rule 2-2-301.1 requirements and is similar to ratios in other power plant siting cases that the Commission has licensed in the past (East Altamont, Los Esteros). Using the 3:1 SOx:PM2.5 ratio, staff estimates that the City would need to provide 45 tons of SOx emission reduction credits to mitigate the remaining 15 TPY of PM2.5.

Staff recommends that SOx emission reduction credits be acquired in the local Hunters Point and/or the Potrero area if they are used to mitigate the project's remaining PM2.5 emission liability. The use of local SOx emission reduction credits would ensure that local PM2.5 impacts are effectively mitigated.

Staff recommends the addition of Conditions of Certification **AQ-SC10, -SC11 and -SC12** to address the requirements of the City's proposed street sweeping program and the City's proposed additional programs to mitigate the project's PM2.5 emission liability. Successful implementation of the City's proposed programs would reduce the project's PM2.5 impact to a level of less than significance.

CUMULATIVE IMPACTS

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

background, particularly when one considers other closely related past, present, and reasonably foreseeable future projects.

This analysis is concerned with "criteria" air pollutants. Such pollutants have impacts that are usually (though not always) cumulative by nature. Rarely will a project cause a violation of a federal or state criteria pollutant standard. However, a new source of pollution may contribute to violations of criteria pollutant standards because of the existing background sources or foreseeable future projects. Air districts attempt to attain the criteria pollutant standards by adopting attainment plans, which comprise a multi-faceted programmatic approach to such attainment. Depending on the air district, these plans typically include requirements for air "offsets" and the use of "Best Available Control Technology" for new sources of emissions, and restrictions of emissions from existing sources of air pollution.

Much of the preceding discussion is concerned with cumulative impacts. "Existing Ambient Air Quality" describes the air quality background in the Bay Area, followed by discussions of historic ambient levels for each of the significant criteria pollutants. "Construction Activities" discusses the SFERP project's contribution to the local existing background caused by project construction. This section includes three additional analyses:

- a summary of projections for criteria pollutants by the air district and the air district's programmatic efforts to abate such pollution;
- an analysis of the project's "localized cumulative impacts"-- direct emissions locally when combined with other local major emission sources (i.e., other San Francisco electric generation facilities); and
- a discussion of secondary pollution impacts, particularly ozone and PM10.

Summary of Projections

Ozone

The air district is currently classified as not in attainment (or "nonattainment") for the federal 1-hour ozone requirement.[1] Consequently, the air district is required to prepare and adopt an ozone attainment plan for submittal to the U.S. EPA describing how the air district will achieve attainment with the 1-hour standard. On October 24, 2001, the air district adopted its Revised San Francisco Bay Area Ozone Attainment Plan for the National 1-Hour Ozone Standard ("OAP"). Pursuant to state law, the air district had previously prepared and adopted the Bay Area 2000 Clean Air Plan ("CAP") for submittal to the California Air Resources Board ("CARB"). These two documents, which have been adopted by the agency's Board of Directors and are publicly available, provide a detailed

[1] EPA designated the air district as in attainment with the standard in 1995 after five years of no exceedances. However, after exceedances of the standard in 1995 and 1996, EPA re-designated the district "nonattainment" in 1998. (OAP, p. 1.)

description of ozone levels within the air district, and the district's program to achieve compliance with the federal standard.

The OAP states that the Bay Area meets the federal 1-hour ozone standard 99.9 percent of the time, but that there are rare occasions that the standard is exceeded on hot days in the inland valleys, especially near Livermore. (OAP, p.4.) Since 1980, the Bay Area's population has increased by more than 30 percent, and traffic has increased by more than 70 percent, but the level of per capita ozone exposure has decreased 70 percent since 1986. (CAP, pp. 9-10.) During the same period, peak ozone concentrations have diminished by an average of 1.2 percent per year on average. (CAP, p. 9.) For the period from 1990-2000, the highest number of violations occurred in Livermore (2.7 violations per annum) and Concord (1.0 violation per annum). (OAP, p. 4.) Notably, there have been no violations of the federal standard in San Francisco. (*Ibid*.)

The OAP describes the emissions inventory and breaks it down by county and source of emissions. The point source inventory includes over 20,000 different sources, and the summary of those sources includes the following narrative:

> *The inventory includes emissions from existing and new power plants, including proposed plants that have not yet received permit approval, based on California Energy Commission projections of capacity and demand. The inventory includes substantial increases in generation of electricity at Bay Area power plants. The power production in 2006 is projected to be more than twice the year 2000 levels. Production by existing plants will drop by 20 percent by 2006. That electric demand, plus the projected increases, will be generated by newly constructed plants. Because the new plants are much cleaner and more efficient than the existing plants, overall NO_x emissions for this source sector will decrease by 69 percent from 2000 to 2006. (OAP, p. 6.)*
>
> *The two principal ozone precursor emissions are NO_x and VOC (also called "ROG"). The dominant origin of these emissions is motor vehicles (49 percent of NO_x and 45 percent of VOC) and other mobile sources (35 percent of NO_x and 15 percent of VOC). (CAP, p. 4.) Industrial and commercial sources comprise one percent of NO_x emitting sources and five percent of VOC. Combustion sources, including power plants, comprise the source of 15 percent of NO_x and one percent of VOC.*
>
> *The air district is attempting to attain compliance with the ozone standard by imposing restrictions on the production and use of solvents and chemicals and requiring various transportation efficiency measures Newer measures include restrictions on aerosol coatings, requirements for the storage of organic liquids, refinery flare monitoring, low-emission refinery valves, rules for architectural coatings, rules for depressurizing vessels, and a vehicle inspection and maintenance program. (OAP, pp.*

25-28.) Measures required by CARB for vehicle emissions are also expected to significantly reduce the total of NO_x and VOC emissions in the Bay Area. (Ibid.) VOC and NO_x emissions will continue to decline in the Bay Area For the period 1995 to 2006, the air district forecasts a VOC decline from 681 tons per day (tpd) to 432 tpd; during the same period NO_x emissions are forecast to decline from 752 tpd to 524 tpd These reductions are calculated by the OAP to result in compliance with the ozone standard by 2006. (OAP, pp. 15-22.) Additional "contingency measures" are also identified in the plan should the goal of attainment not be reached. (OAP, p. 33.) The attainment plan, including emissions inventory and suggested control measures, is described in detail in the OAP.

Particulate Matter

The U.S. EPA's current PM10 standard was adopted in 1987. The air district is in compliance with that federal standard, so there is no adopted implementation plan. However, the federal standards have been criticized for failure to be sufficiently health protective, and California has adopted far more stringent standards for PM10. Currently, virtually all air districts in the state (the lone exception is Lake County), including the Bay Area, are nonattainment with the state PM10 standard. There is no legal requirement for air districts to provide plans to attain the state PM10 standard, so air districts have not developed such plans. (See CAP, p. 12.) In 1997 the federal government adopted PM2.5 standards, as did the state in 2003. Neither the EPA nor CARB have classified the state's air districts as attainment (or nonattainment), so there are, as yet, no federal or state attainment plans for PM2.5.

However, the air districts do monitor for PM10 (and more recently, for PM2.5), and CARB inventories major stationary sources. This information provides a useful picture of what the levels of particulate pollution are in various parts of the state, and some measure of the trend lines for such emissions.

With regard to the air district, CARB has recently provided the following summary regarding PM10 trends:

> *As with other pollutants, the PM 10 statistics also show overall improvement. During the period for which data are available, the maximum annual average of quarters (state) decreased about 26 percent. [Para.] Calculated exceedence days for the State 24-hour standard dropped from a high of 123 days during 1988 to 30 days during 2002. The national 24-hour standard was last exceeded in 1991. Because many of the same sources contribute to both ozone and PM 10 exposure, future ozone precursor emission controls should help to ensure continued PM 10 improvements. (CARB, 2004 California Almanac of Emissions and Air Quality ["2004 Air Almanac"], p. 154.)*

Despite this positive assessment, direct PM10 emissions have actually increased in the air district by roughly 10 percent since 1980. All stationary sources, including power plants, comprise roughly eight percent of total direct PM10 emissions; the dominating source of emissions is "Area-wide Sources," which is defined as "primarily fugitive dust sources." (2004 Air Almanac, p. 152.) [Table 4-14 (p. 152) from the Air Almanac.]

PM10 exceedences occur primarily in the winter during evening and night hours, from a combination of wood smoke, fossil fuel combustion, airborne dust entrained by motor vehicles, and construction. (CAP, p.12.) The largest source, wood-burning, occurs principally in winter and represents about one-third of district PM10 emissions. (*Ibid*.) Exceedances of the PM10 24-hour state standards are greatly influenced by weather (*ibid*.), usually occurring during periods of calm in the winter months.

The air district's annual pollution summaries for 2000-2003 indicate that the annual average PM10 levels, maximum 24-hour measurements, and number of days exceeding the state standard are fairly uniform throughout the Bay Area. (See **AIR QUALITY Table 6** below, which compares four such Bay Area locations.) Measurements for San Francisco do not differ greatly from those of measurements in the North Counties (e.g., Napa, Santa Rosa, San Rafael), the Eastern District (e.g., Concord, Livermore, Pittsburg), South Central Bay (e.g., Fremont, Redwood City), or the Santa Clara Valley (e.g., San Jose). In each of these locations, including San Francisco, there are several measured violations each year[2], with the highest 24-hour average normally between 50 and 100 ug/m3.

AIR QUALITY Table 6
PM10 Air Quality in the Four Bay Area Counties (μg/m3)

	2000			2001			2002			2003		
	Ann. Avg.	Max. 24 hrs	Days	Ann. Avg.	Max. 24 hrs	Days	Ann. Avg.	Max. 24 hrs	Days	Ann. Avg.	Max. 24 hrs	Days
San Francisco	24	63	2	26.4	67	7	24.7	74	2	22.7	52	1
Napa	16.2	45	0	24	91	2	25.4	67	4	21.3	41	0
Pittsburg	16.4	56	2	20.6	98	NA	23.7	73	3	21.1	59	1
San Jose Central	26.7	76	7	28.9	77	4	NA	70	2	23.6	60	3

Applicable Standards (ug/m_3)
Annual Avg. State 20; U.S. 50
24-Hour State 50; U.S. 150
Source: BAAQMD Annual Air Pollution Summaries, years 2000-2003.

If PM10 levels in the Bay Area are relatively uniform, they are also lower (both for 24-hour concentrations and annual averages) than the levels in many of the state's other air districts. (See, e.g., 2004 Air Almanac, p. 75, Table 2-13.)

[2] PM 10 measurements are taken every *sixth* day. The air district thus states that "Actual days over the standard can be estimated to be six times the number shown."

However, they are distinctly higher than the levels measured in "pristine" locations such as the national parks. (CARB Staff Report: Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates, May 3, 2002, p. 6-12.) For instance, the aggregated three-year annual average PM10 level for Yosemite National Park is 8.52 ug/m3 (compared to the new state standard of 20); the aggregated three-year annual average PM2.5 level was 4.33 ug/m3 (compared to the new state standard of 12). (*Ibid*.)

As mentioned earlier, the U.S. EPA has identified the Bay Area as attainment for both the federal 24-hour and the federal annual PM2.5 air quality standards.

California has recently adopted a new PM2.5 annual average standard of 12 ug/m3, which is again more stringent than the federal standard of 15 ug/m3. Because the standard is so new, air districts' attainment status have not yet been designated. San Francisco and the Bay Area generally appear to have average annual levels right at the margin of attainment; San Francisco had annual average PM2.5 levels of 13.1 ug/m3 in 2002, and 10.1 ug/m3 in 2003. ("Bay Area Air Pollution Summary—2003," BAAQMD.) The three-year annual average in 2003 was 11.9 ug/m3. For comparison, the three-year annual average for San Jose Tully Road was 11.8 ug/m3; for Concord 11.4 ug/m3; for Livermore 12.3 ug/m3. (*Ibid.*) Compared to most other air basins, Bay Area PM2.5 levels are markedly lower. (2004 Air Almanac, p. 81.)

Direct PM2.5 emissions from stationary sources (including power plants) have decreased in recent years, while "Area-wide Sources" (primarily fugitive dust) have increased slightly. (2004 Air Almanac, p. 153.) Motor vehicle emissions are decreasing due to more stringent emission standards and clean fuel requirements. (*Ibid*.) According to the air district, overall direct emissions are "declining slightly between 1975 and 2010." (*Ibid.*) However, emissions have actually increased slightly since 2000.

More attention is being focused on particulate emissions, and those districts that are not in attainment with the new federal standards will be required to prepare attainment plans for CARB and U.S. EPA approval. In the meantime, the air district may continue to support voluntary local programs to support abatement of sources such as woodsmoke. In addition, new legislation enacted in the 2003 legislative session (SB 656) will require CARB, in consultation with the air districts, to develop and adopt a list of the most readily available, feasible, and cost-effective control measures that could be employed by CARB and the air districts to reduce PM10 and PM2.5. The goal of this legislation is to make progress toward attainment of the new state and federal particulate standards. The new legislation requires CARB and the air districts to adopt implementation schedules for appropriate measures by July 31, 2005. On November 9, 2005, the District issued a final staff report on the Particulate Matter Implementation

Schedule. This proposed schedule was approved by the District's Board of Directors at its regularly scheduled meeting on November 16, 2005.

Cumulative Impacts Analysis

Staff's cumulative impact assessment is comprised of three types of analyses. The first is a summary of projections of criteria pollutants by the responsible air agencies, including the air district and CARB. The second, which follows, is an analysis of the project's "localized cumulative impacts"—the project's direct emissions when combined with other major local emissions sources (i.e., other San Francisco electric generation facilities emissions). Finally, staff provides a discussion of secondary pollutant impacts, particularly for ozone and PM.

Localized Cumulative 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. The City has provided a cumulative impact analysis (SFERP2005f, App. F), which includes three facilities that are under construction. They are SF Self Storage, SF Wave Exchange, and the University of California San Francisco. In addition to the emissions from these three facilities, the City also conducted an analysis, which for conservative estimates, includes future operation scenarios of the Potrero and Hunter Point power plants.

Air Quality Table 7 provides a summary of the possible cumulative impacts the project, in combination with other projects (Hunters Point, Potrero, SF Self Storage, SF Wave Exchange, and UCSF), can exert in the area. The results of the analysis show that the PM10 cumulative impacts of the project and others on the area can be significant. Again, if the City's proposed local area PM10 mitigation measures are successfully carried out (see **OPERATIONAL IMPACT MITIGATION** Section), staff believes that the impacts contributed by this facility can be mitigated to a level of less than significant.

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

Air Quality Table 7
Cumulative Air Quality Impacts
Potrero and Hunters Point at Maximum Future Emissions

Pollutant	Maximum Modeled Concentration in ug/m3 At Location of SFERP Max Impact				Maximum Modeled Concentration in ug/m3 At Location of Maximum Combined Impact				Current Background [c] ug/m3	Total Cumulative Impact, All Sources ug/m3
	SFERP	Other cumulative sources [a]	POT/HP [b]	Total	SFERP	Other Cumulative Sources [a]	POT/HP [b]	Total		
NOx: 1-hr [d]	8.3	0	34.4	42.7	0	172	0	172	141	313
NOx: annual [e]	0.1	0.1	0.3	0.5	0.02	11.4	0.1	11.5	36	48
PM10: 24-hr	1.2	0.01	1.2	2.4	0	8.7	0	8.7	74	82.7
PM10: annual	0.08	0.005	0.01	0.1	0.01	0.6	0.03	0.6	26.3	26.9

Notes:
a. SF Self Storage, SF Wave Exchange and UCSF.
b. Potrero and Hunters Point future emissions based on maximum allowable generating levels; compliance with future regulations.
c. Maximum monitored ambient concentrations at Arkansas Street, 2001-2003.
d. 1-hr avg NOx ozone-limited using concurrent ozone data for hour of maximum modeled impact.
e. Annual average NOx ozone-limited using ARM and national default factor of 0.75.

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 City 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 the San Francisco area. Staff believes that the provided emission reductions are in sufficient quantity to mitigate the proposed project's ozone impact.

Secondary PM2.5 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 PM2.5

Not all volatile organic compounds can form secondary PM2.5. VOC with six or less carbon atoms in the chain will not participate in the formation of the carbon based PM2.5. The project's VOC emissions would be in the form of unburned natural gas, mostly methane and ethane, which contain only one and two carbon atoms, respectively. Thus, the turbine exhaust is not expected to emit any significant amounts of VOC that can participate in the formation of secondary PM2.5. Therefore, the project organic condensable impact is not significant.

Ammonia, Nitrate and Sulfate PM2.5

Staff believes that the project‘s ammonia, SO_x and NO_x emissions have a potential to contribute to ammonium sulfate and ammonium nitrate formation. As mentioned earlier in the **SETTING** section, such secondary PM would worsen the violations of the state 24-hour and annual PM10 standards and the federal 24-hour PM2.5 standard. 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 (CARB, 2002) also shows that secondary ammonium nitrate (formed by NO_x and ammonia) can account for over half of the wintertime PM2.5 mass during the winter at most of the urban sites in California.

Ambient concentration data collected at the Arkansas Street station shows that secondary particulate nitrates account for about 5 to 40 percent of the total mass of PM10 in the area. The same data also show that secondary particulate sulfates account for about 5 to 70 percent of total mass of PM10 in the area. On the other hand, the secondary particulate ammonium only accounts for about one to five percent of the total mass of PM2.5.

The ammonia emissions from the project would come from the NOx emissions control (SCR) system as ammonia, or ammonia slip, passing through the system unreacted. While the unreacted ammonia is a necessary by-product of the NOx

control system, staff encourages the City to limit the ammonia slip emissions to the lowest extent possible while maintaining the NOx emission limits. CARB has indicated that local air pollution or air quality management districts consider recommending an ammonia slip emission limit of 5 ppm for gas turbines using SCR to control NOx emissions (CARB 1999). For large frame turbines with effective dry low NOx combustor, staff agrees with the CARB recommendation; however, for this project, using aero-derivative turbines running in simple cycle mode, staff considers the City proposed 10 ppm ammonia slip emission limit to be acceptable.

The City proposes to mitigate the project's PM2.5 emission contribution by providing an offset package that includes emission reduction credits and implementing local programs to benefit the local area air quality. The package includes 48 TPY of NOx emission reduction credits and local mitigation programs, such as high-efficiency street sweeping, replacement or modification of existing wood stoves and fireplaces, or providing additional SOx emission reduction credits. Because the amount of NOx emission reduction credits are higher than the project's NOx emissions and the local mitigation program would fully offset the project's PM2.5 emissions, staff believes the City's proposed mitigation package would mitigate the project's PM2.5 impacts to a level of less than significant.

Greenhouse Gas Reporting

In addition to regulated criteria pollutants, the combustion of fossil fuels produces air emissions known as greenhouse gases. These include primarily carbon dioxide, nitric oxide and methane (unburned natural gas). Greenhouse gases are known to contribute to the warming of the earth's atmosphere. Climate change from rising temperatures represents a risk to California's economy, public health, and environment (CEC 2003). In 1998, the Energy Commission identified a range of strategies to prepare for an uncertain climate future, including a need to account for the environmental impacts associated with energy production, planning, and procurement (CEC 1998, p.5). In 2003, the Energy Commission recommended that the state should require reporting of greenhouse gas emissions as a condition of state licensing of new electric generating facilities (CEC 2003, p. 42). Staff recommends Condition of Certification **AQ-SC9**, which requires the project owner to report the quantities of relevant greenhouse gases emitted as a result of electric power production. Such reporting would be done in accordance with accepted reporting protocols as specified.

The calculations specified in Condition of Certification **AQ-SC9** are based on standard protocols developed by the Intergovernmental Panel on Climate Change, an international scientific body that is responsible for developing a common methodology for developing greenhouse gas inventories for all world governments to follow. The calculations are for those emissions associated with on-site fuel storage; all fuel combustion associated with the prime mover of the power plant; and the associated emissions of the on-site power transformer

equipment. The greenhouse gas emissions to be reported in Condition of Certification **AQ-SC9** are carbon dioxide, methane, nitric oxide and sulfur hexafluoride emissions that are directly associated with the production and transmission of electric power.

The Intergovernmental Panel on Climate Change-approved methodology for calculating the greenhouse gas emissions in an inventory is particular to the type of fossil fuel burned. The oxidation factors, fuel-based emission factors and global warming potential factors are established by the Intergovernmental Panel on Climate Change in their Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual.

COMPLIANCE WITH LORS

FEDERAL

The District issued a Final Determination of Compliance (FDOC) on January 19, 2006. 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 will be determined at a later date.

STATE

Staff believes that the operation of the project, after the implementation of the applicant's proposed and staff's recommended additional mitigation measures, and the District recommended conditions specified in the FDOC (**AQ-1** to **42**), would comply with all applicable state LORS.

LOCAL

The District has issued a FDOC, 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.

NOTEWORTHY PUBLIC BENEFITS

The City plans to operate local monitoring stations prior to SFERP operation that would collect information on air quality and provide a basis to address community concerns related to the possible need for further mitigation measures. In connection with the SFERP, the City is operating a total of five $PM_{10}/PM_{2.5}$ monitoring stations in Southeast San Francisco. Monitoring, which began in early July, 2005, is taking place at two locations in Bayview/Hunters Point and two locations in Potrero area. Each location has two samplers: one for PM_{10} and one

for $PM_{2.5}$. The City is also collecting ambient air quality data at the Bay Area AQMD Arkansas Street monitoring station to allow a direct comparison of the Bay Area AQMD's measurements with those from the City's monitoring program. Depending on the data obtained from these stations, the City may continue to monitor the air quality in the southeast part of the City after SFERP start-up.

In addition to the above, it is noteworthy that one of the project objectives of SFERP is to enable the shutdown of Hunters Point Units 1 and 4. The City has been in discussion with the California Independent System Operator (CA ISO) regarding the prerequisites to such a shutdown and the factors that would lead to the termination of the Reliabity Must Run (RMR) contracts for the Hunters Point power plant. This process is still evolving, but it appears increasingly likely that the Hunters Point Units will shut down as a result of these efforts in the approximate time frame that SFERP comes on-line. The Hunters Point units have been a community health concern for many years. The final closure of these units will constitute a benefit to the surrounding community and the air basin by removing this concern. Additionally, the construction of the SFERP and the other small power plant proposed by the City at a site near the San Francisco International Airport, and four additional transmission projects planned to be in service by 2007, may allow the City to terminate the Reliable Must Run agreement with the CA ISO for the Mirant Potrero power plant. If this happened, Mirant may find that continued operation of the Potrero power plant is uneconomic and shut it down.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

No agency or public comments pertaining to air quality have been received as of the preparation of this Final Staff Assessment.

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 level that is less than significant.
- The project PM10 emissions can contribute to the existing violations of the state 24-hour PM10 air quality standard. However, staff has determined that

the proposed mitigation (in the form of PM10 emission reduction credits) would mitigate the project's impact to a level that is less than significant.

- Staff recommends nine additional restrictions on construction activities, which are described in Conditions of Certification **AQ-SC1 to AQ-SC5**. Staff believes that with this addition, the project's construction impacts from PM10 and PM2.5 emissions would be mitigated to a level that is less than significant.
- Staff recommends the addition of three Conditions of Certification **AQ-SC6** to **AQ-SC8** to enhance staff's ability to track the construction and operation of the project.
- Staff recommends the addition of Condition of Certification **AQ-SC9** to require greenhouse gas reporting.
- Staff recommends the addition of three Conditions of Certification **AQ-SC10** to **AQ-SC12** (local PM2.5 emissions mitigation measures) to mitigate the project's PM2.5 emission impacts to a level that is less than significant.

PROPOSED CONDITIONS OF CERTIFICATION

AQ-SC1 Air Quality Construction Mitigation Manager (AQCMM): The project owner shall designate and retain an on-site AQCMM who shall be responsible for directing and documenting compliance with conditions AQ-SC3, AQ-SC4 and AQ-SC5 for the entire project site and linear facility construction. The on-site AQCMM may delegate responsibilities to one or more AQCMM Delegates. The AQCMM and AQCMM Delegates shall have full access to all areas of construction on the project site and linear facilities, and shall have the authority to stop any or all construction activities as warranted by applicable construction mitigation conditions. The AQCMM and AQCMM Delegates may have other responsibilities in addition to those described in this condition. The AQCMM shall not be terminated without written consent of the CPM.

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

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

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

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

a) All unpaved roads and disturbed areas in the project and linear construction sites shall be watered as frequently as necessary to comply with the dust mitigation objectives of AQ-SC4. The frequency of watering 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 construction equipment vehicle tires shall be inspected and washed as necessary to be 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 unpaved exits from the construction site shall be graveled or treated to prevent track-out to public roadways.

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

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

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

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

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

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

n) Construction areas adjacent to any public accessible roadway shall be provided with an eight foot high temporary fence. This fence should be lined with material (such as solid construction tarp) to prevent transport of fugitive dust to publicly accessible

areas. This fence can be removed after the end of the facility's construction period.

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

AQ-SC4 Dust Plume Response Requirement: The AQCMM or an AQCMM Delegate shall monitor all construction activities for visible dust plumes. Observations of visible dust plumes that have the potential to be transported (1) off the project site or (2) 200 feet beyond the centerline of the construction of linear facilities or (3) within 100 feet upwind of any regularly occupied structures not owned by the project owner indicate that existing mitigation measures are not resulting in effective mitigation. The AQCMP shall include a section detailing how the additional mitigation measures will be accomplished within the time limits specified. The AQCMM or Delegate shall implement the following procedures for additional mitigation measures in the event that such visible dust plumes are observed:

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

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

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

Verification: The project owner shall include in the Monthly Compliance Report (MCR): (1) a summary of all actions taken to maintain compliance with this condition, (2) copies of any complaints filed with the air district in relation to project construction, and (3) any other documentation deemed necessary by the

CPM and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

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

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

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

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

1) There is no available soot filter that has been certified by either the California Air Resources Board or U.S. Environmental Protection Agency for the engine in question; or

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

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

4) the CPM may grant relief from Tier 2 requirement for construction diesel engines, which have a rating of 100 hp or more if they are owned and/or operated by a Disadvantaged

Business Enterprise certified by the San Francisco Human Rights Commission.

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

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

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

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

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

e) All heavy earthmoving equipment and heavy duty construction related trucks with engines meeting the requirements of (c) above shall be properly maintained and the engines tuned to the engine manufacturer's specifications.

f) All diesel heavy construction equipment shall not remain running at idle for more than five minutes, to the extent practical.

Verification: The project owner shall include in the MCR (1) a summary of all actions taken to maintain compliance with this condition, (2) copies of all diesel fuel purchase records, (3) a list of all heavy equipment used on site during that month, including the owner of that equipment and a letter from each owner indicating that equipment has been properly maintained, and (4) any other documentation deemed necessary by the CPM and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

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

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

AQ-SC7 The project owner shall surrender 47.5 tons of NOx from the emission offset credits certificate number 896 at the time that surrender is required by condition **AQ-38**. The project owner may request CPM approval for any substitutions or modification of credits. The CPM, in consultation with the District, may approve any such change to the NOx ERC list provided that the project remains in compliance with all applicable laws, ordinances, regulations, and standards, the requested change(s) clearly will not cause the project to result in a significant environmental impact, and each requested change is consistent with applicable federal and state laws and regulations.

Verification: The project owner shall submit to the CPM a list of NOx ERCs to be surrendered to the District at least 60 days prior to initial startup. If the CPM, in consultation with the District, approves a substitution or modification, the CPM shall file a statement of the approval with the commission docket and mail a copy of the statement to every person on the post-certification mailing list. The CPM shall maintain an updated list of approved NOx ERCs for the project.

AQ-SC8 The project owner shall comply with all staff (AQ-SC) and district (AQ) Conditions of Certification. The CPM, in consultation with the District, may approve as an insignificant change, any change to an air quality Condition of Certification, provided that: (1) the project remains in compliance with all applicable laws, ordinances, regulations, and standards, (2) the requested change clearly will not cause the project to result in a significant environmental impact, (3) no additional mitigation or offsets will be required as a result of the change, (4) no existing daily, quarterly, or annual permit limit will be exceeded as a result of the change, and (5) no increase in any daily or annual permit limit will be necessary as a result of the change.

Verification: The project owner shall notify the CPM in writing of any proposed change to a condition of certification pursuant to this condition and shall provide the CPM with any additional information the CPM requests to substantiate the basis for approval.

AQ-SC9 If the project owner does not participate in the voluntary California Climate Action Registry, then the project owner shall report on a quarterly basis to the CPM the quantity of greenhouse gases (GHG) emitted as a direct result of facility electricity production as follows:

The project owner shall maintain a record of fuel use in units of million-Btus (mmBtus) for all fuels burned on site for the purpose of power production. These fuels shall include but are not limited to: (1) all fuel burned in the combustion turbines, (2) HRSGs (if applicable) or auxiliary boiler (if applicable), and (3) all fuels used in any capacity for the purpose of turbine startup, shutdown, operation or emission controls.

The project owner may perform annual source tests of CO_2 and CH_4 emissions from the exhaust stacks while firing the facility's primary fuel, using the following test methods or other test methods as approved by the CPM. The project owner shall produce fuel-based emission factors in units of lbs GHG per mmBtu of fuel burned from the annual source tests. If a secondary fuel is approved for the facility, the project owner may also perform these source tests while firing the secondary fuel.

Pollutant	Test Method
CO_2	EPA Method 3A
CH_4	EPA Method 18 (VOC measured as CH_4)

As an alternative to performing annual source tests, the project owner may use the Intergovernmental Panel on Climate Change (IPCC) Methodologies for Estimating Greenhouse Gas Emissions (MEGGE). If MEGGE is chosen, the project owner shall calculate the CO_2, CH_4 and N_2O emissions using the appropriate fuel-based carbon content coefficient (for CO_2) and the appropriate fuel-based emission factors (for CH_4 and N_2O).

The project owner shall convert the N_2O and CH_4 emissions into CO_2 equivalent emissions using the following IPCC Global Warming Potentials (GWP): 310 for N_2O (1 pound of N_2O is equivalent to 310 pounds of CO_2) and 21 for CH_4.

The project owner shall maintain a record of all SF_6 that is used for replenishing on-site transformers. At the end of each reporting period, the project owner shall total the mass of SF_6 used and convert that to a CO_2 equivalent emission using the IPCC GWP of 23,900 for SF_6.

On a quarterly basis, the project owner shall report the CO_2 and CO_2 equivalent emissions from the described emissions of CO_2, N_2O, CH_4 and SF_6.

Verification: Any greenhouse gas emissions that are reported by the project owner to the California Climate action Registry or pursuant to this condition shall be reported to the CPM as part of the fourth Quarterly or the annual Air Quality Report.

AQ-SC10 For as long as the project is in operation, the project owner shall provide daily street cleaning services using high-efficiency street sweepers for a total of no less than 9.6 miles of Third, Cesar Chavez,

16th, Illinois, Tennessee, Evans, 23rd, 25 streets and Pensylvania Ave.

Verification: The project owner shall keep daily records of the street sweeping activities and shall submit to the CPM the quarterly and annual compliance reports as required by Condition 20.

AQ-SC11 The project owner shall provide an additional 5 TPY of PM2.5 emission reduction credits by subsidizing the replacement or modification (blocking chimneys) of wood stoves or fireplaces.

Verification: At least 30 days prior to the start of any site clearing or ground disturbance activities, the project owner shall provide the CPM, for approval, a final plan to acquire 5 TPY of PM2.5 emission reduction credits. The wood stove and fireplace replacement or modification programs must start after the plan approval, and no later than 60 days prior to initial startup.

AQ-SC12 In lieu of compliance with Condition **AQ-SC11**, the project owner shall provide 45 TPY of SOx emission reduction credits acquired in the local Hunters Point and/or Potrero areas to provide an annual equivalent of 15 TPY of PM2.5.

Verification: The project owner shall submit to the CPM a list of ERCs to be surrendered to the District at least 60 days prior to initial startup.

DISTRICT CONDITIONS OF CERTIFICATION

Permit Conditions

Definitions:

Clock Hour:	Any continuous 60-minute period beginning on the hour.
Calendar Day:	Any continuous 24-hour period beginning at 12:00 AM or 0000 hours.
Year:	Any consecutive twelve-month period of time
Heat Input:	All heat inputs refer to the heat input at the higher heating value (HHV) of the fuel, in Btu/scf.
Rolling 3-hour period:	Any three-hour period that begins on the hour and does not include start-up or shutdown periods.
Firing Hours:	Period of time during which fuel is flowing to a unit, measured in fifteen-minute increments.
MM Btu:	million British thermal units
Gas Turbine Start-up Mode:	The lesser of the first 120 minutes of continuous fuel flow to the Gas Turbine after fuel flow is initiated or the period of time from Gas Turbine fuel flow initiation until the Gas Turbine achieves two consecutive CEM data points in compliance with the emission concentration limits of conditions 20(b) and 20(d).
Gas Turbine Shutdown Mode:	The lesser of the 30 minute period immediately prior to the termination of fuel flow to the Gas Turbine or the period of time from non-compliance with any requirement listed in Conditions 20(b) through 20(d) until termination of fuel flow to the Gas Turbine.
Specified PAHs:	The polycyclic aromatic hydrocarbons listed below shall be considered to Specified PAHs for these permit conditions. Any emission limits for Specified PAHs refer to the sum of the emissions for all six of the following compounds. Benzo[a]anthracene Benzo[b]fluoranthene Benzo[k]fluoranthene Benzo[a]pyrene Dibenzo[a,h]anthracene Indeno[1,2,3-cd]pyrene
Corrected Concentration:	The concentration of any pollutant (generally NO_x, CO, or NH_3) corrected to a standard stack gas oxygen concentration. For emission point P-1 (exhaust stack of S-1 Gas Turbine), emission point P-2 (exhaust stack of S-2 Gas Turbine) and P-3 (exhaust stack of S-3 Gas Turbine) the standard stack gas oxygen concentration is 15% O_2 by volume on a dry basis.

Commissioning Activities:	All testing, adjustment, tuning, and calibration activities recommended by the equipment manufacturers and the SFERP construction contractor to insure safe and reliable steady state operation of the gas turbines, heat recovery steam generators, steam turbine, and associated electrical delivery systems.
Commissioning Period:	The Period shall commence when all mechanical, electrical, and control systems are installed and individual system start-up has been completed, or when a gas turbine is first fired, whichever occurs first. The period shall terminate when the plant has completed performance testing, is available for commercial operation, and has initiated sales to the power exchange.
Precursor Organic Compounds (POCs):	Any compound of carbon, excluding methane, ethane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate
CEC CPM:	California Energy Commission Compliance Program Manager
SFERP:	San Francisco Electric Reliability Project

Conditions for the Commissioning Period

AQ-1 The owner/operator of the SFERP shall minimize emissions of carbon monoxide and nitrogen oxides from S-1, S-2, and S-3, Gas Turbine Combustors to the maximum extent possible during the commissioning period. Conditions 1 through 12 will only apply during the commissioning period as defined above. Unless otherwise indicated, Conditions 13 through 42 will apply after the commissioning period has ended.

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

AQ-2 At the earliest feasible opportunity, in accordance with the recommendations of the equipment manufacturers and the construction contractor, the owner/operator shall ensure that S-1, S-2, and S-3, Gas Turbine Combustors are tuned to minimize the emissions of carbon monoxide and nitrogen oxides.

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

AQ-3 At the earliest feasible opportunity, in accordance with the recommendations of the equipment manufacturers and the construction contractor, the owner/operator shall install, adjust, and operate A-1 through A-6, SCR and Oxidation Systems, to minimize the emissions of carbon monoxide and nitrogen oxides from S-1, S-2, and S-3, Gas Turbine Combustors.

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

AQ-4 Coincident with the as-designed operation of A-1 thru A-6, SCR and Oxidation Systems, pursuant to Parts 3, 8, 9 and 10 of this condition, the owner/operator shall ensure that the Gas Turbine Combustors (S-1, S-2, and S-3) comply with the NO_x and CO emission limitations specified in Parts 20(a) through 20(d) of this condition.

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

AQ-5 The owner/operator of the SFERP shall prepare a plan describing the procedures to be followed during the commissioning of the gas turbines. The plan shall be submitted the District Engineering Division and the CEC CPM at least four weeks prior to first firing of S-1, S-2, or S-3, Gas Turbine Combustors. 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 not be limited to, the tuning of the Water Injection system, the installation and operation of the SCR systems and oxidation catalysts, the installation, calibration, and testing of the CO and NO_x continuous emission monitors, and any activities requiring the firing of the Gas Turbine Combustors (S-1, S-2, and S-3) without abatement by their respective SCR and Oxidation Systems. No Gas Turbine Combustor (S-1, S-2, or S-3) shall be fired sooner than 28 days after the District receives the commissioning plan.

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

AQ-6 During the commissioning period, the owner/operator of the SFERP shall demonstrate compliance with Conditions 8 through 11 of this condition through the use of properly operated and maintained continuous emission monitors and data recorders for the following parameters:

- firing hours for each gas turbine (S-1, S-2, and S-3)
- fuel flow rates to each train
- stack gas nitrogen oxide emission concentrations at P-1, P-2, and P-3
- stack gas carbon monoxide emission concentrations P-1, P-2, and P-3
- stack gas oxygen or carbon dioxide concentrations P-1, P-2, and P-3

The owner/operator shall monitor the parameters and record at least once every 15 minutes (excluding normal calibration periods or when the monitor source is not in operation) for the Gas Turbine Combustors (S-1, S-2, and S-3). The owner/operator shall use District-approved methods to calculate heat input rates, NO_x (as NO_2) mass emission rates, carbon monoxide mass emission rates, and NO_x and CO emission concentrations, summarized for each clock hour and each calendar day. All records shall be retained on site for at least 5 years from the date of entry and made available to District personnel upon request.

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

AQ-7 The owner/operator shall install, calibrate, and properly operate District-approved continuous emission monitors specified in Condition 6 prior to the first firing of the Gas Turbine Combustors (S-1, S-2, and S-3). After first firing of the turbines, the detection range of these continuous emission monitors must be adjusted as necessary to

accurately measure the resulting range of CO and NO_x emission concentrations. The type, specifications, and location of these monitors shall be subject to District review and approval (by the District's Source Test Section).

Verification: The project owner shall submit a monthly compliance report to the CPM specifying 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-8 The owner/operator shall not exceed 100 hours of firing during the commissioning period of S-1, Gas Turbine Combustor without abatement of nitrogen oxide emissions by A-1, SCR System. Such operation of S-1, Gas Turbine Combustor without abatement shall be limited to discrete commissioning activities that can only be properly executed without the SCR or Oxidation Catalyst Systems fully operational. Upon completion of these activities, the owner/operator shall provide written notice to the District's Engineering and Enforcement Divisions, and the unused balance of the 100 firing hours without abatement shall expire.

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

AQ-9 The owner/operator shall not exceed 100 hours of firing during the commissioning period of S-2, Gas Turbine Combustor without abatement of nitrogen oxide emissions by A-3, SCR System. Such operation of S-2, Gas Turbine Combustor without abatement shall be limited to discrete commissioning activities that can only be properly executed without the SCR or Oxidation Catalyst Systems fully operational. Upon completion of these activities, the owner/operator shall provide written notice to the District's Engineering and Enforcement Divisions, and the unused balance of the 100 firing hours without abatement shall expire.

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

AQ-10 The owner/operator shall not exceed 100 hours of firing during the commissioning period of S-3, Gas Turbine Combustor without abatement of nitrogen oxide emissions by A-5, SCR System. Such operation of S-3, Gas Turbine Combustor without abatement shall be limited to discrete commissioning activities that can only be properly executed without the SCR or Oxidation Catalyst Systems fully operational. Upon completion of these activities, the owner/operator shall provide written notice to the District Engineering and Enforcement Divisions. and the unused balance of the 100 firing hours without abatement shall expire.

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

AQ-11 The owner/operator shall calculate the total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, PM10, and sulfur dioxide that are emitted by each Gas Turbine Combustor (S-1, S-2, and S-3) during the commissioning period. These emissions count towards the consecutive twelve-month emission limitations specified in Condition 23 of this condition.

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

AQ-12 Prior to the end of the Commissioning Period, the owner/operator shall conduct a District- and CEC-approved source test using external continuous emission monitors to determine compliance with Condition 18 of this condition. The source test shall determine NO_x, CO, and POC emissions during start-up and shutdown of the gas turbines. The POC emissions shall be analyzed for methane and ethane to account for the presence of unburned natural gas. The source test shall include a minimum of three start-up and three shutdown periods. No later than twenty working days before the execution of the source tests, the owner/operator shall submit to the District and the CEC Compliance Program Manager (CPM) a detailed source test plan designed to satisfy the requirements of this condition. The District and the CEC CPM will notify the owner/operator of any necessary modifications to the plan within 20 working days of receipt of the plan; otherwise, the plan shall be deemed approved. The owner/operator shall incorporate the District and CEC CPM comments into the test plan. The owner/operator shall notify the District and the CEC CPM within seven (7) working days prior to the planned source testing date. Source test results shall be submitted to the District and the CEC CPM within 30 days of the source testing date.

Verification: No later than 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 CPM comments into the test plan. The project owner shall notify the District and the CPM within seven (7) working days prior to the planned source testing date. Source test results shall be submitted to the District and the CPM within 60 days of the source testing date.

Conditions for the Gas Turbine Combustors (S-1, S-2, and S-3)

AQ-13 The owner/operator shall ensure that S-1, S-2 and S-3 gas turbine combustors are fired on PUC natural gas exclusively. (Basis: BACT for SO_2 and PM10)

Verification: The project owner shall complete, on a monthly basis, a laboratory analysis showing the sulfur content of natural gas being burned at the facility. The daily sulfur analysis reports shall be incorporated into the quarterly compliance reports.

AQ-14 The owner/operator shall ensure that heat input rate to each Gas Turbine Combustor (S-1, S-2, and S-3) does not exceed 487.3 MM Btu per hour, averaged over one hour period. (Basis: 2-1-234)

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-15 Except during the commissioning period, the owner/operator of S-1, Gas Turbine Combustor shall properly operate and properly maintain A-1, Selective Catalytic Reduction (SCR) and A-2, Oxidation Catalyst Systems whenever fuel is combusted at the source and the A-1 catalyst bed has reached minimum operating temperature. (Basis: BACT for NO_x and CO)

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-16 Except during the commissioning period, the owner/operator of S-2, Gas Turbine Combustor shall properly operate and properly maintain A-3, Selective Catalytic Reduction (SCR) and A-4, Oxidation Catalyst Systems whenever fuel is combusted at those sources and the A-3 catalyst bed has reached minimum operating temperature. (Basis: BACT for NO_x and CO)

Verification: As part of the quarterly and annual compliance reports, the project owner shall provide information on any major problem in the operation of the Oxidizing Catalyst and Selective Catalytic Reduction Systems for the Gas Turbines and HRSGs. The information shall include, at a minimum, the date and description of the problem and the steps taken to resolve the problem.

AQ-17 Except during the commissioning period, the owner/operator of S-3, Gas Turbine Combustor shall properly operate and properly maintain A-5, Selective Catalytic Reduction (SCR) and A-6, Oxidation Catalyst Systems whenever fuel is combusted at the source and the A-5 catalyst bed has reached minimum operating temperature. (Basis: BACT for NO_x and CO)

Verification: As part of the quarterly and annual compliance reports, the project owner shall provide information on any major problem in the operation of the Oxidizing Catalyst and Selective Catalytic Reduction Systems for the Gas Turbines and HRSGs. The information shall include, at a minimum, the date and description of the problem and the steps taken to resolve the problem.

AQ-18 The owner/operator of the Gas Turbine Combustors (S-1, S-2, and S-3) shall comply with requirements (a) through (h) below under all operating scenarios, except requirements (a) through (h) do not apply during a gas turbine start-up or shutdown. (Basis: BACT and Toxic Risk Management Policy)

(a) Nitrogen oxide mass emissions (calculated in accordance with District-approved methods) at each P-1, P-2, and P-3 (the exhaust point for each Gas Turbine abated by SCR and Catalyst Oxidation) shall not exceed or 0.0090 lb/MM Btu (HHV). (Basis: BACT for NO_x)

(b) The nitrogen oxide emission concentration at each P-1, P-2, and P-3 shall not exceed 2.5 ppmv, on a dry basis, corrected to 15% O_2, averaged over any rolling 1-hour period. (Basis: BACT for NO_x)

(c) Carbon monoxide mass emissions at each P-1, P-2, and P-3 shall not exceed 0.0089 lb/MM Btu (HHV) of natural gas fired, averaged over any rolling 3-hour period. (Basis: BACT for CO)

(d) The carbon monoxide emission concentration at each P-1, P-2, and P-3 shall not exceed 4 ppmv, on a dry basis, corrected to 15% O_2, averaged over any rolling 3-hour period. (Basis: BACT for CO)

(e) Ammonia (NH_3) emission concentrations at each P-1, P-2, and P-3 shall not exceed 10 ppmv, on a dry basis, corrected to 15% O_2, averaged over any one-hour period. The owner/operator shall verify, by continuous recording, the ammonia injection rate to A-1, A-3, and A-5, SCR Systems. The correlation between the gas turbine, A-1, A-3 and A-5, SCR System ammonia injection rates and the corresponding ammonia emission concentration at emission points P-1, P-2 and P-3 shall be determined in accordance with Part 25 of this condition. (Basis: TRMP for NH_3)

(f) Precursor organic compound (POC) mass emissions (as CH_4) at each P-1, P-2, and P-3 shall not exceed 0.0025 lb/MM Btu of natural gas fired. (Basis: BACT)

(g) Sulfur dioxide (SO_2) mass emissions at each P-1, P-2, and P-3 shall not exceed 0.0028 lb/MM Btu of natural gas fired. (Basis: BACT)

(h) Particulate matter (PM10) mass emissions at each P-1, P-2, and P-3 shall not exceed 3 pounds per hour. (Basis: BACT)

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, PM10, 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) Any permanent changes made in the plant process or production, which would affect air pollutant emissions, and indicate when changes were made.

(j) 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 District personnel on request.

AQ-19 The owner/operator shall not exceed the regulated air pollutant mass emission rates from each of the Gas Turbine Combustors (S-1, S-2, and S-3) during a start-up or a shutdown as established below. (Basis: BACT)

	Start-Up (lb/hour)	**Shutdown (lb/hour)**
Oxides of Nitrogen (as NO_2)	40	40
Carbon Monoxide (CO)	10	10
Precursor Organic Compounds (as CH_4)	2	2

Verification: The project owner shall submit to the District and CPM the quarterly and annual compliance reports as required by **AQ-18**.

AQ-20 The owner/operator of the Gas Turbines (S-1, S-2 and S-3) shall not exceed the following daily limits for each turbine during any one calendar day. (Basis: Cumulative Increase)

Daily Limits	lb/day
Oxides of Nitrogen (as NO_2)	283
Carbon Monoxide (CO)	132
Precursor organic Compounds (as CH_4)	34
Particulate Matter	60
Sulfur Dioxide (SO_2)	33
Ammonia (NH_3)	156

Verification: The project owner shall submit to the District and CPM the quarterly and annual compliance reports as required by **AQ-18**.

AQ-21 The owner/operator shall ensure that the cumulative combined emissions from the Gas Turbine Combustors (S-1, S-2, and S-3) do not exceed the following limits during any consecutive twelve-month period, including emissions generated during gas turbine start-ups and shutdowns:

- 39.8 tons of NO_x (as NO_2) per rolling 365 day period;
- 27.9 tons of CO per rolling 365 day period;
- 7.7 tons of POC (as CH_4) per rolling 365 day period;
- 18 tons of PM10 per rolling 365 day period; and
- 2.7 tons of SO_2 per rolling 365 day period.

(Basis: Cumulative Increase)

Verification: The project owner shall submit to the District and CPM the quarterly and annual compliance reports as required by **AQ-18**.

AQ-22 The owner/operator shall ensure that the maximum projected annual toxic air contaminant emissions from the Gas Turbine Combustors (S-1, S-2, and S-3) not exceed the following limits:

- 2,110 pounds of formaldehyde per year
- 235 pounds of acetaldehyde per year
- 21 pounds of acrolein per year
- 19 pounds of benzene per year

unless the following requirement is satisfied:

The owner/operator shall perform a health risk assessment using the emission rates determined by annual source test and the most current Bay Area Air Quality Management District-approved procedures and

unit risk factors in effect at the time of the analysis. This risk analysis shall be submitted to the District and the CEC CPM within 60 days of the source test date. The owner/operator may request that the District and the CEC CPM revise the carcinogenic compound emission limits specified above. If the owner/operator demonstrates to the satisfaction of the APCO that these revised emission limits will result in a cancer risk of not more than 1.0 in one million, the District and the CEC CPM may, at their discretion, adjust the carcinogenic compound emission limits listed above. (Basis: TRMP)

Verification: The project owner shall submit to the District and CPM the quarterly and annual compliance reports as required by **AQ-18**.

AQ-23 The owner/operator shall demonstrate compliance with Conditions 14 through 15, 18(a) through 18(d), 19, 21(a), and 21(b) by using properly operated and maintained continuous monitors (during all hours of operation including equipment start-up and shutdown periods) for all of the following parameters in (a) through (d) below.

(a) Firing Hours and Fuel Flow Rates for each of the following sources: S-1, S-2, and S-3 combined.

(b) Carbon Dioxide (CO2) or Oxygen (O2) concentrations, Nitrogen Oxides (NOx) concentrations, and Carbon Monoxide (CO) concentrations at each of the following exhaust points: P-1, P-2, and P-3.

(c) Ammonia injection rate at A-1, A-3, and A-5, SCR Systems

(d) Water or steam injection rate at S-1, S-2, and S-3 Gas Turbine Combustors

The owner/operator shall record all of the above parameters measured in (a) though (d) every 15 minutes (excluding normal calibration periods) and shall summarize all of the above parameters for each clock hour. For each calendar day, the owner/operator shall calculate and record the total firing hours, the average hourly fuel flow rates, and average hourly pollutant emission concentrations. (Basis: District Regulations 1-520.1, 9-9-501, BACT, Offsets, Cumulative Increase)

Verification: At least 30 days before first fire, the project owner shall submit to the CPM a plan on how the measurements and recordings required by this condition will be performed.

AQ-24 The owner/operator shall use the parameters measured in Condition 23(a) through (d) and District-approved calculation methods to calculate the parameters below.

(a) Heat Input Rate for each of the following sources: S-1, S-2, and S-3.

(b) Corrected NOx concentrations, NOx mass emissions (as NO_2), corrected CO concentrations, and CO mass emissions at each of the following exhaust points: P-1, P-2, and P-3.

Applicable to emission points P-1, P-2, and P-3, the owner/operator shall record the parameters specified above at least once every 15 minutes (excluding normal calibration periods).
(Basis: District Regulations 1-520.1, 9-9-501, BACT, Offsets, Cumulative Increase)

Verification: At least 30 days before first fire, the project owner shall submit to the CPM a plan on how the measurements and recordings required by this condition will be performed.

AQ-25 As specified below, the owner/operator shall calculate and record the following data:

(a) total Heat Input Rate for every clock hour and the average hourly Heat Input Rate.

(b) on an hourly basis, the cumulative total Heat Input Rate for each calendar day for the following: each Gas Turbine and all three sources (S-1, S-2, and S-3).

(c) the average NO_x mass emissions (as NO_2), and corrected NO_x emission concentrations for every clock hour.

(d) the average CO mass emissions and corrected CO emission concentrations for every rolling 3-hour period.

(e) on an hourly basis, the cumulative total NO_x mass emissions (as NO_2) and the cumulative total CO mass emissions, for each calendar day for the following: each Gas Turbine (S-1, S-2, and S-3) combined.

(f) For each calendar day, the average hourly Heat Input Rates, Corrected NO_x emission concentrations, NO_x mass emissions (as NO_2), corrected CO emission concentrations, and CO mass emissions for each Gas Turbine combined.

(g) On a daily basis, the cumulative total NO_x mass emissions (as NO_2) and cumulative total CO mass emissions, for the previous consecutive twelve month period for all three sources (S-1, S-2, and S-3) combined.

(Basis: District Regulations 1-520.1, 9-9-501, BACT, Offsets, Cumulative Increase)

Verification: The project owner shall submit to the District and CPM the quarterly and annual compliance reports as required by **AQ-18**.

AQ-26 To demonstrate compliance with Conditions AQ-18(f), 18(g), 18(h), 21(c), 21(d) and 21(e), the owner/operator shall calculate and record on a daily basis, the Precursor Organic Compound (POC) mass

emissions, Fine Particulate Matter (PM10) mass emissions (including condensable particulate matter), and Sulfur Dioxide (SO_2) mass emissions from each power train. The owner/operator shall use the actual Heat Input Rates calculated pursuant **AQ-28**, actual Gas Turbine Start-up Times, actual Gas Turbine Shutdown Times, and CEC and District-approved emission factors to calculate these emissions. The calculated emissions shall be presented as follows:

(a) For each calendar day, POC, PM10, and SO_2 emissions shall be summarized for: each power train (S-1, S-2, and S-3) combined.

(b) On a daily basis, the 365 day rolling average cumulative total POC, PM10, and SO_2 mass emissions, for all three sources (S-1, S-2, and S-3) combined.

(Basis: Offsets, Cumulative Increase)

Verification: The project owner shall submit to the District and CPM the quarterly and annual compliance reports as required by **AQ-18**.

AQ-27 To demonstrate compliance with Condition 22, the owner/operator shall calculate and record on an annual basis the maximum projected annual emissions of: Acetaldehyde, Acrolein, Formaldehyde and Benzene. Maximum projected annual emissions shall be calculated using the maximum Heat Input Rate of 5,847,600 MM Btu/year and the highest emission factor (pounds of pollutant per MM Btu of Heat Input) determined by any source test of the S-1, S-2, and S-3 Gas Turbine Combustors. (Basis: TRMP)

Verification: The project owner shall submit to the District and CPM the quarterly and annual compliance reports as required by **AQ-18**.

AQ-28 Within 120 days of start-up of the SFERP, the owner/operator shall conduct a District-approved source test at the exhaust point P-1, P-2, or P-3 to determine the corrected ammonia (NH_3) emission concentration compliance with Condition AQ-18(e). The source test shall determine the correlation between the heat input rates of each gas turbine S-1, S-2, and S-3 and NH_3 mass emissions. (Basis: TRMP)

Verification: 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.

AQ-29 The owner/operator shall determine the SCR System ammonia injection rate and the corresponding NH_3 emission concentration at emission point P-1, P-2, or P-3. The source test shall be conducted over the expected operating range of the turbine (including, but not limited to minimum, 70%, 85%, and 100% load) to establish the range

of ammonia injection rates necessary to achieve NO_x emission reductions while maintaining ammonia slip levels. Continuing compliance with **AQ-18**(e) shall be demonstrated through calculations of corrected ammonia concentrations based upon the source test correlation and continuous records of ammonia injection rate. (Basis: TRMP)

Verification: 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.

AQ-30 Within 120 days of start-up of the SFERP and on an annual basis thereafter, the owner/operator shall conduct a District-approved source test on exhaust points P-1, P-2, and P-3 while each Gas Turbine Combustor is operating at maximum load to determine compliance with **AQ-18** (a), (b), (c), (d), (f), (g), and (h), while each Gas Turbine Combustor is operating at minimum load to determine compliance with Conditions AQ-18(b) and (d), and to verify the accuracy of the continuous emission monitors required in **AQ-23**. The owner/operator shall test for (as a minimum): water content, stack gas flow rate, oxygen concentration, precursor organic compound concentration and mass emissions, nitrogen oxide concentration and mass emissions (as NO_2), carbon monoxide concentration and mass emissions, sulfur dioxide concentration and mass emissions, methane, ethane, and particulate matter (PM10) emissions including condensable particulate matter. (Basis: BACT, offsets)

Verification: Approval of the source test protocols, as required in condition 32, 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.

AQ-31 Within 120 days of start-up of the SFERP and on a biennial basis (once every two years) thereafter, the owner/operator shall conduct a District-approved source test at the exhaust point P-1, P-2, or P-3 while the Gas Turbine Combustor is operating at maximum allowable operating rates to demonstrate compliance with **AQ-27**. If three consecutive biennial source tests demonstrate that the annual emission rates calculated pursuant to Part 27 for any of the compounds listed below are less than the BAAQMD Toxic Risk Management Policy trigger levels shown, then the owner/operator may discontinue future testing for that pollutant:

- Acetaldehyde $\leq$ 235 pounds/year
- Acrolein $\leq$ 21 pounds/year

- Benzene $\leq$ 19 pounds/year
- Formaldehyde $\leq$ 2110 pounds/year

(Basis: TRMP)

Verification: Approval of the source test protocols, as required in condition AQ-16, 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.

AQ-32 The owner/operator shall obtain approval for all source test procedures from the District's Source Test Section and the CEC CPM prior to conducting any tests. The owner/operator shall comply with all applicable testing requirements for continuous emission monitors as specified in Volume V of the District's Manual of Procedures. The owner/operator shall notify the District's Source Test Section and the CEC CPM in writing of the source test protocols and projected test dates at least 7 days prior to the testing date(s). As indicated above, the owner/operator shall measure the contribution of condensable PM (back half) to the total PM10 emissions. However, the owner/operator may propose alternative measuring techniques to measure condensable PM such as the use of a dilution tunnel or other appropriate method used to capture semi-volatile organic compounds. Source test results shall be submitted to the District and the CEC CPM within 60 days of conducting the tests. (Basis: BACT)

Verification: Submitting and getting approval of the source test procedures is the verification of 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.

AQ-33 The owner/operator of the SFERP shall submit all reports (including, but not limited to monthly CEM reports, monitor breakdown reports, emission excess reports, equipment breakdown reports, etc.) as required by District Rules or Regulations and in accordance with all procedures and time limits specified in the Rule, Regulation, Manual of Procedures, or Enforcement Division Policies & Procedures Manual. (Basis: Regulation 2-6-502)

Verification: The project owner shall submit to the District and CPM the reports as required by procedures and time limits specified in the Rule, Regulation, Manual of Procedures, or Enforcement Division Policies & Procedures Manual.

AQ-34 The owner/operator of the SFERP shall maintain all records and reports on site for a minimum of 5 years. These records shall include

but are not limited to: continuous monitoring records (firing hours, fuel flows, emission rates, monitor excesses, breakdowns, etc.), source test and analytical records, natural gas sulfur content analysis results, emission calculation records, records of plant upsets and related incidents. The owner/operator shall make all records and reports available to District and the CEC CPM staff upon request. (Basis: Regulation 2-6-501)

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-35 The owner/operator of the SFERP shall notify the District and the CEC CPM of any violations of these permit conditions. Notification shall be submitted in a timely manner, in accordance with all applicable District Rules and Regulations, and the Manual of Procedures. Notwithstanding the notification and reporting requirements given in any District Rule, Regulation, or the Manual of Procedures, the owner/operator shall submit written notification (facsimile is acceptable) to the Enforcement Division within 96 hours of the violation of any permit condition. (Basis: Regulation 2-1-403)

Verification: Submittal of these notifications as required by this condition is the verification of these permit conditions. In addition, as part of the quarterly and annual compliance reports of **AQ-18**, the project owner shall include information on the dates when these violations occurred and when the project owner notified the District and the CPM.

AQ-36 The owner/operator of SFERP shall provide adequate stack sampling ports and platforms to enable the performance of source testing. The location and configuration of the stack sampling ports shall be subject to BAAQMD review and approval.
(Basis: Regulation 1-501)

Verification: 120 days prior to construction of the turbine stacks, the project owner shall provide the District and CPM an “approved for construction” drawing showing the appropriate stack height and location of sampling ports and platforms. The project owner shall make the site available to the District, EPA and CEC staff for inspection.

AQ-37 Within 180 days of the issuance of the Authority to Construct for the SFERP, the owner/operator shall contact the BAAQMD Technical Services Division (Source Test Section) regarding requirements for the continuous monitors, sampling ports, platforms, and source tests required by parts AQ-23, 28, 29, 30, and 31. All source testing and monitoring must be conducted in accordance with the BAAQMD Manual of Procedures or EPA methods. (Basis: Regulation 1-501)

Verification: Compliance with this condition is the verification of this permit condition.

AQ-38 Prior to the issuance of the BAAQMD Authority to Construct for the SFERP, the owner/operator shall provide to the District valid emission reduction credit banking certificates in the amount of 45.8 tons/year of Nitrogen Oxides or equivalent as defined by District Regulations 2-2-302.1 and 2-2-302.2. (Basis: Offsets)

Verification: At least 30 days prior to issuance of the District's Authority to Construct, the project owner shall provide valid emission reduction credit banking certificates to the District and the CPM for approval.

AQ-39 Pursuant to BAAQMD Regulation 2, Rule 6, section 404.1, the owner/operator of the SFERP shall submit an application to the BAAQMD for a major facility review permit within 12 months of the issuance of the Authority to Construct. (Basis: Regulation 2-6-404.1)

Verification: The project owner shall submit to the CPM copies of the Federal (Title IV) Acid Rain and (Title V) Operating Permit within 30 days after they are issued by the District.

AQ-40 Pursuant to 40 CFR Part 72.30(b)(2)(ii) of the Federal Acid Rain Program, the owner/operator of the SFERP shall not operate any of the gas turbines until either: 1) a Title IV Operating Permit has been issued; 2) 24 months after a Title IV Operating Permit Application has been submitted, to the District whichever is earlier. (Basis: Regulation 2, Rule 7)

Verification: The project owner shall submit to the District and CPM the quarterly and annual compliance reports as required by **AQ-18**.

AQ-41 The owner/operator of SFERP shall comply with the continuous emission monitoring requirements of 40 CFR Part 60 or 75 (Appendix A; Specifications and Test procedures, and Appendix B; Quality Assurance and Quality Control Procedures). (Basis: Regulation 2, Rule 7)

Verification: At least 60 days prior to the installation of the CEMS, the project owner shall seek approval from the District for an emission monitoring plan.

AQ-42 The owner/operator shall take monthly samples of the natural gas utilized at the SFERP and analyze for the sulfur content using District-approved laboratory methods, or shall obtain certified analytical results from the gas supplier. The sulfur content test results shall be retained on site for a minimum of five years from the test date and shall be utilized to satisfy the requirements of 40 CFR Part 60, subpart GG. (Basis: Recordkeeping)

Verification: The project owner shall submit to the District and CPM the quarterly and annual compliance reports as required by **AQ-18**.

REFERENCES

BAAQMD 2004a – Bay Area Air Quality MD/Nishimura (tn: 31204). Letter to CEC dated April 7, 2004 regarding BAAQMD's Completed Initial Review of the AFC. Submitted to CEC/Pfanner on 4/7/04.

CARE 2004b – CAlifornia for Renewable Energy/Boyd (tn: 32067). First Set of Data Request of CARE. Submitted to CEC/Dockets on 8/10/04.

CARTER 2004z – Anna Carter (tn: 32111). San Francisco Natural Gas Simple Cycle Plant. Submitted to CEC/Pfanner/Dockets on 8/17/04.

CEC 1998. California Energy Commission. 1997 Global Climate Change, Greenhouse Gas Emissions Reduction Strategies for California, Volume 2, Staff Report. 1998.

CEC 2003. California Energy Commission. 2003 Integrated Energy Policy Report. December.

CEC 2004aa – California Energy Commission/Pfanner (tn: 31644). Issues Identification Report. Submitted to San Francisco Public Utility Commission/CEC/Dockets on 6/4/04.

CEC 2004bb – California Energy Commission/Pfanner (tn: 31642). Data Requests Nos. 1 thru 91. Submitted to SF PUC/Labonte/CEC/Dockets on 6/4/04.

CEC 2004g - California Energy Commission/Keese (tn: 31237). Letter proposing to construct and operate a simple-cycle power plant in San Francisco. Submitted to The Honorable Mark Leno, Member of the Assembly on 4/14/04.

CEC 2005b – California Energy Commission/Johnson (tn: 33815). Notice of Receipt. Supplement A, Site Relocation. Submitted to CEC/Dockets on 4/5/05.

FARENDIN 2004a – Lisa Farendin (tn: 31879). Comments on SFERP Workshop on July 19, 2004. Submitted to CEC/PAO/Dockets on 7/12/04.

SFERP 2004a - City and County of San Francisco/Blout (tn: 31130). Application for Certification San Francisco Electric Reliability Project - 145-megawatt natural gas-fired peaking power plant located in San Francisco. Submitted to CEC/Therkelsen/Dockets on 3/18/04.

SFERP 2004aa – CH2MHill (tn: 32141). Response to Data Requests 1 through 9, Set 1. Submitted to CEC/Dockets on 8/18/04.

SFERP 2004c - CH2MHill/Carrier (tn: 31127). Electronic copies (CD-ROM) of SFERP Ambient Air Quality Modeling Files, March 04. Submitted to CEC/Pfanner/Dockets on 3/18/04.

SFERP 2004d - CH2MHill/Carrier (tn: 31128). Sets of 7.5 Minute U.S. Geological Survey (USGS) Quad Maps. Submitted to CEC/Pfanner/Dockets on 3/18/04.

SFERP 2004f - City and County of San Francisco (tn: 31132). Application for a Determination of Compliance & Authority to Construct. Submitted to Bay Area Air Quality Management District/Dockets on 3/22/04.

SFERP 2004ff – CH2MHill/Carrier (tn: 32218). Data Response, Set 1D. Submitted to CEC/Pfanner/Dockets on 8/27/04.

SFERP 2004g - CH2MHill/Carrier (tn: 31268). Data Adequacy Supplement. Submitted to CEC/Pfanner/Dockets on 4/16/04.

SFERP 2004gg – CH2MHill/Carrier (tn: 32229). Informal Data Response, Set 4. Submitted to CEC/Pfanner/Dockets on 8/27/04.

SFERP 2004h - CH2MHill/Carrier (tn: 31274). Attachment to the Data Adequacy Supplement: Attachment WM-DA-1, the Phase I Environmental Site Assessment. Submitted to CEC/Pfanner/Dockets on 4/16/04.

SFERP 2004i - CH2MHill/Carrier (tn: 31275). Attachment to the Data Adequacy Supplement: Attachment WR-DA-1. Submitted to CEC/Pfanner/Dockets on 4/16/04.

SFERP 2004t– CH2MHill/Carrier (tn: 31854). Data Responses Set 1A. Response to Staff's Data Requests dated 6/4/04. Submitted to CEC/Pfanner/Dockets on 7/6/04.

SFERP 2004u– CH2MHill/Carrier (tn: 31880). Data Response Set 1B. Submitted to CEC/Pfanner/Dockets on 7/12/04.

SFERP 2004v– CH2MHill/Carrier (tn: 31894). Data Response Set 1C. Submitted to CEC/Pfanner/Dockets on 7/15/04.

SFERP 2004x– CH2MHill/Carrier (tn: 31948). Informal Data Response Set 1. Submitted to CEC/Pfanner/Dockets on 7/23/04.

SFERP 2005b – San Francisco Electric Reliability Project (tn: 33737). Air Quality Modeling Files. Submitted to Dockets on 3/25/05.

SFERP 2005e – San Francisco Electric Reliability Project (tn: 33763). Application for Determination of Compliance. Submitted to CEC/Dockets on 3/29/05.

SFERP 2005f – Sierra Research/Matthews (tn: 33920). Supplement to the AFC, Air Quality Errata. Submitted to CEC/Pfanner/Dockets on 4/13/05.

SFERP 2005g – Sierra Research/Matthews (tn: 33922). Revised Air Quality Modeling Files. Submitted to CEC/Pfanner/Dockets on 4/13/05.

SFERP 2005k – Sierra Research/Matthews (tn: 34289). Application for Determination of Compliance. Submitted to Bay Area Air Quality Management District/Bateman/CEC/Dockets on 5/11/05.

SFPUC 2005a – San Francisco Public Utilities Commission/Hale (tn: 34403). Amendment A of the Application for Certification. Submitted to CEC/Therkelsen/Dockets on 3/25/05.

BIOLOGICAL RESOURCES

Testimony of Susan D. Sanders

SUMMARY OF CONCLUSIONS

Construction of the San Francisco Electric Reliability Project would not have any significant direct impacts to sensitive biological resources and complies with applicable laws, ordinances, regulations and standards because construction activities will occur in areas that are paved or otherwise barren of native plants or wildlife. Transmission lines would be buried, eliminating potential for bird electrocution or collisions with transmission lines. Process water for operations would be supplied by the city's wastewater system and go through a new on-site tertiary water treatment plant. However, the United States Fish & Wildlife Service expressed concern about air emissions and potential impacts to listed (i.e., on Federal Threatened or Endangered Species lists or a Species of Special Concern) butterflies and plants found in serpentine grasslands on San Bruno Mountain, approximately 4.5 miles southwest of the project area. Nitrogen deposition from air emissions can change serpentine plant community composition, with adverse effects to several species of threatened or endangered butterfly and plant species.

Existing nitrogen deposition rates at San Bruno Mountain are estimated to be 6.169 kilograms/hectare/year (kg/ha/yr). The San Francisco Electric Reliability Project would contribute an additional 0.0059 kg/ha/year to this background level, resulting in a net nitrogen deposition of 6.175 kg/ha/year, or a 0.0009 percent increase. The background deposition rate is already above the level that is likely to be affecting listed species and their habitat on San Bruno Mountain. Operation of the San Francisco Electric Reliability Project would contribute a small amount to an ongoing significant impact (nitrogen deposition) to protected species and their habitats on San Bruno Mountain. However, any contribution, even a minor one, to an existing cumulative impact to listed species is potentially significant. The project owner has purchased emission reduction credits from the nearby Potrero Power Plant to offset their nitrogen emissions. The emission reduction credits would mitigate the project's minor contribution to ongoing cumulative impacts to protected species on San Bruno Mountain and be in compliance with all laws, ordinances, regulations, and standards.

INTRODUCTION

In this analysis, staff describes the biological resources of the project site and ancillary facilities, and of regional sensitive habitats potentially affected by the project. Staff determined the need for mitigation, the adequacy of mitigation proposed by the applicant, and where necessary, specific additional mitigation measures to reduce identified impacts to less than significant levels. In this analysis, staff determined compliance with laws, ordinances, regulations, and standards (LORS), and if conditions of certification are necessary.

This analysis is based, in part, upon information provided in the Application for Certification (AFC) for the San Francisco Electric Reliability Project (SFERP) (SFPUC 2004a, Section 8.2 and Appendices 8.2 A and B), the supplement to the AFC (SFERP 2005a), responses to staff's Data Requests 157-159 (CH2MHill 2004), and discussions and correspondence with the United States Fish and Wildlife Service (USFWS) (USINTERIOR 2004a).

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

Biological Resources Table 1, below, identifies the LORS applicable to the SFERP analysis.

BIOLOGICAL RESOURCES Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
FEDERAL	
Federal Endangered Species Act (1973) Title 16, U. S. Code section 1531	Projects that could adversely impact a federally listed species require consultation with the U. S. Fish and Wildlife Service and mitigation of potential impacts
Migratory Bird Treaty Act Title 16, U. S. Code sections 703 to 712	Protects all migratory birds, including their nests and eggs
Bald and Golden Eagle Protection Act Title 16, U. S. Code section 668	Protects bald and golden eagles from harm or trade in parts
STATE	
State Endangered Species Act (1984) Fish and Game Code, section 2050 et seq.	For species that are protected (listed) by the state, these species can not be 'taken' or harmed w/out a 'take' permit provided by the California Department of Fish & Game
Fully Protected Species Fish and Game Code, sections 3511, 4700, 5050, and 5515	Prohibits take of species that are classified as Fully Protected
Nests and Eggs – Take, Possess or Destroy, Fish and Game Code, sections 3503 and 3503.5	Protects birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Also, specifically protects birds of prey and their eggs
Migratory Birds Fish and Game Code, section 3513	Protects California's migratory birds by making it unlawful to take or possess any migratory non-game bird as designated by the Migratory Bird Treaty Act
Native Plant Protection Act (1977) Fish and Game Code, section 1900 et seq.	Designates and protects rare, threatened and endangered California plants
Title 14, California Code of Regulations, sections 670.2 and 670.5	Lists animals designated as threatened or endangered in California

Applicable Law	Description
McAteer-Petris Act and San Francisco Bay Plan – administered by the San Francisco Bay Conservation and Development Commission (BCDC)	BCDC regulates activities and development with the potential to adversely impact the San Francisco Bay
LOCAL	
City and County of San Francisco General Plan, Objective 8, Policies 1.1, 1.2, 1.3, & 1.4	Conserve, protect, restore and replenish the natural resources of San Francisco
City and County of San Francisco General Plan, Objective 8 - Policies 8.1, 8.2, and 8.3	Ensures protection of plant and animal life in the City, coordination with the California Department of Fish and Game, protection of habitat of plants and animals that need a relatively natural environment, and rare and endangered species
San Francisco General Plan Water Resources Policy 3.3	Implement plan to improve sewage treatment and halt pollution of the Bay and ocean
San Francisco Public Health Code (Article 22A)	Requires soils and groundwater testing, assessment of environmental risks including risks to marine life in San Francisco Bay, implementing mitigation measures if necessary to protect the environment, and reporting the results of investigation and mitigation activities
Sustainability Plan for the City of San Francisco, goals 2, 3, and 4	Protect and restore remnant natural habitats, sensitive species, and to maximize habitat value in developed and naturalistic areas, both public and private
San Mateo County General Plan, Policies 1.2, 1.23, 1.26, and 1.27	Protect sensitive habitats, regulate development to minimize impacts to vegetation, water, fish and wildlife resources, and protect rare, endangered, and unique plants and animals

SETTING

REGIONAL

The SFERP will be located near the western shore of San Francisco Bay in the Potrero District of San Francisco. The San Francisco Bay, the largest estuary in the western United States, is an inlet where the waters from the Sacramento and San Joaquin rivers meet the Pacific Ocean. A wide variety of habitat types including deep open water, coastal shoreline, salt flats, oak woodlands, grasslands, salt and brackish marshes, and riparian areas occur in the San Francisco region due to the combination of a favorable Mediterranean climate, the coastal mountains and estuarine environments.

Significant biological resources in the project vicinity include the San Francisco Bay, Heron's Head Park, San Bruno Mountain, and Islais Creek. The Bay provides important habitat for fish, migratory birds, and wetland plant and wildlife species. Heron's Head Park is located approximately one mile south of the project and adjacent to the Hunters Point Power Plant. The 24-acre park is a restored wetland situated on top of a landfill.

San Bruno Mountain State and County Park is located approximately 4.5 miles southwest of the project in San Mateo County, east of Daly City. The biological resources of this park are the subject of the San Bruno Mountain Habitat Conservation Plan (USFWS 1998). Islais Creek is located approximately 990 feet directly south of the proposed SFERP site. It is one of the few freshwater creeks located in the city of San Francisco and once emptied into a large marsh bordering the Bay, but has been channelized and riprapped. It is now a tidal ship channel and provides little natural habitat. Restoration efforts on Islais Creek have focused on cleaning up contaminated sediment and development of water-related recreation amenities.

PROJECT, SITE, AND VICINITY DESCRIPTION

The four-acre SFERP site is located in a heavily industrialized area of San Francisco. The plant site has been cleared of permanent structures and is currently occupied by a temporary concrete batch plant. The existing Potrero Power Plant is approximately 0.3 mile to the north. The approximately 8.5-acre proposed laydown area is immediately east of the site on Port of San Francisco land. This area is currently being used for equipment storage and separates the SFERP site from the Bay. Industrial and commercial land uses are immediately adjacent to all site boundaries. Bay aquatic habitats are located approximately 180 feet northeast of the site and 120 feet from the temporary laydown yard. The associated SFERP underground electrical transmission, gas, and water lines will be located along or within roadways and are entirely within commercial and industrial areas.

The site is characterized by hard-packed dirt that is unvegetated and covered with gravel. Only sparse non-native grasses and forbs are found on site. There are no remaining features that provide habitat for plant or wildlife species. The associated linear features of the site (natural gas pipeline, water supply lines, underground transmission lines) will be contained within a combination of pavement and hard-pack gravel roads and concrete sidewalks. The 8.5-acre laydown area is an often-used storage area consisting of hard-packed gravel and dirt, with a paved perimeter. The north and northeastern boundaries of the laydown are approximately 120 feet from the Bay. The adjacent shoreline is armored with riprap (rocks) and the upper bank includes sparse, weedy vegetation such as fennel, pampas grass, and other non-native grasses and forbs. This area is outside of the laydown area and provides limited forage and resting areas for species such as western gull (*Larus occidentalis*) and rock dove (*Columba livia*). San Francisco Bay is the closest area of significant habitat to the SFERP site. The Bay shoreline has been significantly modified with piers, bulkheads, riprap, and stabilizing structures. The project site, laydown area, and associated linear facilities do not include any wetlands or waters of the United States or other sensitive habitat types.

Special Status Species

The project site and immediate vicinity provides no habitat for special status plants or wildlife. Many of the rare plants and animals that have been recorded near the project area occur in plant communities such as salt marsh or coastal scrub habitats that have long been eliminated by industrial and residential development in the immediate project area. However, rare plants and animals dependent on native and non-native grasslands and other habitats on San Bruno Mountain (approximately 4.5 miles southwest of the project site) are within the range of air emissions from the SFERP.

Five special status insects depend on nectar sources associated with serpentine habitats such as those on San Bruno Mountain. Those species include San Bruno elfin butterfly (*Incisalia mossii bayensis*), mission blue butterfly (*Icaricia icarioides missionensis*), callippe silverspot butterfly (*Speyeria callippe callippe*), Bay checkerspot butterfly (*Euphydryas editha bayensis*), and Opler's longhorn moth (*Adela oplerella*). Biological Resources **Table 2** summarizes the status of special status plant and animal species that could occur at San Bruno Mountain.

Special status aquatic species in the vicinity of the project area, including Central Valley fall/late fall-un Chinook salmon and winter-run Chinook salmon (*Oncorhynchus tshawytscha*) and Central California coast Coho salmon (*Oncorhynchus kisutch*), are not considered further in this analysis because no aquatic habitats will be affected by project construction or operation, and construction impacts to the shoreline environment will be limited to one minor encroachment that extends to the Mean High Tide Line. The SFERP water will be supplied and discharged by conventional City of San Francisco (City) infrastructure, with no direct intake or discharge of San Francisco Bay water. A complete list of sensitive plant and animal species that occur in the project region is provided in Table 8.2-2 of the Application for Certification (SFPUC 2005a, pages 8.2-25 to 8.2-31).

Critical Habitat

Critical Habitat refers to specific geographic areas, whether occupied by a listed species or not, that are essential for conservation of a species and that have been formally designated by rule published in the Federal Register. Although the proposed project disturbance areas do not fall within any designated or proposed Critical Habitat areas, it is located in the general vicinity of Critical Habitat designated under the Federal Endangered Species Act (FESA) for:

- Central Valley fall/late fall-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*);
- Central California coast Coho salmon ESU (*Oncorhynchus kisutch*);
- Winter-run Chinook salmon ESU (*Oncorhynchus tshawytscha*); and
- Steller (northern) sea lion (*Eumetopias jubatus*).

An ESU is a distinctive group of Pacific salmon or steelhead. The designated Critical Habitats for the above three salmon species are associated with aquatic resources in the San Francisco Bay and Delta, while local sea lion Critical Habitat is limited to

offshore island rookeries. No project features or construction activities would affect any aquatic or shore habitats.

The Bay checkerspot butterfly, a federal Threatened species, historically inhabited San Bruno Mountain. San Bruno Mountain is 4.5 miles southwest of the SFERP project site, but still within range of direct air quality impacts from SFERP. This population of Bay checkerspot butterflies was believed to have been completely wiped out around 1986 (USFWS 2001). The USFWS has designated San Bruno Mountain as part of Critical Habitat for this species because this site supported a substantial Bay checkerspot population in the past, and the USFWS believes that the butterfly can be reestablished here (USFWS 2001).

BIOLOGICAL RESOURCES Table 2
Regional Special Status Species

Species	Status*	Habitat
Franciscan manzanita *Arctostaphylos hookeri ssp. franciscana*	FSC, CNPS List 1A	Coastal scrub (serpentinite). May be found on San Bruno Mountain. Last recorded in 1942.
San Francisco gumplant *Grindelia hirsutula* var. *maritima*	FSC, CNPS List 1B	Coastal bluff scrub, coastal scrub, valley and foothill grassland/sandy or serpentinite. May be found on San Bruno Mountain.
Marin western flax *Hesperolinon congestum*	FT, CT, CNPS List 1B	Chaparral, valley and foothill grassland-serpentinite. May be found on San Bruno Mountain.
White-rayed pentachaeta *Pentachaeta bellidiflora*	FE, CE, CNPS List 1B	Valley and foothill grassland (often on serpentine). May be found on San Bruno Mountain. Currently known from one location near Hwy 280.
Adobe sanicle *Sanicula maritima*	FSC, CNPS List 1B	Chaparral, coastal prairie, meadows and seeps, valley and foothill grassland/clay, serpentine. May be found on San Bruno Mountain.
Santa Cruz microseris *Stebbinsoseris decipiens*	FSC, CNPS List 1B	Broadleaved upland forest, closed-coned coniferous forest, chaparral, coastal prairie, coastal scrub, valley and foothill grassland/open areas, sometimes on serpentine. May be found on San Bruno Mountain.
San Francisco owl's-clover *Triphysaria floribunda*	FSC, CNPS List 1B	Coastal prairie, coastal scrub, valley and foothill grassland/usually serpentine. May be found on San Bruno Mountain.
Bay checkerspot butterfly *Euphydryas editha bayensis*	FT	Serpentine grassland with adult nectar sources and larval host plant (dwarf plantain and owls clover). Found on San Bruno Mountain as recently as mid-1980s, portions of San Bruno Mt designated as Critical Habitat.
Mission blue butterfly *Icaricia icarioides missionensis*	FE	Dunes and grassland areas with *Lupinus* host plant. Found on San Bruno Mountain. Restricted to three metapopulations, including San Bruno Mountain in San Mateo County, Twin Peaks in San Francisco, and the vicinity of Skyline College in San Mateo County.
San Bruno elfin butterfly *Incisalia mossii bayensis*	FE	Wooded canyons with cliffs and rocky outcrops. Stonecrop host plant. Found on San Bruno Mountain. Current population restricted to San Bruno Mountain, Milagra Ridge, Montara Mountain, and Whiting Ridge.

Callippe silverspot butterfly *Speyeria callippe callippe*	FE	Dry woodlands, foothill grasslands, and chaparral communities. Violet host plant. Closest metapopulation found on San Bruno Mountain.
Opler's longhorn moth *Adela oplerella*	FSC	Serpentine grasslands with larval food plant, California cream cups. Found on San Bruno Mountain.

* **STATUS - Federal Status** - **FE =** Federal listed Endangered. **FT =** Federally listed Threatened; **FSC** = Federal Species of Special Concern; **California Status** - **CE =** State listed Endangered, **CT =** State listed Threatened; **CNPS (California Native Plant Society)** - **CNPS List 1A** - Plants presumed extinct in California, **CNPS List 1B** - Plants rare, threatened, or endangered in California and elsewhere and rare throughout their range

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Significant biological resources impacts would occur if state or federal listed species, Fully Protected species, candidates for state or federal listing and/or Species of Concern were likely to be impacted. Interruption of species migration, reduction of fish, wildlife and plant habitat, and disturbance of wetlands, marshes, riparian areas or other wildlife habitat would also be considered significant impacts.

DIRECT AND INDIRECT IMPACTS AND MITIGATION

Direct impacts occur because of the project and at the same time and place. *Indirect* impacts occur because of the project and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect impacts may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Construction Impacts and Mitigation

SFERP Project Site and Temporary Construction Laydown Area

SFERP construction would permanently occupy approximately four acres of an existing industrial site. This area is currently covered with gravel and dirt with patches of weedy area supporting sparse non-native vegetation. The plant site has been cleared of all permanent structures. Currently, there are some temporary facilities on the property including construction trailers, a construction laydown area and a concrete batch plant. The temporary facilities will be removed prior to the construction of the SFERP. The project site has a history of industrial use and is surrounded by a variety of industrial uses primarily associated with the Port of San Francisco.

The project site and laydown area provides little or no habitat value for native plant and wildlife species. The construction laydown area will be approximately 8.5 acres. The laydown area would be located directly east and adjacent to the project site, between 25th and Cesar Chavez streets and between the project site and the Bay. The proposed laydown area has been recently graded and partially graveled. Due to the existing high level of disturbance at the project site, and the absence of natural plant communities at the site, SFERP's construction would not result in direct impacts to sensitive biological

resources. No jurisdictional wetlands or waters are present on the project site or laydown area.

No aquatic habitat will be adversely affected by construction or by operation of the cooling system. As described in more detail below, no water will be withdrawn directly from the Bay or discharged there. Cooling water discharged from the plant cooling system and other plant wastewater will be sent to the Southeast Wastewater Treatment Plant (SEWWTP) via the City‘s combined sewer system.

Stormwater Runoff and Surface Water Quality

Preliminary soil contamination investigations at and near the SFERP site indicate high levels of total petroleum hydrocarbons, arsenic, lead, polynuclear aromatic hydrocarbons, and possibly other contaminants (CH2MHill 2005). Grading activities and excavation at the SFERP site could adversely affect water quality and aquatic organisms in the San Francisco Bay if stormwater drainage concentrates runoff in areas that have been disturbed by construction. Water quality could also be impacted by discharge of toxic materials released during construction, or migration of existing toxic materials present in the subsurface soils and groundwater. During and after construction, drainage and sedimentation control measures will be implemented to limit the discharge of potentially contaminated sediment from the site. Final Staff Assessment Section 4.9. (**Soil and Water Resources**), provides a more detailed discussion of potential soil and groundwater water quality issues in relation to contamination at the site, and recommends mitigation measures to avoid or minimize impacts.

Construction Noise

Noise due to construction activities can have significant impacts on local wildlife if loud noises occur during the breeding or nesting season, or if the noise affects a species' ability to find prey or avoid predators. Construction noise is anticipated to be 82 decibels (dBA) at 100 feet, and 58 dBA at 1,600 feet, compared to daytime ambient noise levels of 66 dBA at 1600 feet (SFPUC 2005a, Section 8.5). Noise created during power plant construction will be temporary, and will not differ substantially from existing noise levels in the vicinity. Construction noise is not likely to pose a threat to wildlife activities because existing noise levels and disturbance is already high, and the area surrounding the construction site is relatively barren of breeding or foraging habitat. Staff concludes that power plant construction noise impacts will be insignificant and does not propose any mitigation.

Natural Gas Supply and Water Supply Pipelines

Fuel will be delivered to SFERP via an approximately 900-foot long natural gas pipeline. This gas pipeline will tie in with the existing PG&E San Francisco Line 101 located at the corner of Illinois and 25th streets, west of the plant site. The primary method of pipeline construction includes excavation of an open trench approximately four feet deep and three to seven feet wide. The construction corridor will be approximately 50 feet wide.

The potable water supply line is a 300-foot long tie-in with an existing city main located on Cesar Chavez Street. The source of the process water will be treated secondary

effluent from a pressurized manhole in the SEWWTP outfall located approximately 2,600 feet from the SFERP site. Pipeline installation for natural gas lines and water supply lines will involve an open trench to the local tie-in location, and will occur entirely within paved areas that lack sensitive biological resources. Pipeline installation for natural gas lines and water supply lines will involve an open trench to the local tie-in location and will occur entirely within paved areas that lack sensitive biological resources. Staff concludes that sensitive species or habitat will not be impacted by natural gas or water supply pipeline construction, and does not propose any biological resource mitigations.

115-kV Transmission Lines

Two approximately 3,000-foot long underground 115-kV transmission circuits will connect the SFERP switchyard with the existing Potrero Substation via underground cables. Construction will involve an open duct trench to the local tie-in location, and will occur entirely within paved areas that do not support natural plant communities or sensitive biological resources. Transition structures (underground to overhead) will be located on the northern portion of the SFERP switchyard and at the Potrero substation. These structures are not higher than existing onsite structures. Staff concludes that sensitive species or habitat will not be impacted by construction of underground transmission lines or underground to overhead transitions structures and does not propose any biological resource mitigations.

Operation Impacts and Mitigation

Noise and Lighting during Project Operation

Noise due to ongoing plant operations can have significant impacts on local wildlife if loud noises occur during the breeding or nesting season or if the noise affects a species' ability to find prey or avoid predators. Operation noise from the SFERP site will include noise created by the generators, cooling tower, transformers, and other components of the plant. Noise from operation of the power plant is predicted not to exceed 54 dBA (decibels) at the nearest residence to the site. This plant site is currently zoned industrial and is surrounded by several industrial facilities adjacent to the site. These facilities typically operate 24 hours per day, seven days per week and have standard industrial lighting and noise emissions. Noise resulting from operation of the SFERP power plant is not likely to adversely impact wildlife because it will not differ substantially from existing noise levels, and wildlife using the shoreline area adjacent to the plant site will have acclimated to existing noise.

Bright night lighting could disturb wildlife (e.g., nesting birds, foraging mammals, and flying insects). Night lighting is also suspected to attract migratory birds to some areas and, if the lights are on tall buildings or the combustion turbine exhaust stacks, collisions could occur. However, the SFERP exhaust stack height of 85 feet is lower in profile than much of the surrounding development. In comparison, exhaust stack height for the nearby Potrero Power Plant Unit 3 is approximately 300 feet.

Operation of the power plant will require onsite nighttime lighting for safety and security. To reduce offsite lighting impacts, lighting at the facility will be restricted to areas required for safety, security, and operation. Exterior lights will be hooded, and lights will

be directed onsite so that significant light or glare will be minimized. Low-pressure sodium lamps and fixtures of a non-glare type will be specified. For areas where lighting is not required for normal operation, safety, or security, switched lighting circuits will be provided, thus allowing these areas to remain dark at most times, minimizing the amount of lighting potentially visible offsite. With these measures to reduce offsite light on the Bay, lighting from the new facility is not likely to attract or otherwise interfere with wildlife activities in the vicinity.

Potential for Collision and Electrocution Hazard to Birds

The SFERP project will bury the approximately 3,000-foot long electrical transmission lines, eliminating potential impacts associated with bird electrocution and collision with aboveground lines. Underground to overhead transition structures will be located on the northern portion of the SFERP site and at the Potrero switchyard. At the Potrero switchyard the overhead line would then connect with the switchyard bus in an overhead arrangement. The proposed project would require construction of three, 85-foot high exhaust stacks that could potentially pose a collision threat to birds. Bird collisions with tall structures typically involve nocturnal migrants flying at night in inclement weather and low-visibility conditions, colliding with tall-guyed television or radio transmission towers. Migratory birds generally fly at an altitude that would avoid ground structures, except when crossing over topographic features (e.g. ridge tops) or when inclement weather forces them down closer to the ground. A large number of birds migrate along the Pacific Coast, passing through the San Francisco Bay Area. The project area is within a known path for nocturnally migrating birds. However, there are no topographic or ecological features that would attract birds to this location or “funnel” them into the vicinity of the exhaust stacks or other elevated features of the project. Because of the relatively low structure height and lack of guy wires and aboveground transmission lines, the potential for bird collisions with stacks and other project structures is considered less than significant, and staff proposes no mitigation.

Cooling Effluent and Discharge

Process water for the SFERP power plant operations will be supplied by the City’s combined sewage system and go through a new on-site water treatment plant. Water will be discharged to the plant wastewater sump, and then returned to the City’s combined sewer system. The SFERP project will draw process water from, and discharge wastewater into, the combined sewer system, therefore fish and other aquatic organisms in the San Francisco Bay will be unaffected by cooling effluent and discharge.

Stormwater Runoff and Drainage Improvements

Untreated stormwater runoff from the paved SFERP plant site could adversely affect water quality and aquatic organisms in the Bay. To avoid these potential impacts, sheet flow from both the power plant and 25th Street in front of the power plant will be directed into a vegetated swale, a stormwater treatment feature consistent with Port of San Francisco’s Best Management Practices (BMPs). The vegetated swale would run along the eastern border of the power plant site and terminate near the San Francisco Bay Conservation and Development Commission’s (BCDC’s) 100-foot shoreline bank jurisdiction at the intersection of Maryland and 25th Streets. Within BCDC’s jurisdiction, a 12-inch thick riprap apron would extend approximately to the Mean High Tide Line to

protect against shoreline erosion. These drainage improvements would minimize potential for adverse water quality effects to aquatic organisms in the Bay. Section 4.9. **Soil and Water Resources**, provides a more detailed discussion of the proposed treatment of post-construction stormwater runoff and measures to protect water quality in the Bay.

Nitrogen Deposition Impacts on Serpentine Soil Plant Communities

Serpentine soils in the San Francisco Bay Area, including those on San Bruno Mountain, support native grassland plant communities that sometimes provide habitat for rare and endemic species (Weiss 1999). Non-native annual grasses have invaded most grassland communities in California, but the highly specialized plant species adapted to nutrient-poor serpentinitic soils are often capable of resisting these non-natives. Serpentine-adapted natives can thrive in soils that are deficient in nitrogen, potassium, phosphorus, and other nutrients, offering a competitive advantage over the faster growing non-native annual species that have overtaken most of California's grasslands (Kruckeberg 1984).

That competitive advantage can be lost when nitrogen deposition from air pollution fertilizes these serpentine plant communities and nitrogen ceases to be a limiting nutrient for plant growth. Under these circumstances, non-native annual grasses out compete the native species, threatening the biodiversity of these unique native plant communities (Weiss 1999). Studies have demonstrated that nitrogen deposition from air pollution can change serpentine plant community composition with adverse effects to several species of threatened or endangered butterfly species that rely upon these native serpentine plants for food (Weiss 1999, USFWS 1998). The threshold of annual nitrogen deposition rates that can potentially influence ecosystem change to herbaceous plant communities is approximately five to six kilograms/hectare/year (kg/ha/year) (SFPUC 2005a). Increased fertilization and subsequent succession of endemic serpentine species to non-native grasses may be a problem in grassland habitats throughout the Bay Area (USFWS 1998).

Air emissions from SFERP's three combustion turbine exhaust stacks include nitrogen oxides (NOx), sulfur oxides (SOx), and particulates (PM10). Nitrogen oxide gases (NO, NO_2) convert to nitrate particulates (nitrates and nitrites) in a form that is suitable for uptake by most plants. The USFWS (USINTERIOR 2004a) expressed concern about the potential for SFERP to increase the load of NOx emissions and ammonia in the San Bruno Mountain area. The USFWS noted in their September 2, 2004, letter (USINTERIOR 2004a) that many regional listed plant and animal species occur on native grasslands (including serpentine grasslands) that could be adversely affected by increases in nitrogen deposition from the SFERP. These species include the largest documented population of the endangered callippe silverspot butterfly, the endangered mission blue butterfly, and the endangered San Bruno elfin butterfly. The USFWS also hopes to reintroduce the threatened Bay checkerspot butterfly to San Bruno Mountain (USFWS 1998, USFWS 2001), and still considers it Critical Habitat for this species.

All four listed butterfly species depend on nectar from a variety of plants but require specific larval host plants. Mission blue butterfly larvae feed exclusively on lupine species (*Lupinus albifrons, L. variicolor*, and *L. formusus*) which grow in open grassland

habitat, rocky slopes, and disturbed areas. California golden violet (*Viola pedunculata*) is the host plant of the callippe silverspot butterfly and is found in a variety of habitats including open grasslands and chaparral. The host plant for the San Bruno elfin butterfly is the Pacific stone crop (*Sedum spathufolium*) which is typically found around rocky outcrops. The primary larval host plant for the Bay checkerspot is dwarf plantain (*Plantago erecta*), an annual, native plantain. Habitat loss and fragmentation is the chief factor responsible for the contracting range and decreased numbers of these endangered butterfly species. The ongoing primary threat to the butterfly species at San Bruno Mountain is habitat loss due to the encroachment of non-native species and the expansion of coastal scrub vegetation (Kobernus 2004, cited in SFPUC 2005a). Experimental evidence from serpentine grasslands in San Mateo County indicates that increased levels of nitrogen and other nutrients allow invasion and dominance of non-native annual grasses causing suppression of native forbs, including the dwarf plantain, the Bay checkerspot's main larval food plant (USFWS 1998).

In addition to the special status butterfly species discussed above, San Bruno Mountain provides habitat for seven special status plant species (Table 2). Most of the seven rare plant species potentially occurring on San Bruno Mountain are associated with chaparral and coastal scrub communities as well as serpentine soils. Invasive non-native species have also been documented as threats to some of these species, such as white-rayed pentachaeta (USFWS 1998). The USFWS (USINTERIOR 2004a) also expressed concerns about potential impacts to rare plant species due to increased nitrogen levels from the SFERP.

In response to USFWS concerns about potential air quality impacts of the SFERP project to rare plants and butterflies, the applicant conducted an analysis to establish the existing levels of nitrogen deposition near San Bruno Mountain and to determine SFERP's additional contribution to this background level (CH2MHill 2004). This analysis demonstrated that the existing background nitrogen deposition rate at San Bruno Mountain is estimated to be 6.169 kg/ha/year. The average modeled nitrogen deposition from the SFERP project over the area is estimated to be 0.0059 kg/ha/year on San Bruno Mountain, a 0.0009 percent increase from ambient levels (see CH2MHill 2004 for the modeling methodology used to derive these figures). With the SFERP project, the total nitrogen deposition is 6.169 kg/ha/yr plus 0.0059 kg/ha/yr, or 6.175 kg/ha/year.

This modeling analysis did not take into account the NOx emission reduction credits being provided for the project which will offset the nitrogen emissions increase from SFERP. The analysis also does not consider NOx emission reductions from the closure of existing power plants within the City. One of the chief goals of the SFERP is to close existing in-City generation, while maintaining the reliability of the electric system. Construction and operation of SFERP is one of several steps necessary to achieve this goal (Edwards 2004). According to the California Independent System Operator (CAISO), construction of the SFERP, in combination with the construction of a number of planned transmission projects and a small generating facility at the San Francisco International Airport, will provide for the release of units at the Potrero Power Plant from the applicable Reliability-Must-Run (RMR) agreement (Edwards 2004). According to the San Francisco Action Plan negotiated by the City and the CAISO, terminating the RMR contracts will force closure of the Hunters Point power plant; the Potrero facilities could

remain open but are not expected to be able to operate economically without a RMR contract, and would also likely close (Edwards 2004).

While the City is committed to closure of polluting power plants, the USFWS noted (USINTERIOR 2004a) that no firm timeline for these closures is provided. Given that no definite date can yet be offered for closure of these facilities, the applicant analyzed three potential future SFERP operating scenarios with differing combinations of plant closures and installation of emission controls. In the first scenario, it was assumed that both Potrero and Hunters Point power plants would continue to operate at historical levels, but that selective catalytic reduction (SCR) systems would be installed on the boilers to reduce NOx emissions. Installation of the SCR systems is required for these power plants to meet the 2006 NOx regulatory limits contained in the Bay Area Air Quality Management District's (BAAQMD) Rules and Regulations. In the second scenario, it was assumed that the Potrero Power Plant would continue to operate at historical levels, with Unit 3's NOx emissions controlled using SCR to meet the BAAQMD's regulatory NOx limit, and that the Hunters Point power plant would be shut down. In the third scenario, it was assumed that both the Potrero and Hunters Point power plants would be shut down. All scenarios include the NOx reductions from the offsets to be provided for SFERP.

Analysis of these three scenarios show that even with operation of SFERP and continued operation of the Hunters Point and Potrero power plants (with the required SCR control in place) emissions in southeast San Francisco would be reduced by more than 52 tons per year of nitrogen (CH2MHill 2004). The continued operation of the Potrero Power Plant and the shutdown of the Hunters Point Power Plant would result in a net reduction in nitrogen emissions of approximately 86 tons per year. If both the Potrero and Hunters Point power plants are shut down, the area would see a net reduction in nitrogen emissions of about 169 tons per year.

At an informal meeting with the USFWS on June 22, 2005, Energy Commission staff discussed the modeling results (CH2MHill 2004) that demonstrate the SFERP project would result in an approximately 0.0009 percent increase from ambient nitrogen levels (Powers 2005). The USFWS asserts that current nitrogen deposition rates are already at levels affecting native grasslands in the Bay Area (within the five to six kg/ha/year expected to affect herbaceous plants), and noted that even slight increases in this deposition rate contribute to the cumulative adverse effects to rare and endangered species in the San Bruno Mountain area. Of even greater concern is the absence of a definite timetable and firm commitment to shutting down the existing polluting power plants.

Staff agrees that any contribution, even a minor one, to an existing cumulative impact to listed species is potentially significant and should be mitigated. The applicant proposes to purchase and surrender 47.5 tons per year of oxides of nitrogen emission reduction credits from the nearby Potrero Power Plant to mitigate the project's 39.8 tons of emission liability (see Air Quality section for a more detailed discussion of emission reduction credits). The surrendering of emission reduction credits would reduce the overall nitrogen emissions in the greater Bay Area and in the San Bruno Mountain area, and would eliminate the project's contribution to cumulative adverse impacts to listed species.

Cooling Tower Drift

Cooling tower drift is the fine mist of water droplets that escape the cooling tower's mist eliminators and are emitted into the atmosphere. Cooling towers concentrate the particulates (total dissolved solids) during the cooling process and produce a salt mist. At high concentrations, salts can physically damage leaf cells, which affect the photosynthetic ability of the plant. Other effects include blocking the stomata (leaf pores) so that normal gas exchange is impaired, as well as affecting leaf adsorption and solar radiation reflectance. These effects can reduce productivity in crops, trees, and sensitive special status plant species in a deposition area. Given the absence of crops or native plant communities near SFERP, no impacts to biological resources are expected due to cooling tower drift.

Cooling Effluent and Discharge

Process water for the SFERP power plant operations will be supplied by the City's combined sewage system and go through a new on-site water treatment plant. Water will be discharged to the plant wastewater sump, and then to the City's combined sewer system. The SFERP project will draw process water from, and discharge wastewater into, the combined sewer system, therefore no aquatic organisms in the San Francisco Bay or its tributaries will be affected by securing or discharging water during operations.

This use of tertiary-treated wastewater (recycled water) for power plant cooling and the discharge back to the wastewater system for further treatment will eliminate the chance of any impacts to the nearby aquatic biological resource, so staff does not propose any biological resources mitigation.

CUMULATIVE IMPACTS AND MITIGATION

The term "*cumulative impacts"* refers to two or more individual and similar effects which, when considered together, are considerable or which compound or increase other environmental impacts. No construction-related cumulative impacts will occur to biological resources because construction will occur entirely in areas that are paved or otherwise barren. However, operation of the SFERP would contribute, albeit a minor amount, to an ongoing significant cumulative impact to listed plant and animal species on San Bruno Mountain from emissions from various sources including power plants. Any contribution, even a minor one, to an existing cumulative impact to listed species is potentially significant and should be mitigated. To mitigate for the slight increase in nitrogen deposition resulting from the SFERP, emission reduction credits will be provided to mitigate the project's potential cumulative impacts.

COMPLIANCE WITH LORS

Appendix G of the California Environmental Quality Act (CEQA, Public Resources Code 21000 et seq.) includes a list of impacts that are likely to be determined to be *significant* if they occur. Regarding biological resources impacts, CEQA considers impacts to state or federal listed species, interference with fish and wildlife migration and loss of habitat to be *significant* if one or more of these impacts is likely to occur. As discussed above, operation of the SFERP will contribute to an ongoing significant impact (nitrogen deposition) to listed plant and animal species on San Bruno Mountain. Any contribution,

even a minor one, to an existing cumulative impact to listed species is potentially significant under CEQA and should be mitigated if possible. To mitigate for the slight increase in nitrogen deposition resulting from the SFERP, the project owner will acquire emission reduction credits and must provide verification that they will be implemented before SFERP comes on line so that listed species on nearby San Bruno Mountain benefit from this air emission mitigation (CEC 2005pp, CEC 2005qq). If this is done, the project would be in compliance with the federal Endangered Species Act.

The project would use recycled water for power plant cooling, satisfying the San Francisco General Plan Water Resources Policy 3.3 regarding the use of recycled water and protection of Bay waters and resources.

Implementation of the terms of Article 22A of the San Francisco Public Health Code will serve to mitigate potentially significant water quality impacts to marine life in the San Francisco Bay.

The use of a vegetated swale to treat post-construction stormwater runoff is consistent with the BCDC *San Francisco Bay Plan* policies (policies 2, 3, 5, and 6) on water quality because it minimizes the discharge of pollutants into the Bay and because these drainage improvements will be reviewed and approved by the Regional Water Quality Control Board (BCDC 2005a).

NOTEWORTHY PUBLIC BENEFITS

Construction of the SFERP, in combination with the construction of a number of planned transmission projects and a small generating facility at the San Francisco International Airport, would clear the way for closure of the Hunters Point Power Plant, and possibly the Potrero Power Plant. If both the Potrero and Hunters Point power plants are shut down, the area would realize a net reduction in nitrogen emissions of about 169 tons per year (for more information see Air Quality analysis). This reduction in nitrogen emissions would benefit the listed species and their habitats on San Bruno Mountain. In addition, when either of these power plants is shut down, California will have fewer coastal power plants withdrawing cooling water from San Francisco Bay and less associated impingement, entrainment, and thermal discharge impacts on marine biological resources.

Another benefit of the SFERP is that the facility will incorporate an alternative cooling technology by utilizing recycled water rather than Bay water. As stated above, using an alternative cooling technology avoids the coastal ecosystem impacts associated with once-through cooling.

CONCLUSIONS

Construction of the SFERP would not have any significant direct impacts to sensitive biological resources and would be in compliance with applicable LORS. However, it could potentially have indirect and cumulative air quality impacts to listed butterflies and plants found on San Bruno Mountain, approximately 4.5 miles south of the project area. Existing nitrogen deposition rates at San Bruno Mountain are 6.169 kg/ha/year. The

SFERP project would contribute an additional 0.0059 kg/ha/year to this background level, resulting in net nitrogen deposition of 6.175 kg/ha/year, or a 0.0009 percent increase. This nitrogen deposition rate is already above the level that is thought to be impacting listed species on San Bruno Mountain. Operation of the SFERP may contribute to an ongoing significant cumulative impact (nitrogen deposition) to listed plant and animal species on San Bruno Mountain. Any contribution, even a minor one, to an existing cumulative impact to listed species is potentially significant and should be mitigated. Emission reduction credits from the nearby Potrero power plant have been acquired and will be surrendered to reduce the nitrogen deposition resulting from operation of the SFERP. The emission reduction credits would mitigate the project's direct impacts and minor contribution to cumulative impacts to listed butterfly and plant species on serpentine grasslands of San Bruno Mountain and be in compliance with LORS. The USFWS would require verification that the emission reduction credits have been secured and surrendered before the SFERP project comes on line (CEC 2005pp).

PROPOSED CONDITIONS OF CERTIFICATION

Staff does not have any Biological Resources conditions of certification. For more information about emission reduction credits required for the SFERP project, the Air Quality testimony contains Condition of Certification **AQ-38** regarding the provision of valid emission reduction credit banking certificates for 47.5 tons/year of oxides of nitrogen from the Potrero plant site to offset the anticipated oxides of nitrogen emissions for the proposed power plant project.

Untreated stormwater runoff from the paved SFERP plant site could adversely affect water quality and aquatic organisms in the San Francisco Bay. Water quality could also be impacted by discharge of toxic materials released during construction, or migration of existing toxic material present in the subsurface soils and groundwater. The Soil and Water Resources testimony contains Conditions of Certification to minimize or avoid water quality impacts. These Conditions, described in **S&W-1**, **S&W -2**, **S&W -3**, and **S&W -6**, require development and implementation of a Site Implementation and Mitigation Plan to prevent existing subsurface contamination from migrating to the San Francisco Bay through groundwater transport, discharge of eroded sediments, or discharge of construction wastewater.

REFERENCES

BCDC 2005a – San Francisco Bay Conservation & Development Commission (tn: 35974). Recommendations from BCDC on the PSA for San Francisco. 11/22/2005. Rec'd 11/28/2005.

CEC 2004pp – CEC/Pfanner (tn: 32323). Data Request Set #2. Submitted to Dockets on 9/10/04.

CEC 2005pp – California Energy Commission/W. Pfanner (tn: 36025). Record of Conversation between Susan Sanders, PAR Environmental/CEC, and Mary Hammer, US Fish & Wildlife Services; re: Comments to the PSA and the upcoming FSA. 10/21/2005. Rec'd 12/09/2005.

CEC 2005qq – California Energy Commission/W. Pfanner (tn: 36025). Record of Conversation between Susan Sanders, PAR Environmental/CEC, Mary Hammer, US Fish & Wildlife Services; re: Air Quality Data. 07/14/2005. Rec'd 12/09/2005.

CH2MHill 2004. Data Response, Set 2A (Responses to Data Requests: 157-159); Submitted to City and County of Sacramento by CH2MHill. October 12, 2004. Submitted to Dockets on 10/13/04.

CH2MHill 2005. Informal Data Response, Set 6D – Addendum. Summary of shallow environmental assessment at proposed SFPUC Muni Power Plant Site (Supplemental SFERP). Prepared by Dina Calanchini and Tom Lee, CH2MHill, for John Carrier, August 31, 2005. Submitted to Dockets on 11/27-05

Edwards, M. 2004. Memorandum to ISO Board of Governors regarding Action Plan for San Francisco, Options and Risks. September 10, 2004.

Kobernus, P. 2004. Personal communication with John Cleckler, September 2004. Patrick Kobernus is the San Bruno Mountain HCP administrator. Cited in SFERP 2005a.

Kruckeberg, A. R. 1984. California Serpentines: Flora, Vegetation, Geology, Soils, and Management Problems. University of California Press, Berkeley. 180 pp.

Lerman, S.L., and E.F. Darley. 1975. "Particulates," pp. 141-158. In J.B. Mudd and T.T. Kozlowski (eds.). Responses of Plants to Air Pollution. Academic Press. New York, NY.

Pahwa, S. and B. Shipley. 1979. A Pilot Study to Detect Vegetation Stress around a Cooling Tower. Presented at the 1979 Cooling Tower Institute Annual Meeting, Houston, Texas. Paper TP7903.

SFERP 2004a - City and County of San Francisco/Blout (tn: 31130). Application for Certification San Francisco Electric Reliability Project - 145-megawatt natural

gas-fired peaking power plant located in San Francisco. Submitted to CEC/Therkelsen/Dockets on 3/18/04.

SFPUC 2005a – San Francisco Public Utilities Commission/Hale (tn: 34403). Amendment A of the Application for Certification. Submitted to CEC/Therkelsen/Dockets on 3/25/05.U.S. Fish and Wildlife Service. 1998. Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area. Portland, Oregon. 330+pp.

U.S. Fish and Wildlife Service. 2001. Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for the Bay Checkerspot Butterfly (*Euphydryas editha bayensis*); Final Rule. (pdf) Portland, Oregon. Federal Register 66:21499; April 30, 2001

US INTERIOR 2004a – U. S. Department of the Interior/Goude (tn: 32255). Comments of the AFC Relative to Requirements of the Endangered Species Act of 1973 as Amended (Act). Submitted to CEC/Pfanner/Dockets on 9/8/04.

Weiss, Stuart B. 1999. Cars, cows, and checkerspot butterflies – nitrogen deposition and management of nutrient-poor grasslands for a threatened species. *Conservation Biology* Vol. 13, No. 6.

CULTURAL RESOURCES

Testimony of Beverly E. Bastian and Gary Reinoehl

SUMMARY OF CONCLUSIONS

Staff has determined that the San Francisco Electrical Reliability Project (SFERP) would have no impact on known significant archaeological resources, historic standing structures, historic districts, or ethnographic resources with the adoption and implementation of the conditions of certification **CUL-1** through **CUL-8**.

INTRODUCTION

This cultural resources assessment identifies the potential impacts of the SFERP to cultural resources. Cultural resources are defined under state law as buildings, sites, structures, objects, and historic districts. Three kinds of cultural resources are considered in this assessment: prehistoric, historic, and ethnographic.

Prehistoric archaeological resources are those materials relating to prehistoric human occupation and use of an area. These resources may include sites and deposits, structures, artifacts, rock art, trails, and other traces of Native American human behavior. In California, the prehistoric period began over 10,000 years ago and extended through the eighteenth century until 1769, the time when the first Europeans settled in California.

Historic-period resources are those materials, archaeological and architectural, usually associated with Euro-American exploration and settlement of an area and the beginning of a written historical record. They may include archaeological deposits, sites, structures, traveled ways, artifacts, or other evidence of human activity. Under federal and state requirements, historical cultural resources must be greater than fifty years old to be considered of potential historic importance. A resource less than fifty years of age may be historically important if the resource is of exceptional importance.

Ethnographic resources are those materials important to the heritage of a particular ethnic or cultural group, such as Native Americans or African, European, or Asian immigrants. They may include traditional resource collecting areas, ceremonial sites, topographic features, cemeteries, shrines, or ethnic neighborhoods and structures.

For this project, staff provides an overview of the environmental setting and history of the project area, an inventory of the cultural resources identified in the project vicinity, and an analysis of the potential impacts from the proposed project using criteria from the California Environmental Quality Act (CEQA). The primary concern is to ensure that all potential impacts are identified and that conditions are set forth that ensure that impacts are mitigated below the level of significance.

If cultural resources are identified, staff determines whether there may be a project-related impact to them. If the cultural resources cannot be avoided, staff determines whether any of the impacted resources are eligible for the California Register of Historical Resources (CRHR). If impacted resources are eligible for the register, staff

recommends mitigation measures that ensure that impacts to the identified cultural resources are reduced to a less than significant level.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Projects licensed by the Energy Commission are reviewed to ensure compliance with all applicable laws. For this project, in which there is no federal involvement,[1] the applicable laws are primarily state laws, in particular, CEQA. Although the Energy Commission has pre-emptive authority over local laws, it typically ensures compliance with local laws, ordinances, regulations, standards, plans, and policies.

CULTURAL RESOURCES Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
State	
Public Resources Code, section 21083.2	The lead agency may require reasonable steps to preserve a unique archaeological resource in place. Otherwise, the project applicant is required to fund mitigation measures to the extent prescribed in this section. This section also allows a lead agency to make provisions for archaeological resources unexpectedly encountered during construction, which may require the project applicant to fund mitigation and delay construction in the area of the find (CEQA).
California Code of Regulations, Title 14, section 15064.5, subsections (d), (e), and (f)	Subsection (d) allows the project applicant to develop an agreement with Native Americans on a plan for the disposition of remains from known Native American burials impacted by the project. Subsection (e) requires the landowner [possibly the project applicant] to rebury Native American remains elsewhere on the property if other disposition cannot be negotiated within 24 hours of accidental discovery and required construction stoppage. Subsection (f) directs the lead agency to make provisions for historical or unique archaeological resources that are accidentally discovered during construction, which may require the project applicant to fund mitigation and delay construction in the area of the find (CEQA Guidelines).
California Code of Regulations, Title 14, section 15126.4(b)	This section describes options for the lead agency and for the project applicant to arrive at appropriate, reasonable, enforceable mitigation measures for minimizing significant adverse impacts from a project. It 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 advises mitigation through avoidance of damaging effects on any historical resource

[1] Cultural resources are indirectly protected under provisions of the federal Antiquities Act of 1906 (Title 16, United States Code, Section 431 et seq.) and subsequent related legislation, policies, and enacting responsibilities, e.g., federal agency regulations and guidelines for implementation of the Antiquities Act.

	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).
Public Resources Code 5024.1	The California Register of Historic Resources (CRHR) is established and includes properties determined eligible for the National Register of Historic Places (NRHP)(criteria: A. events, B. important persons, C. distinctive construction, and D. data), State Historic Landmark No. 770 and subsequent numbered landmarks, points of historical interest recommended for listing by the State Historic Resources Commission, and historical resources, historic districts, and landmarks designated or listed by a city or county under a local ordinance. CRHR criteria are 1) events, 2) important persons, 3) distinctive construction, and 4) data.
Public Resources Code 5020.1 (h)	"Historic district" means a definable unified geographic entity that possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development.
California Health and Safety Code, Section 7050.5	This code makes it a misdemeanor to disturb or remove human remains found outside a cemetery. This code also requires a project owner to halt construction if human remains are discovered and to contact the county coroner.
Local	
San Francisco General Plan, General Goals, Goal 1	The first goal of the General Plan is the protection, preservation, and enhancement of the economic, social, cultural, and esthetic values that establish the desirable quality and unique character of the city.
San Francisco General Plan, Preamble, Priority Policy 7	Landmarks and historic buildings should be preserved.
San Francisco General Plan, Preservation Element, Policy 7.0	Encourages historic preservation through local, state, and federal programs.
Central Waterfront Area Plan, Urban Design Section, Policy 10.3	Encourages the rehabilitation of architecturally or historically significant buildings with reuse potential.

SETTING

REGIONAL SETTING

The project area is located on the San Francisco Peninsula, a northward extension of the Santa Cruz Mountains that separates San Francisco Bay from the Pacific Ocean. The proposed project is in an industrial area within the City of San Francisco.

PROJECT, SITE, AND VICINITY DESCRIPTION

The proposed project is located in the Potrero area of the western shoreline of San Francisco Bay about 1.5 miles south of the Bay Bridge. Potrero Hill rises to an elevation of about 300 feet, one-half mile northwest of the project. The project area is industrial, with the former Pier 70 shipyard complex and warehouses to the north, warehouses to the south, and the Pier 80 shipping complex to the southeast. An open field, where a San Francisco MUNI Operations and Maintenance Facility is being constructed at this time, is due west of the proposed plant site. A residential area at the base of Potrero Hill known as the Dogpatch Neighborhood is northwest of the project area.

The proposed power plant site and laydown area are, at this time, undeveloped and unpaved (SFPUC 2005a:8.3-6). They consist entirely of land created by filling in the bay (see discussion under Land Modification, below). The undeveloped 4.0-acre plant site is bounded by 25th and Cesar Chavez Streets on the north and south, by the MUNI light rail development site on the west, and by the 8.5-acre undeveloped project laydown area to the east (SFPUC 2005a:2-2).

The proposed 115kV underground transmission line route totals 3,000 feet in length. The proposed route exits north from the plant site into 25th Street and proceeds west along 25th to Michigan Street where it turns north. At 24th Street it turns west until it reaches Illinois Street where it turns north again. It continues on Illinois until it reaches the PG&E Potrero Switchyard. Two alternative routes into the yard are being considered: one which stays underground and goes directly into the switchyard from Illinois Street, and one which continues underground north on Illinois Street to 22nd Street and then east on 22nd to an underground/overhead transition structure into the switchyard (SFPUC 2005a:5-1). Except at the power plant and the switchyard, the entire proposed route is in the city streets.

The proposed 900-foot-long underground natural gas pipeline runs from PG&E's 24-inch pipeline in Illinois Street, east on 25th Street to the west edge of the plant site, and south into the site. The construction would be primarily open-trench in a 50-foot-wide construction corridor (SFPUC 2005a:6-1).

The proposed plant would require two water supply lines, one for process water and one for potable water. The proposed process water line would be about 2,600 feet long, consisting of all new construction. Process water would be taken from the Southeast Waste Water Treatment Plant (SEWWTP) outfall located 80 feet east of the intersection of Third and Tulare Streets. From the pressurized manhole there, the proposed process water pipeline route would run west on Tulare to Third Street, then north on Third to Marin Street. On Marin, the line would run east to Michigan Street, where it would turn north until it intersected Cesar Chavez. There it would turn east and run to Maryland

Street, where it would turn west at the property boundary and run to the water treatment plant that would be part of the proposed power plant (SFPUC 2006c:1).

The proposed plant would tap into the city's potable water distribution system. There are two alternative routes for the proposed potable water supply line, one running 300 feet south from the southeast corner of the plant site boundary to an existing city water pipeline in Cesar Chavez Street, and another running 300 feet from the northwest corner of the plant site boundary to an existing city water pipeline in 25th Street (SFPUC 2005a:7-2).

Prehistoric Setting

Human settlement of the San Francisco Bay region could possibly date as early as 12,000 years BP (Before Present, based on the date of 1950) (Moratto 2004:76), but no evidence for this early occupation has been found. Until about 8,500 BP, there was no bay, rather the area was a basin crossed by the flood plain of the Sacramento River, which flowed through the Golden Gate's gorge to reach the ocean "many kilometers west of the present shoreline" (Moratto 2004:xliv;219). The flooding of the bay was complete at about 6,000 BP, but before that time the proposed project area was on a ridge, more distant from the ocean to the west than from the valley and river to the east and north.

The earliest documented occupation of the area between San Francisco and Monterey Bays dates to about 8,000 BP. Archaeological evidence indicates that, prior to 2,000 BP, this area was occupied by small groups of hunter-gatherers who used both terrestrial and marine resources (primarily shellfish). Large shellmound sites began to be occupied around San Francisco Bay around 2,500 BP. These sites appear to be habitation sites with dense shell midden, flaked and ground stone tools, bone tools, beads, ornaments, charmstones, and burials. The shellmound sites were occupied until the arrival of the Spanish. The principal marine resource exploited was shellfish, consisting mostly of oysters and bentnose clams. The most important terrestrial resource was acorns gathered from oak trees in the fall. Acorn processing (leaching out the tannic acid and grinding the meats into meal) required a significant amount of labor. Use of acorns as early as 2,500 BP indicates intensification of resource procurement at a relatively early period in prehistory in this area. The beginning of the use of the shellmound sites around San Francisco Bay may correspond with the arrival of Utian speaking people from the Delta area. These Utian speakers were the ancestors of the Costanoans who occupied the San Francisco Bay area when the Spanish arrived (SFPUC 2005a:8.3-8).

Ethnographic Background

The proposed project area is in territory formerly occupied by the Native American group known to the Spanish and twentieth-century ethnographers as the Costanoan. The contemporary descendants of this group are members of the Ohlone Indian Tribe. The Costanoan group occupied the coast of California from San Francisco to Monterey and inland to the coastal mountains from the southern side of the Carquinez Straits to the eastern side of the Salinas River south of Chalone Creek. Costanoan actually refers to a language family consisting of eight related languages. Each language was spoken by a different ethnic group within a recognized geographical area. The political units

within each ethnic group were tribelets. Tribelet population varied from 50 to 500, with the average being about 200 people. Each tribelet had one or more permanent villages and several temporary camps within its territory. Collecting and hunting parties lived in temporary camps when obtaining resources within the tribelet territory away from the village (SFPUC 2005a:8.3-8).

The proposed project area is in the territory occupied by speakers of the Ramaytush language. It is estimated there were about 1,400 speakers of this language in 1770. The Ramaytush speakers were divided into at least 10 tribelets. Each tribelet had a chief, and the office was inherited patrilineally. In particular, the chief fed visitors, directed ceremonial activities, organized hunting, fishing, and gathering, and directed warfare expeditions. Trade between the coastal Costanoan groups and the inland Yokuts groups involved the exchange of coastal products, such as salt, mussels, abalone shells, and dried abalone meat,, for inland products, such as piñon nuts (SFPUC 2005a:8.3-8).

Acorns from four species of oak were the most important plant food. Nuts, berries, seeds, and roots were also important. Costanoan groups practiced managed burning of chaparral to encourage sprouting of seed plants and improve browsing for deer and elk. The most important animals consumed were deer and rabbit. Steelhead, salmon, sturgeon, and lamprey were the most important fish gathered from San Francisco Bay, and oysters and clams were the most important shellfish (SFPUC 2005a:8.3-8).

People lived in thatched dome houses with rectangular doorways and a central hearth. Other structures in a village included sweathouses, dance enclosures, and an assembly house. Technology included tule balsa canoes, bows and arrows, and baskets. Chipped stone tools were made from chert obtained locally and obsidian obtained in trade with other groups (SFPUC 2005a:8.3-8, 9).

The Spanish established seven missions in Costanoan territory between 1769 and 1797. Due to introduced European diseases and a declining birth rate, the Costanoan population decreased from about 10,000 to 2,000 by 1832 (SFPUC 2005a:8.3-9).

Historic Setting

Spanish explorers reached San Francisco Bay in 1769. Soldiers and priests established the San Francisco Presidio (military post) and the Mission Dolores on the peninsula in 1776. The Mexican government in the early 1830s closed the missions. Former mission lands were granted to soldiers and other Mexican citizens for use as cattle ranches. The sons of Francisco de Haro, the first alcalde of San Francisco, were the grantees for the Rancho Potrero de San Francisco, including the project area. Ranching in the Potrero area continued during the American period that began when the Treaty of Guadalupe Hidalgo was signed between Mexico and the United States in 1848. The Gold Rush of 1849 brought large numbers of Anglo-Americans to San Francisco, which soon became the commercial entrepot for the region. Other towns in the Bay Area, such as Oakland and San Jose, developed rapidly after the arrival of the transcontinental railroad in 1869. Bay Area towns provided commercial, warehousing, financial, and manufacturing services for California’s agricultural and mining areas to the east. The earthquake and consequent fire of 1906 destroyed many nineteenth-century buildings, especially in San

Francisco, and resulted in a period of reconstruction and expansion of buildings and infrastructure in the 1910s and 1920s (SFPD 2001a:7, 8; SFPUC 2005a:8.3-9, 10, 11).

Industrial Development

The wide expanse of the Mission Bay tidal flats north of the Potrero Point area discouraged settlement during the early American period, but the lack of development south of the flats, coupled with the deep water anchorage on the bay at the point, earmarked the area early in the city's history as an ideal location for the production of black powder, used for hard rock mining in the Sierra. E.I. du Pont de Nemours Company built the first black powder magazine on the south shore of the point in 1854 and initiated the industrial development of the Potrero area. Other black powder manufacturers followed, and soon other industries were attracted to the vacant land to the south. The encroachment of other industries and the growth of residential areas nearby made the black powder manufacturers move on to less populated areas by 1881 (SFPD 2001b:2; SFPUC 2005a:8.3-12), but from the late 1850s on, the Potrero area became the center for San Francisco's industrial activity. Between 1850 and 1950 many other industries, especially those oriented to marine activities, established themselves in the area, including a rope factory, steel rolling mills, several shipyards, a slaughterhouse, a lighting gas manufacturing plant, an electrical generating plant, a sugar-processing plant, a barrel factory, and a manufacturer of tin cans (SFPUC 2005a:8.3-10-8.3-11; SFPD 2001a:8-10).

San Francisco Cordage Manufactory (later Tubbs Cordage Company) was established in 1857 and became one of the area's largest employers in the 1870s. The factory included a 1,500-foot ropewalk and wharf that extended on a southeasterly angle, paralleling the shoulder of Potrero Hill, out into the bay (SFPD 2001a:8; SFPUC 2005a:8.3-10). The ropewalk was a long, narrow building on low piers where workers manually twisted fibers into long lengths of rope. These ropes were used in California's growing mining and shipping industries (Mirant 2001c:1-7). The facility shut down in 1962 (SFPD 2001b:3; SFPUC 2005a:8.3-12-8.3-13).

The first shipyard on Potrero point was built by John North in 1862, and other shipbuilders soon followed (SFPD 2001a:9). Rolled steel was produced for the first time on the west coast at Pacific Rolling Mills in 1868. The company also produced rails, nuts, bolts, washers, railroad spikes, and ship and locomotive parts. In 1883, another steel rolling mill, Union Iron Works, started operations right next door to Pacific Mills. Union Iron made machinery, but had chosen a site on the bay because it intended to go into shipbuilding. The United States Shipbuilding Company acquired Union Iron in 1902. When U. S. Shipbuilding went into receivership in 1905, Bethlehem Steel bought Union Iron Works and renamed it the San Francisco Yard. In 1911, Bethlehem Steel bought another iron works and shipbuilding company (formerly Pacific Rolling Mills) and added it to the San Francisco Yard. Just before World War I, several major Navy contracts led to the expansion of the Yard, resulting in the demolition of the Irish Hill residential area to the south in 1917. In 1938, the shipyard was renamed the Potrero Yard. Numerous warships used in both World War I and World War II were built at this shipyard. During World War II, the yard operated at maximum capacity, running 24 hours a day and employing 18,500 workers. Bethlehem Steel operated the yard until 1949 (SFPD 2001a:9, 11-12, 14; SECAL 2001b; SFPUC 2005a:8.3-10).

In 1871 the meat-processing firm of William Dunphy and Associates got a grant of tidelands in Islais Creek Cove and established “Butchertown” there. It was built on platforms and wharves supported by pilings in Islais Creek Cove. This area contained slaughterhouses, stables, offices, saloons, and boarding houses. Butchertown continued in operation until 1906 when it was destroyed during the earthquake. This part of the cove was later filled, and in the 1960s Islais Creek was converted to a manmade channel that ends at Interstate 280 (URS/Dames & Moore 2000:5-6).

Before electricity was generally available in San Francisco, gas was used for lighting. Gas was manufactured from coal or oil until natural gas became available in 1929. The City Gas Company established the first gas manufacturing plant at Potrero Point in 1872 (SFPUC 2005a:8.3-10; SECAL 2001c:5). In 1873, this company merged with two rivals to form the San Francisco Gas Light Company (SFPD 2001a:9-10). Ownership was transferred to San Francisco Gas & Electric in 1897 (SFPUC 2005a:8.3-11; SECAL 2001c:5), and this company constructed a large powerhouse, meter house, purifying house, and machine shop and began using manufactured gas to generate electricity in 1899 (SFPD 2001a:10). This company became Pacific Gas & Electric in 1906. The Potrero gas plant was one of two in the city that survived the 1906 earthquake, and it was expanded as the city was rebuilt. The Potrero gas plant was converted from coal to oil in 1906. The Potrero gas plant was placed on standby status from 1929 to 1960. Most of it was subsequently demolished (SFPUC 2005a:8.3-11; SECAL 2001c:4-6).

Claus Spreckels established the California Sugar Refinery at Potrero Point in 1881 to refine and produce sugar made from Hawaiian sugar cane. It became the largest sugar refinery in the western United States, including wharves and several multistory brick structures that served as a wash house, a melt/filter house, and warehouses. The refinery changed ownership in 1891 and was renamed the Western Sugar Refinery. The refinery continued operations at Potrero Point until 1949, when it was purchased by its major competitor, the California and Hawaiian Sugar Refining Corporation (C & H). Judging the plant too costly to modernize, C & H demolished most of the refinery structures in 1951 (SFPUC 2005a:8.3-10-8.3-11; SECAL 2001c:R3-4-R3-7; SFPD 2001a:10).

In 1901 Spreckels built Station A, a large brick structure that housed a steam-powered electrical generating plant. It was soon purchased by San Francisco Gas & Electric, which was renamed Pacific Gas & Electric. Station A was the largest steam electric plant west of the Rocky Mountains between 1903 and 1913 and supplied almost all of San Francisco’s electricity during this period. Later, when cheaper hydroelectric power became available, Station A was used to supplement the hydroelectric power during periods of peak use. With continuing equipment upgrades, Station A remained in operation until 1983 (SFPUC 2005a:8.3-11; SECAL 2001c:4). The City and County of San Francisco (CCSF) is considering rehabilitation or demolition of Station A for seismic safety under a CCSF ordinance.

The American Barrel Company, one of the earliest barrel-making firms in San Francisco, built its factory on Potrero Point in 1884. It moved from its original location to another Potrero area address in 1900 and continued operations until 1956 (SFPD 2001a:10).

The American Can Company was the last manufacturer to build a large plant in the Potrero Hill area. The factory started operations in 1916 and soon became a major employer, providing jobs for 1,200 workers in the 1930s, and expanding in size up through the early 1950s (SFPD 2001a:10).The factory continues to operate today.

Other, smaller businesses, especially those oriented toward maritime activities, grew up in the area around the turn of the century, including commercial fish-processing plants, ship supply warehouses, a yeast and vinegar works, and a bone-processing plant (SFPD 2001a:9).

Residential Development

Chinese fishermen had a presence on Potrero Point in the 19th century, but information on where and when is inconclusive. They may have had a village on the southern edge of the point in the 1850s or the 1880s (SECAL 2001a, Replacement AFC Section 8.3:8.3-16-8.3-17; URS/Dames & Moore 2000:4), and/or they may have occupied some ten buildings in Block 4229 of Minnesota Street around the turn of the century (SFPD 2001a:9). For persons of other ethnicities, the shipyards and other Potrero Point industries provided many jobs, and these laborers needed housing nearby. After the completion of the Long Bridge (see below) in 1867, the Irish Hill and Dogpatch neighborhoods met this need, expanding greatly with single family houses, boarding houses, hotels, groceries, restaurants, and saloons. Irish Hill was a large rock outcrop northeast of the intersection of Illinois and 20th Streets. There were two zones to the Irish Hill neighborhood: the Hill itself, on which many cottages crowded, and the nearby intersection, where residential hotels and saloons predominated. In the 1880s and 1890s, the inhabitants of Irish Hill were nearly all unskilled and semi-skilled male Irish laborers employed at the Pacific Rolling Mills or the Union Iron Works. The pre-World War I expansion of the San Francisco Shipyard forced residents out of Irish Hill, and the knoll was flattened in 1917.

The Dogpatch Neighborhood developed a little later than Irish Hill. Dogpatch was in the area between Mariposa and 24th Streets (north-south) and between Indiana and Third Streets (east-west). Building in this area was difficult because of the terrain—steep in places and subject to flooding in others, so the houses were more widely scattered than in Irish Hill. Also, the Atchison, Topeka & Santa Fe Railroad owned considerable land in Dogpatch, and the company was slow to sell or develop their lots. Dogpatch was distinct from Irish Hill in the nineteenth century, with less clustered, commonly owner-occupied houses whose inhabitants were mostly American-born skilled craftsmen employed in the boatyards and foremen at the ropewalk or rolling mills. In the 1880s, other ethnic groups had their own enclaves in the Potrero area as well, including Germans, Scots, and Russians. When Irish Hill was demolished in 1917, many of the inhabitants resettled in Dogpatch, erasing the earlier differences between the two neighborhoods (SFPD 2001a:13-15; SFPD 2001b:4, 10-11; SFPUC 2005a:8.3-13).

Land Transportation

In 1865, the need for a land connection between San Francisco’s primary residential and business districts and the new industrial area on and near Potrero Point led Potrero land investors to finance the building of a bridge, called the Long Bridge, across the Mission Bay mud flats, from the northern shore of Mission Bay south to the point. Soon

after the bridge's completion in 1867, the Potrero and Bay View Railroad began running a double-track, horse-drawn streetcar line across it, facilitating the movement of people and goods between the city proper and the Potrero area. To extend the streetcar line further south, Kentucky (later Third) Street had to be constructed across a ridge of serpentine rock between Potrero Hill and Potrero Point. Massive blasting was required to accomplish this (the removed rock contributed to the filling of Mission Bay), but in 1868 the streetcar line crossed Potrero Point and Islais Creek Cove and continued south to the Bay View Racetrack. The segment across Islais Creek Cove was another bridge, called the Third Street Trestle (SFPD 2001a:8; SFPD 2001b:4; Mirant 2001c:1-7, Figure 220-2).

The railroads played an important role in the development of the Potrero industrial area. They laid tracks throughout the area to provide service to the city and to the factories of the area. They became residents themselves, building operational support facilities on and near the point, such as a depot, a roundhouse, warehouses, and a jetty (SFPD 2001b:4-5). But their most significant role was in the ownership and transformation of the land. In the late nineteenth and early twentieth centuries, the railroads were the Potrero area's largest landowners, thanks to the largesse of the state of California (SFPD 2001a:19). In 1869, the state gave the Southern Pacific and Atchison Topeka & Santa Fe (AT&SF) railroads most of the Mission Bay tidal flats in exchange for agreeing to fill the flats now enclosed by the Long Bridge. The state also granted to AT&SF considerable land on Potrero Point, including what would become Dogpatch, where blasting the serpentine bedrock produced both buildable house lots and rock rubble to fill Mission Bay. The railroads profited greatly from their land development activities in the 1890s, but were slow to honor their obligation to fill the tidal flats. It was 1901 before Southern Pacific finished filling their part of Mission Bay and 1903 before AT&SF completed theirs (SFPD 2001b:4-5). The latter developed extensive tracks and warehouse facilities in the filled area adjacent to the old Long Bridge (SFPD 2001a:17; Mirant 2001c:1-7, Figure 220-4).

The railroad companies built two tunnels for their trains in the Potrero area in 1905 and 1907. They are part of a rail system called the Bayshore Cutoff. Still in use today, they run under Iowa Street between 18th and 22nd Streets and between 23rd and 25th Streets (SFPD 2001b:19).

In 1909 the Western Pacific Railroad (WPRR) built a jetty and wharf 1,500 feet out from the shoreline (located roughly at Minnesota Street at that time) and ran tracks out along 25th Street into the bay. The jetty was in the same location as an earlier wharf whose owner or purpose are unknown, but which appears on the 1869 U. S. Coastal Survey map of the area (SFERP 2004v:4; Mirant 2001c:1-7, Figure 220-2). The 1909 jetty and wharf were built to facilitate WPRR's transport of cargo, primarily dry goods, across the bay to Oakland via an unobstructed shipping channel established for the railroad by the Harbor Commission. The tracks ran on the jetty, while a wooden pier on pilings provided docking for the ferries which transported rail cars back and forth across the bay. Several wood-framed buildings (offices, sheds, storage) were also built along the jetty over the years, and there was a "Repair Track Building" (AGS 1999:2.4). After 1935, WPRR filled the area north of the wharf (see below) and added extensive trackage for a switchyard for ferried cars. The wharf and tracks continued in operation until 1978, although the

ferry service back and forth to Oakland ended in 1975 (URS/Dames & Moore 2000:4-5; SFPUC 2005a:8.3-14; AGS 1999:2.4).

Land Modification

Individual waterfront lot owners began the filling of Mission Bay and Islais Creek Cove as a means of increasing the available land in the Potrero industrial area in the 1850s (SFPD 2001a:17). But filling became a public mandate after the Long Bridge and the Third Street Trestle were completed in 1867-68 (SFPD 2001b:4). As discussed above, the state gave two railroad companies the submerged lands of Mission Bay in exchange for filling them. The two trestle structures to the north and south of Potrero Point provided eastern perimeters toward which the filling from the shoreline would proceed and from which additional filling could be staged. As a result, Mission Bay and Islais Creek Cove progressively shrank as they were enclosed from all sides. Filling to extend Potrero Point itself was from the shoreline outward in all directions (Mirant 2001c: Figures 220-2, 220-3, 220-4). As noted above, Mission Bay filling was completed in 1903. Much of the fill material for these efforts came from the Potrero area itself, which had a rugged natural terrain unsuited to development. Blasting and hauling away many tons of the bedrock and using it to fill in low places or to extend the shoreline was an arduous task undertaken individually by those industries wanting their existing land to be usefully flat and/or wanting to reclaim usable land from the bay. Potrero Point ceased to be a peninsula by 1950, when the WPRR filled the area north of their jetty at 25th Street until it connected to the Potrero Power Plant property. The filling of Islais Creek Cove occurred later and in stages, in the 1910s, in the 1940s, and, most recently, in the 1960s, when 68 acres were filled in, the creek was confined to a man-made channel, and Cesar Chavez (then Army) Street was extended east in connection with the Pier 80 terminal. (SFPD 2001a:18; URS/Dames & Moore 2000:5; SFPUC 2005a:8.3-14). Today, it is estimated that the Central Waterfront area consists of about one-third natural ground (albeit extensively leveled) and two-thirds filled land (SFPD 2001a:16-18).

Based on a site history done for the MUNI site to the west of the proposed power plant project site (SFERP 2005p), the application and the field survey report represent the plant site as progressively reclaimed from Islais Creek Cove between 1931 and 1966. After 1935, WPRR is said to have filled the north half of the “property” (it is unclear what property is being discussed) and to have built a switchyard to serve its ferry terminal. By 1947, a series of railroad tracks, presumably on fill, was covering about the northern third of the project site. The rest of the project area was filled in between 1955 and 1966 (SFPUC 2005a:8.3-14; SFERP 2005jj:19).

This reconstruction of the evolution of the proposed plant site does not include the information that the initial fill was placed before 1915 (AGS 1999:2.12). The site may have an even earlier beginning, before 1869, as an unidentified wharf (depicted on the 1869 U. S. Coastal Survey’s San Francisco Peninsula map but gone from later maps), but it certainly got its permanent foundation as WPRR’s 1909 jetty and wharf (discussed above under Transportation and shown on the U. S. Geological Survey’s 1915 quadrangle map) (Mirant 2001c: Figures 220-2, 220-4). WPRR’s jetty and wharf are shown (but not labeled as such) as the “approximate location of 1935 shoreline” on Figure CR-161-4 (SFERP 2005jj), which purports to depict the progression of the filling

of the project site. That figure shows that the 1935 jetty occupies about the northern third of the project site and about the northern third of the laydown area. The applicant's representation of the post-1935 expansion of the jetty, by filling to the northwest and south and the construction of various buildings on the jetty (shown on the 1944 Sanborn map of the area), completes the picture of the evolution of the project site and appears to be accurate. But it should be recognized that approximately the northern third of the proposed plant site is created land nearly 100 years old and, despite its lack of development at this time, that northern third was heavily used by a railroad for nearly 70 years.

Resources Inventory

Literature/Records Search and Native American Contacts

The applicant's records check and literature search included all known cultural resources within a one-quarter-mile radius of the proposed plant site, laydown area, and appurtenant linear facilities. The object of the search was to identify known prehistoric and historical terrestrial and submerged archaeological sites, historic architectural structures, and Native American sacred sites in the project area (SFPUC 2005a:8.3-6-8.3-7). Records and relevant previous cultural resources studies for the project area were accessed (SFPUC 2005a:8-13, 8-14), including:

- A cultural resources study of the area around an earlier proposed expansion of the Potrero power plant (see Wirth 1979);
- A cultural resources inventory of the PG&E Potrero power plant site was part of an EIR completed for the sale of the Potrero and other power plants (see ESA 1998);
- A 2000-01 survey of the Central Waterfront area done by the San Francisco Department of Planning (see SFPD 2001a);
- Energy Commission Final Staff Assessment of cultural resources (CEC 2002a:Section 5.4) for the proposed Potrero Unit 7 power plant project, which incorporated information from various sources relating to this project's application for certification, including Mirant (Mirant 2001a and Mirant 2001b), SECAL (SECAL 2000a, SECAL 2000b, SECAL 2000c, SECAL 2001a, SECAL 2001b, SECAL 2001c, and SECAL 2001d), and URS/Dames and Moore (2000);
- A cultural resources study for the original SFERP on the Potrero Power Plant property (although this study, per se, is not cited; see SFERP 2004a);
- A search for records (#NWIC 04-687) at the California Historical Resources Information System (CHRIS) at Sonoma State University in January, 2005 (SFERP 2005n:Appendix A);
- A review of the public on-line shipwrecks database of the State Lands Commission (SLC), and a search of the SLC's non-public shipwreck database (SFERP 2005n:10);
- A search of the Native American Heritage Commission's (NAHC) database of Native American sacred lands (SFERP 2005n:Appendix B);

- An NAHC-provided list of Native Americans having historic ties to the Potrero area, to whom the applicant sent a letter on May 27, 2005, asking them if they were aware of any cultural resources which could be affected by the proposed project (SFERP 2005n:Appendix B).

On April 26, 2005, Energy Commission staff also obtained from the NAHC the names and addresses of Native Americans interested in the Potrero area. On May 12, 2005, a letter was sent to all listed Native Americans informing them of the project and asking that they contact staff if they had any concerns about the project's potential effects on cultural resources.

The applicant made an additional effort to obtain information on cultural resources from Native Americans, telephoning those on the NAHC list on July 11 and again on July 13, 2005, and leaving messages on both occasions with a number to call for further information. The applicant had received no responses to this outreach by December 1, 2005 (SFERP 2005y:Data Request 163; Carrier 2005).

At an Energy Commission public Information Hearing on the proposed SFERP, held in San Francisco on May 6, 2005, a self-identified representative of the Ohlone Tribe, Francisco Da Costa, was a participant. Da Costa informed staff that there is a large prehistoric archaeological site near the United Parcel Service depot. Staff raised this issue for discussion at the Workshop which followed the public hearing on May 6, and at that time asked the applicant to investigate this site and report on it to staff.

The applicant telephoned Francisco Da Costa on July 13, 2005, asking about the Native American archaeological site locations of which Da Costa had indicated knowledge. Da Costa identified the banks of Islais Creek and the shore zone of San Francisco Bay as archaeologically sensitive areas where prehistoric Native American burials might be found, but he could not be specific about site locations (SFERP 2005z:Data Response CR7-1).

Field Surveys

For the proposed SFERP, the potential areas which the applicant might have surveyed for archaeological resources were the power plant parcel, the laydown area, the process water intake site, and the routes of the linear facilities. The applicant explained that the transmission line, natural gas pipeline, and potable water pipeline routes were not surveyed because the trenches for these utilities would be installed within the existing street network where soils are paved over and therefore not visible to an archaeologist (SFERP 2005jj:30). Similarly, the process water intake site and pipeline would be installed where existing utility pipes have already disturbed the soil along Third and Marin Streets or where pavement prevents examination of the soils (SFERP 2006c: 3).

The proposed plant site was physically surveyed for archaeological resources on February 21, 2005, and the laydown area was surveyed on July 20, 2005. The areas were walked in 5-to-10-meter-wide transects by a qualified archaeologist, and the exposed ground (i.e., neither paved nor graveled) was inspected for artifacts, features, structures, or other archaeological remains that might be 50 or more years old. No

indications of railroad usage and no other artifacts or features were found (SFERP 2005jj:29-30).

No new historic building or structure inventory or evaluation was done in the field for the current project (SFERP 2005jj:26).

The geotechnical boring conducted by the applicant at the proposed plant site to provide data to aid in the design of the foundation was monitored by a qualified archaeologist to assess the possibility of encountering submerged/buried cultural resources under the fill on the site. The soils pulled up from fifteen borings, ranging in depth from about 30 feet to over 168 feet below present ground surface, were examined but found to contain no cultural materials indicative of significant resources (SFERP 2005jj:30; SFERP 2005kk; SFERP 2005ll).

Identified Prehistoric and Historical Archaeological Resources

The Wirth Associates study (Wirth 1979) did not identify any archaeological resources on the proposed project site or along linear routes, but based on that report, the applicant concluded that there was a “low to moderate potential for buried prehistoric resources and a moderate to high potential for buried historical resources” in the SFERP vicinity (SFPUC 2005a:8.3-13). The ESA inventory found no archaeological resources on the Potrero power plant site, but concluded, like Wirth Associates, that there was low to moderate potential for prehistoric resources and a moderate to high potential for buried historical resources on the site (SECAL 2000a:8.3-10).

The applicant cited a February, 2004, CHRIS records search (NWIC 03-548) done in connection with a cultural resources study for the location of the original proposed SFERP on the Potrero Power Plant property, and a January, 2005 search (NWIC 04-687) for the location of the proposed SFERP. Neither search produced records of known archaeological resources on or adjacent to the project site or construction laydown area. The only CHRIS-listed archaeological resource located within a mile of the project plant site was a prehistoric archaeological site, CA-SFR-15, (P-38-000015), located about 0.5 miles south of Marin Street.

The Energy Commission Final Staff Assessment of cultural resources for the suspended Potrero Unit 7 power plant project summarized the archaeological findings from geotechnical boring and sediment sampling along the proposed alignments for the water discharge structures of the proposed Potrero Unit 7. Because of the possibility of there being submerged/buried cultural resources in the bay, an archaeologist observed the borings, and found bits of wood, later identified as eucalyptus, in boring No. B-7, at a depth of 9 to 23 feet. Other bits of wood were found in 8 out of 31 sediment samples. These findings were interpreted as remnants of the East Wharf/Sugar Dock associated with the Western Sugar Refinery. No other historical material was found (CEC 2002a:Section 5.4-10).

For the earlier Potrero Unit 7 cultural resources inventory, a record search was conducted in 2000 to identify underwater cultural resources, such as shipwrecks, that could be impacted by construction of discharge pipelines in the bay. The record search sought information on file at the State Lands Commission (SLC), U.S. Army Corps of Engineers, San Francisco Bay Conservation and Development Commission, and the

Port of San Francisco. No shipwrecks or other underwater cultural resources were identified as a result of this earlier record search (SECAL 2000c:#155).

For the proposed SFERP, in 2005, the applicant again reviewed the SLC's on-line public shipwrecks database, without positive results. In June, 2005, SLC staff conducted a search of their non-public shipwreck database for the applicant and identified only one shipwreck anywhere near the SFERP area. That vessel was the *Fannie Adele*, which in 1904 blew up at the 16th Street pier and, when cut loose, drifted ablaze toward the Golden Gate. The applicant included the information that the SLC staff person considered it unlikely that the *Fannie Adele* sank in the part of the bay where the proposed SFERP would be built (SFERP 2005y:Data Request 175).

The recent archaeological surveys of the proposed SFERP plant site and laydown area found no archaeological resources in those locations. The routes of the linear facilities and the process water intake site were not surveyed because they are in city streets, under pavement and/or in existing utility corridors. Therefore, no archaeological deposits were identified by archaeological survey of the locations potentially impacted by the proposed project (SFERP 2005jj:29-30; SFERP 2006c: 3).

The applicant expects that the filled parts of the project impact area would be of low sensitivity for either prehistoric or historical archaeological resources, but that those parts of the project area that are on the landward side of the prehistoric shoreline would be of high sensitivity for prehistoric archaeological resources (SFPUC 2005a:8.3-12).

Identified Historic Standing Structures

The applicant cited a February, 2004 CHRIS records search (NWIC 03-548) done in connection with a cultural resources study for the location of the original proposed SFERP on the Potrero Power Plant property, and a January, 2005 search (NWIC 04-687) for the location of the proposed SFERP. Neither search produced records of known architectural resources on or adjacent to the project site or construction laydown area. The only CHRIS-listed architectural resource located within a mile of the project plant site was the Southeast Waste Water Treatment Plant (aka the Islais Creek Sewage Treatment Plant), P-38-004274, located at 750 Phelps Street, about 0.5 miles south of the proposed SFERP process water pipeline intake at Tulare and Thirds Streets (SFPUC 2005a:8.3-14). Built in 1951 as the City's first waste treatment plant, it has been evaluated as eligible for the National Register of Historic Places (NRHP), significant under criteria A and C, (CRHR Criteria 1 and 3). The facility consists of five major buildings, ten large cylindrical tanks, and connecting pipes, tunnels, roads, an exhaust stack, and accessory equipment on a 26-acre site. Due to its distance from the proposed SFERP, this building does not have to be considered when assessing the possible impacts of the SFERP to historic resources.

In addition to CHRIS, previous inventories and evaluations of historic structures in the Central Waterfront area were consulted. These included: a Carey & Co., Inc.1994 evaluation of structures in the Southern Waterfront survey area that included the adjacent Union Iron Works, Pier 70 Historic District (SECAL 2001b), a 1998 records search carried out for an Environmental Impact Report in connection with a proposed sale of PG&E power plants (ESA 1998), a 1999 evaluation of structures on the Potrero

Power Plant parcel by Ward Hill and Laurence Shoup (SECAL 2001c), and a 2001 historic architecture survey conducted for the previous Potrero Power Plant Unit 7 application (SECAL 2001a, Replacement AFC, Section 8.3:20). The 1998 study identified several industrial buildings more than 50 years old in the vicinity of the Potrero Power Plant, mostly located west of Third Street, and highlighted the I. M. Scott School, built in 1895 and located at 1060 Tennessee Street, as San Francisco Historical Landmark 138 (SFPUC 2005a:8.3-15). In January, 2001, Michael Corbett, architectural historian, and Denise Bradley, landscape historian, conducted the Potrero Unit 7 project historic architecture windshield survey, which covered the power plant parcel and all properties directly adjacent to the power plant parcel, including the Pier 70 area. They also drove along the underground transmission route, in order to provide a characterization of the types and ages of the structures along the route (SECAL 2001a, Replacement AFC, Section 8.3:20; SECAL 2001a, Appendix R:R-10).

All these resources are included in the more recent Central Waterfront survey, carried out for the San Francisco Department of Planning in 2000-01. The Central Waterfront survey was bounded by “16th Street on the north, Interstate 280 to the west, Islais Creek to the south and San Francisco Bay to the east” (SFPD 2001a:5). The survey identifies buildings and structures that are eligible for the NRHP and the CRHR, as well as those resources significant at the local level. The survey recorded 243 buildings having status codes indicating an undetermined status or either actual or potential eligibility for some register (the NRHP, or the CRHR, or local historic listing) (SFPUC 2005a:8.3-7).

The survey identified four potential historic districts: the Dogpatch Neighborhood, Pier 70 (Bethlehem Steel’s San Francisco Yard), Bridges and Tunnels, and Industrial-Type Buildings included within the Central Waterfront District. Dogpatch and Pier 70 have been officially recognized as historic districts within the Central Waterfront area (SFPUC 2005a:8.3-6-8.3-7). Dogpatch is a fully documented district either designated or eligible for designation as a local historic district (SFPD 2001a:25), and its survey was endorsed by the City and County Planning Commission in December, 2001 (SFERP 2004t, Attachment Cul-22:5). Pier 70 is also a fully documented district that may be eligible for the NRHP (SFPD 2001a:25). The Bridges and Tunnels district and the Industrial-Type Buildings district are not officially recognized, but the Central Waterfront survey indicates they are fully documented, and potentially eligible for the NRHP under Criterion A, at the local level of significance (SFPD 2001a;26).

A larger potential historic district, the Central Waterfront Historic District, encompassing the four districts just discussed and corresponding to the boundaries of the Central Waterfront survey, has also been fully documented, and a DPR District record has been prepared for it, with an assigned period of significance of 1854-1948 (SFPD 2001a; SFERP 2004t, Attachment Cul-23). The District contains buildings and structures that contribute to its significance, and some buildings and structures that do not contribute to its significance. Generally, non-contributing structures were built outside of the period of significance of the District or suffer loss of integrity. Although the District has not been officially recognized, the City Planning Commission moved to endorse the Central Waterfront Cultural Resources Survey and directed that this survey, along with the one for Dogpatch, be forwarded to the Office of Historic Preservation for inclusion in the

CHRIS (SFERP 2004t, Attachment Cul-22:5). This documented historic district must be considered when assessing the possible impacts of the SFERP to historic resources.

A number of buildings which were recorded in the Central Waterfront survey are located along the proposed SFERP linear facility routes. These buildings were evaluated (shown in Table 2) for eligibility to the NRHP or the CRHR, for contributing or not contributing to the Central Waterfront Historic District, and, in some instances, for special consideration in local planning (SFPD 2001a). Only five recorded historic buildings (shown in italics in Table 2) along the routes of SFERP linear facilities are potentially significant resources: 3201 Third Street and 2501 Third Street, both of which were evaluated as individually eligible for the CRHR, and 1300 Illinois Street, 1401-1475 Illinois, and 1485-1495 Illinois, all of which were called out as contributors to the Central Waterfront Historic District. These buildings must be considered when assessing the possible impacts of the SFERP to historic resources.

Cultural Resources Table 2.
Eligibility Status of Potentially Impacted Central Waterfront Buildings

Underground Transmission Line Route					
Address	**Description**	**Date Built**	**CRHR Status**	**Central Waterfront District**	**Consideration in Local Planning**
2501 Third Street (American Can Company Southern Extension) [entire rear elevation fronts on Illinois Street]	*three-story reinforced concrete warehouse and office building*	*1955*	*individually eligible*	non-contributor (not old enough)	*not evaluated*
1300 Illinois Street	*one-story concrete warehouse*	*c. 1948*	*individually ineligible*	*contributor*	*not evaluated*
1401-1475 Illinois Street [entire rear elevation fronts on Michigan Street]	*one-story, two-part frame and brick garage, truck wash and loading dock*	*1946-1947*	*individually ineligible*	contributor	*yes*
1215-1275 Michigan Street	six industrial buildings and one office building, on three city blocks	1950-1952	individually ineligible	non-contributor (not old enough)	not evaluated
Natural Gas Pipeline Route					
Address	**Description**	**Date Built**	**CRHR Status**	**Central Waterfront District**	**Consideration in Local Planning**
1485-1495 Illinois Street	*one-story, two-part frame and brick garage, truck wash and loading dock*	*1946-1947*	*individually ineligible*	*contributor*	*yes*

1215-1275 Michigan Street	six industrial buildings and one office building, on three city blocks	1950-1952	individually ineligible	non-contributor (not old enough)	not evaluated
Process Water Pipeline Route					
Address	**Description**	**Date Built**	**CRHR Status**	**Central Waterfront District**	**Consideration in Local Planning**
800 Cesar Chavez Street	one-story warehouse with steel frame and corrugated panel siding	1952	individually ineligible	non-contributor (not old enough)	not evaluated
900 Marin Street	one-story reinforced concrete warehouse and office	1953	individually ineligible	non-contributor (not old enough)	not evaluated
888 Marin Street (Cobbledick-Kibbe)	one-story prefabricated steel frame warehouse with corrugated panel siding, and two-story steel frame and glass office building	1955-1960	individually ineligible	non-contributor (not old enough)	not evaluated
3201 Third Street (Reynolds Metals Company buildings)	*one-story steel frame warehouse and two-story attached office, both featuring aluminum cladding, windows, and roofing*	*1956-1959*	*individually eligible*	*non-contributor (not old enough)*	not evaluated
Potable Water Pipeline Route (25th Street Alternative)					
Address	**Description**	**Date Built**	**CRHR Status**	**Central Waterfront District**	**Consideration in Local Planning**
1215-1275 Michigan Street	six industrial buildings and one office building on three city blocks	1950-1952	individually ineligible	non-contributor (not old enough)	not evaluated
1485-1495 Illinois Street	one-story, two-part frame and brick garage, truck wash and loading dock	1946-1947	individually ineligible	contributor	yes

Potable Water Pipeline Route (Cesar Chavez Street Alternative)					
Address	**Description**	**Date Built**	**CRHR Status**	**Central Waterfront District**	**Consideration in Local Planning**
800 Cesar Chavez Street	one-story warehouse with steel frame and corrugated panel siding	1952	individually ineligible	non-contributor (not old enough)	not evaluated

The Energy Commission Final Staff Assessment (FSA) of cultural resources for the proposed Potrero Unit 7 power plant project focused on three groups of structures, constructed more than 45 years ago, within the impact area of that now postponed project. These were the structures on the Potrero Power Plant associated with the Station A power plant and the Potrero gas plant, the structures on the adjacent parcel to the north that are part of the Pier 70 Historic District, and the structures on the parcel to the south of the postponed power plant project that were part of the defunct Western Sugar Refinery (CEC 2002a:5.4-10-5.4-12). The easternmost two of the latter structures were steel-frame warehouses, which were formerly used to store sugar.

The Pier 70 structures are three to four blocks away from the proposed SFERP plant site, and the power plant structures are two blocks away, with a tall building intervening. The sugar warehouses, however, are about 1.5 blocks from the proposed SFERP plant site, with only relatively low buildings and the bay between the two locations. A historic architecture assessment of the two old warehouses was done in January, 2001, for the licensing application of the Potrero Unit 7 power plant (SECAL 2001d). That source provides the information that the western warehouse was built in 1923, and the eastern one in 1929. The two retain good integrity. The architectural historians evaluated both buildings as eligible for listing, at the local level of significance, on both the NRHP, under Criterion A, and the CRHR, under Criterion 1 (SECAL 2001d:R3-8). These buildings must be considered when assessing the possible impacts of the SFERP to historic resources.

Identified Ethnographic Resources

The NAHC informed the applicant that no known Native American cultural resources in the project area were found in the NAHC's sacred lands database. The letters the applicant and Energy Commission staff sent out to Native Americans in the spring of 2005 have received no responses, nor have the telephone calls the applicant made the following summer. From this it is concluded that no ethnographic resources have been identified in the vicinity of the project, and so no ethnographic resources will be considered when assessing the possible impacts of the SFERP to historic resources.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Various laws apply to the evaluation and treatment of cultural resources. CEQA requires the Energy Commission to evaluate resources by determining whether they meet several sets of specified criteria. These evaluations then influence the analysis of potential impacts to the resources and the mitigation that may be required to ameliorate any such impacts.

The CEQA Guidelines provide a definition of a historical resource as a "resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR", or "a resource listed in a local register of historical resources or identified as significant in a historical resource survey meeting the requirements of Section 5024.1 (g) of the Public Resources Code," or "any object , building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the agency's determination is supported by substantial evidence in light of the whole record." (California Code of Regulations, Title 14, section 15064.5(a)). Historical resources that are automatically listed in the CRHR include California historical resources listed in or formally determined eligible for the NRHP and California Registered Historical Landmarks from No. 770 onward (Public Resources Code, Section 5024.1(d)).

Under the CEQA Guidelines, a resource is generally considered to be historically significant if it meets the criteria for listing in the CRHR. These criteria are essentially the same as the eligibility criteria for the NRHP. In addition to being at least 50 years old,[2] a resource must meet at least one of the following four criteria: is associated with events that have made a significant contribution to the broad patterns of our history (Criterion 1); or, is associated with the lives of persons significant in our past (Criterion 2); or, that embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values (Criterion 3); or, that has yielded, or may be likely to yield, information important to history or prehistory (Criterion 4) (Public Resources Code section 5024.1). In addition, historical resources must also possess integrity of location, design, setting, materials, workmanship, feeling, and association (California Code of Regulations, Title 14, section 4852(c)).

Even if a resource is not listed or determined to be eligible for listing in the CRHR, CEQA allows the lead agency to make a determination as to whether the resource is a historical resource as defined in Public Resources Code sections 5020.1 (j) or 5024.1. Whether a proposed project would cause a substantial adverse change in the significance of historical resources is the issue that staff analyzes to determine if the project may have a significant effect on the environment.

[2] The Office of Historic Preservation's Instructions for Recording Historical Resources (1995) endorses recording and evaluating resources over 45 years of age to accommodate a five-year lag in the planning process.

DIRECT/INDIRECT IMPACTS AND MITIGATION

In the abstract, direct impacts to cultural resources are those associated with project development, construction, and co-existence. Construction usually entails surface and subsurface disturbance of the ground, and direct impacts to archaeological resources may result from the immediate disturbance of the deposits, whether from vegetation removal, vehicle travel over the surface, earth-moving activities, excavation, or demolition of overlying structures. Construction can have direct impacts on historic standing structures when those structures must be removed to make way for new structures or when the vibrations of construction impair the stability of historic structures nearby. New structures can have direct impacts on historic structures when the new structures are stylistically incompatible with their neighbors and the setting, and when the new structures produce something harmful to the materials or structural integrity of the historic structures, such as emissions or vibrations.

Generally speaking, indirect impacts to archaeological resources are those which may result from increased erosion due to site clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource components due to improved accessibility. Similarly, historic structures can suffer indirect impacts when project construction creates improved accessibility and vandalism or greater weather exposure becomes possible.

Ground disturbance accompanying construction at the proposed plant site, along the proposed linear facilities, and at the proposed laydown area has the potential to directly impact archaeological resources, unidentified at this time. The potential direct, physical impacts of the proposed construction on unknown archaeological resources are commensurate with the extent of ground disturbance entailed in the particular mode of construction. This varies with each component of the proposed project. Placing the proposed plant into this particular setting could have a direct impact on the integrity of association, setting, and feeling of nearby standing historic structures.

Construction Impacts and Mitigation

Direct Impacts on Archaeological Resources

Staff agrees with the applicant that no significant known archaeological resources have been identified in any of the areas where the proposed project would be built. Consequently, no project-related construction impacts from the SFERP to known archaeological resources which would materially impair their significance have been identified, and no mitigation would be required.

But because the proposed project development and construction generally require subsurface disturbance of the ground in an area (the original shoreline) that has been greatly utilized in both prehistory and history (as indicated in the sections on prehistoric and historic settings), the applicant and staff agree that SFERP has the potential to adversely affect as yet unknown archaeological resources.

In general, staff expects that the fill used to create the land which constitutes most of the project construction zones will contain considerable historic-period material, i. e., lots of construction debris and some artifacts. The specific sources of the fill are

unknown, and the artifacts have been jumbled and redistributed in the soil and debris matrix as it was gathered, hauled, and laid down, destroying the spatial relationships among the artifacts and soils and negating the information values of these deposits. Consequently, fill deposits as archaeological resources usually cannot meet criterion 4 of the CRHR and so cannot be considered historical resources that requires mitigation. The applicant, however, provided information on one possible resource—scuttled boats—which could be found in the fill and which might be considered historical resources. The reference librarian of the San Francisco Maritime National Historic Park informed the applicant that it was a relatively common practice to tow boats to areas of the bay which were being filled, salvage them, burn them to the waterline, and then fill around and over them. The buried boats helped stabilize the fill (SFERP 2005n:10). Excavations at the plant site for piping or pilings and trenching for the underground transmission line on 25th, Michigan, 24th, and Illinois Streets, for the natural gas pipeline on 25th Street, for the potable water pipelines on 25th and Cesar Chavez Streets, and for the process water pipeline along its entire route might encounter the remains of a scuttled boat in the fill. Procedures for identifying, evaluating, and possibly mitigating impacts to such resources must be put into place by means of conditions of certification (Conditions of Certification **CUL-1**, **CUL-5**, **CUL-6** and **CUL-8**).

Ground disturbance resulting from construction at the proposed plant site and the use of the laydown area is unlikely to directly impact archaeological resources, unidentified at this time. It is not known whether the existing ground surface of the proposed power plant site and laydown area is the same as that on which the Western Pacific Railroad had its switchyard and wharf. Since the railroad tracks and structures were removed nearly 30 years ago, the old surface could have been scraped away or it could have been covered with additional fill or both. So whether or not any buried archaeological remains of those facilities still exist on the plant site cannot be predicted. Because such remains could be encountered during construction of the proposed plant, procedures for identifying, evaluating, and possibly mitigating impacts to such resources must be put into place by means of conditions of certification.

In addition, the entire plant site was once ten or more feet under water (URS/Dames and Moore 2000:Figure 3), and there is some chance that submerged prehistoric cultural resources may now be buried under the fill which the WPRR used to create the land where the plant site is. The applicant has recognized the possibility that prehistoric shell middens or other sites from a time period when the bay's water level was lower (pre-6000 B.P.) could exist under the fill (SFERP 2005n:10). Also, submerged historic-period cultural resources normally considered as underwater cultural resources, such as sunken boats, lost cargoes, or collapsed wharves, may now be buried under the fill at the plant site. The applicant has also recognized the possibility that historic-period resources, such as a boat or shipwreck or dumped refuse, could exist under the fill (SFERP 2005n:10). Procedures for identifying, evaluating, and possibly mitigating impacts to such resources must be put into place by means of conditions of certification.

Installation of the project's process water intake and pipeline would require excavation of a trench projected to be at least 5 feet wide by 7 feet deep (SFERP 2006c:1). An existing, abandoned, 54"-diameter SEWWTP pipeline has already disturbed the fill soils along the Third Street and Marin Street segments of the process water pipeline route, so no intact archaeological resources are expected in the old utility trench, but

trenchless methods, such as jack-and-bore or micro-tunneling, may be used for the process water line where Marin Street crosses Illinois Street, beneath the railroad tracks. Jack-and-bore construction would entail driving a pipe horizontally underground between an entrance pit and an exit pit. The required entrance pit would be 30 feet wide, 15 feet long, and six or more feet deep (SFERP 2005n:2-3; SFPUC 2005a:7-1, 7-2), which would reach into previously undisturbed fill soils where buried archaeological resources such as a scuttled boat could be encountered (see discussion above). Except for the previous disturbance along Third and Marin Streets, the new ground disturbance of trenching and/or jack-and-bore construction for the process water pipeline route has the potential to directly impact archaeological resources, unidentified at this time, to the extent of the. area and depth of the entrance pits at the intersection of Marin and Illinois Streets and the trenches along Michigan, Cesar Chavez, and Maryland Streets. Procedures for identifying, evaluating, and mitigating potential impacts to such resources must be put into place by means of conditions of certification.

The installation of both alternative routes for the potable water line (north from Chavez Street or south from 25th Street), would entail open-trench construction, with excavations two to three feet wide and five or more feet deep, depending on the stability of the soil and on the presence of subsurface obstructions. The ground disturbance of trenching for the potable water pipeline has the potential to directly impact archaeological resources, unidentified at this time, to the extent of the area and depth of the excavation. Procedures for identifying, evaluating, and mitigating potential impacts to such resources must be put into place by means of conditions of certification.

As previously mentioned, the structures that make up the SEWWTP would not be impacted by construction of the SFERP because of the distance between the two facilities. However, the SEWWTP abandoned 54” outfall pipeline (on top of which the SFERP process water pipeline would be installed along the Third and Marin Street segments of its proposed route) is associated with the SEWWTP, an eligible resource (SFERP 2006c:1-2). The abandoned outfall pipeline was installed in 1966 and connected the treatment plant to an offshore outfall in the bay some 800 feet out from Pier 80. The pipe was abandoned around 1986 or 1987 because it had settled 4 ½ feet, and a new pipeline was installed (Loiachono 2006). Despite its association with the significant SEWWTP, this outfall was constructed after the period of significance for the SEWWTP and consequently does not contribute to the significance of the resource. Impacts to this outfall would not constitute an impact to the SEWWTP.

The applicant recognized the possibility of encountering remnants of the Third Street Trestle where the trench for the process water pipeline runs along Third Street, but noted the lack of success at locating that historical archaeological feature when Wirth Associates dug a deep test trench looking for it in the area of Third and 23rd Streets (SFPUC 2005a:8.3-19). The previous disturbance along the Third Street route from the abandoned SEWWTP outfall pipe makes it unlikely that remnants of the Third Street Trestle will be encountered in the excavations for the process water pipeline.

Construction of the underground transmission line would entail digging a trench along almost the entire route through the streets. Open trenches would be five to six feet wide and six or more feet deep, depending on the stability of the soil and on the presence of subsurface obstructions. Splice boxes at about 1,000–foot intervals along the route

could require larger and deeper excavations than the trench, but until the final design is completed, the location and size of the splice box holes has not been established. It is known that if the project elects to use the underground-to-overhead configuration for the transmission line entry into the switchyard (from 22nd Street), a splice box requiring a 30-foot-deep excavation would have to be installed at that location (Brock 2005). Jack-and-bore construction, which may be used at the intersection of 24th and Illinois Streets, would require an entrance pit 30 feet wide, 15 feet long, and six or more feet deep (SFERP 2005n:3). The ground disturbance of trenching, installing splice boxes, and jack-and-bore construction for the underground transmission line has the potential to directly impact archaeological resources, unidentified at this time, to the extent of the area and depth of the trenches, holes, and exploration pits. Procedures for identifying, evaluating, and mitigating potential impacts to such resources must be put into place by means of conditions of certification.

The most archaeologically sensitive area of the underground transmission line trench would be on Illinois Street about halfway between Humboldt and 23rd Streets. Staff has reached this conclusion because at that location the trench would intersect the prehistoric shoreline (SFERP 2005n:Figure CR-178). Prehistoric and ethnographic studies (see Prehistoric Setting and Ethnographic Background, above) have shown that the original bay shoreline was a resource zone heavily exploited by Native Americans prior to the arrival of the Spanish, and that prehistoric and ethnographic sites are more likely to occur along the old shoreline. Consequently, the underground transmission line trench could encounter unknown prehistoric resources at that location. Because the trench would intersect rather than parallel the old shoreline, the area of old shoreline that could be exposed is small. Additionally, intensive historic-period utilization of this area could have greatly disturbed or obliterated evidence of earlier Native American activities. For these reasons, it is unlikely that the underground transmission line trench would encounter unknown prehistoric resources. A large excavation for a splice box at this location is somewhat more likely to impact unknown prehistoric cultural resources due to its size. Also, the underground transmission line trench, a splice box, or a jack-and-bore pit might encounter some buried remains of the Tubbs Cordage Company ropewalk at the intersection of Illinois and 23rd Streets. Procedures for identifying, evaluating, and possibly mitigating potential impacts to such resources must be put into place by means of conditions of certification.

Construction of the gas pipeline would entail digging an open trench along 25th Street. The open trench would be two to three feet wide and five or more feet deep, depending on the stability of the soil and on the presence of subsurface obstructions (SFERP 2005n:2-3). The ground disturbance of trenching for the gas pipeline has the potential to directly impact archaeological resources, unidentified at this time, to the extent of the area and depth of the trenches. Like the proposed plant site and laydown area, the land where the gas pipeline would be installed was created by filling Islais Creek Cove. It had railroad tracks and other structures on it at one time, so there is at least a possibility that unknown archaeological resources could be encountered during construction, and procedures for identifying, evaluating, and possibly mitigating potential impacts to such resources must be put into place by means of conditions of certification.

As discussed above, it is possible that both prehistoric and historical archaeological deposits could be encountered during construction. If the newly found resources are

eligible for the CRHR, the direct impacts from construction could materially impair the resources. Appropriate mitigation measures, such as avoidance or assessment and data recovery, must be implemented to reduce that impact to less than significant. In recognition of this possibility, CEQA allows a lead agency to make provisions for archaeological resources unexpectedly encountered during construction, and the project owner may be required to train workers to recognize cultural resources, fund mitigation, and delay construction in the area of the find (Public Resources Code, section 21083.2; California Code of Regulations, Title 14, sections 15064.5(f) and 15126.4(b)). Staff's provisions for this eventuality are conditions of certification (see **CUL-5, CUL-6, CUL-7** and **CUL-8**, under Proposed Conditions of Certification, below), requiring: that construction workers be trained, as part of the Worker Environmental Awareness Program, to recognize archaeological resources; that construction be monitored by a qualified archaeologist and an interested Native American, if necessary, and halted if archaeological resources are encountered; that finds be evaluated for significance; and that data recovery be carried out if impacts cannot be avoided.

In the application, the applicant indicated that when the project was certified and construction could begin, a number of cultural resources mitigation measures would be put in place by the owner. The project owner would agree to have a qualified archaeologist monitor construction at the plant site and along the routes of the linear facilities. The project owner would envision no need for archaeological monitoring at the laydown area because project plans included no subsurface disturbance for that location. The owner would allow the monitoring archaeologist to halt construction in the appropriate area if archaeological material were found, so that its significance could be determined. For significant finds, the owner would expect mitigation measures to be developed in consultation with staff. The owner would also undertake a worker education program to train workers to recognize archaeological materials when they encountered them during construction and to be informed about what to do when they found such materials (SFPUC 2005a:8.3-19). These measures suggested by the applicant correspond almost exactly to those staff proposes (Proposed Conditions of Certification CUL-1 through CUL-8).

In "Initial Comments" on the Energy Commission's Preliminary Staff Assessment (PSA) of the impacts of the proposed SFERP, the applicant expressed a concern regarding the following stipulation of the verification for **CUL-8**: "No later than 48 hours following the completion of data recordation/recovery for discovered cultural material that cannot be treated programmatically, completed DPR form 523s shall be submitted to the Compliance Project Manger (CPM) for review and approval." The applicant's comment is as follows: "The Applicant finds this to be burdensome and unreasonable. A DPR Form 523 will require longer than 48 hours to complete, and will require both sketch maps and a location map before it may be submitted. Please revise as follows: "No later than 30 days following the completion of data recordation/recovery for discovered cultural material that cannot be treated programmatically, completed DPR form 523s shall be submitted to the CPM for review and approval" (SFERP 2005mm:8).

At the PSA workshop on October 18, 2005, staff and the applicant discussed this issue, with staff pointing out that the applicant would probably want to submit completed forms to the CPM as quickly as possible because **CUL-8** would only permit construction to resume in the area of the discovered cultural material when several specified tasks

were completed, including the submission of a Department of Parks and Recreation form 523 to the CPM. The applicant agreed to allow the 48-hour stipulation to stand, but asked for two other changes to **CUL-8**. First, with respect to the deadline in the verification for submitting the form, instead of the deadline being no later than 48 hours after the data recordation/recovery was completed, the applicant wanted the deadline changed to 48 hours after the CPM was notified of the find. Second, the applicant wanted the condition to state clearly that construction would have to be halted only in the vicinity of the find, not over the entire project site.

Staff agreed to make these changes. The requested change regarding the halting of construction only in the immediate area of the newly discovered cultural material is now reflected in the verification of **CUL-8**. The verification now limits to 100 feet around the discovery, the area within which construction must be halted until the specified tasks are completed. The requested change regarding the deadline is provided in the verification of **CUL-8** as an alternative deadline, while retaining the deadline originally proposed. Staff chose this manner of making the requested change because of the possibility of encountering an archaeological feature of such size or complexity that more than 72 hours (a maximum of 24 hours to notify the CPM plus a maximum of 48 hours to submit the form to the CPM) would be required to complete the treatment of the feature and to complete the DPR form 523 for it. As it is now written, the verification should allow the Cultural Resource Specialist (CRS) to submit DPR form 523s for simple finds quickly and thus resume construction quickly, while also allowing the CRS to accomplish data recovery for more complicated finds (with construction halted in a limited area) and to submit DPR form 523s to the CPM only after the data recovery is completed. The resumption of construction in the latter circumstance would depend on how long the CRS needed to notify the CPM, create a data recovery and curation plan and obtain CPM approval for it, complete data recovery, and complete and submit the form.

Direct Impacts on Historic Standing Structures

No previously recorded historic standing structures were identified in the construction zones of the project, so no standing historic structures would be demolished for this project. The proposed plant, however, with its tall combustion turbine stacks, would introduce a new element into the immediate area. In the abstract, such a change could affect the integrity of association, setting, and feeling of nearby standing historic structures and also affect the integrity of setting and feeling of the general area, including character-defining features of the potential Central Waterfront historic district. But, as reflected in the discussion which follows, staff does not believe that the plant would have a significant impact on historic structures.

The significant historic buildings located closest to the project construction zones are the two sugar warehouses at 435 23rd Street, which are 700 feet northeast of the proposed power plant. These warehouses were associated with the former Western Sugar Refinery and date to 1923 and 1929. The warehouses were part of a 16-building sugar-producing complex, the rest of which was demolished in 1951. Both warehouses are of steel frame construction erected on a reinforced concrete foundation. Reinforced concrete walls enclose the steel frames, and the industrial windows and ground level doors are steel. The architectural historians who evaluated the two warehouses found that they retain integrity of location, design, materials, and workmanship, since only

minor changes have been made to the two structures. But, because the other structures and buildings that were part of the sugar refinery have been demolished, the evaluators found that there was some loss of integrity of setting and feeling (Mirant 2001a:#188; Mirant 2001a:#189). The architectural historians evaluated both buildings as eligible for listing, at the local level of significance, on both the NRHP, under Criterion A, and the CRHR, under Criterion 1 (SECAL 2001d:R3-8).

The applicant has stated that the proposed plant's impact to the integrity of setting and feeling of the two warehouses would not be of a degree to be considered significant. This is true, the applicant says, because the integrity of the setting of the warehouses has already been reduced by the demolition of the rest of the sugar complex of which they were a part. The applicant also states that the evaluators who determined that the two warehouses were eligible for the NRHP and CRHR deemed the buildings significant for their integrity of location, design, workmanship, and association, not for their integrity of setting or feeling (SFERP 2005n:6).

Staff concurs that although the construction of the proposed power plant would affect the setting and feeling of the sugar warehouses, this impact would not be significant. These aspects of integrity are not important characteristics for the eligibility of the resources. Construction of the new power plant would not diminish the integrity of setting and feeling of the two sugar warehouses to the point that it would affect their eligibility for the CRHR or materially impair the resources. Consequently, this impact does not represent a significant effect on the environment.

The applicant also believes that the introduction of the proposed power plant in the Potrero area would have a negligible effect on the integrity of the potential Central Waterfront historic district because of its location at a distance from any of the buildings or structures identified as historic properties in the Central Waterfront study (SFPD 2001a), and because the industrial character of the proposed power plant is entirely in keeping with the character of the potential Central Waterfront historic district (SFERP 2005n:7)

Staff concurs with the applicant's determination that the introduction of the proposed power plant would not have a significant effect on the setting, feeling, or any character-defining features of the potential Central Waterfront historic district. Consequently, this impact does not represent a significant effect on the environment.

Vibrations from the excavation and installation of underground facilities could adversely affect recorded historic buildings adjacent to the underground transmission line trench, the natural gas pipeline trench, the process water pipeline trench, and the potable water pipeline alternative trenches. Buildings which could be affected by such vibrations include 3201 Third Street and 2501 Third Street, both of which were evaluated as individually eligible for the CRHR, and 1300 Illinois Street, 1401-1475 Illinois, and 1485-1495 Illinois, all of which were called out as contributors to the Central Waterfront Historic District. The applicant stated that the vibrations from the excavation and installation of the underground SFERP facilities would only be equivalent to existing truck traffic and so would have no impact on known historic buildings (SFERP 2005n**:**4). Staff accepts the applicant's conclusions regarding this potential impact, due to lack of evidence showing otherwise, and agrees there would be no significant adverse physical

impact on standing historic structures from the construction of the plant site or linear facilities.

No project-related construction impacts to standing historic structures which would materially impair their significance have been identified, so no mitigation would be required for this class of cultural resources.

Direct Impacts on Ethnographic Resources

No ethnographic resources, either previously recorded or newly disclosed in the communications with Native Americans initiated by the applicant for the proposed project, were identified in the vicinity of the project. Consequently, no significant ethnographic resources were identified, and so no mitigation measures would be required for this class of cultural resources.

Indirect Impacts

Neither the applicant nor staff identified any indirect impacts to any identified cultural resources in the impact area of the proposed project, and so no mitigation measures would be required for any class of cultural resources.

Operation Impacts and Mitigation

During operation of the proposed power plant, if a leak should develop in the gas or water pipelines supplying the plant, repair of the buried utility could require the excavation of a large hole. So such repairs could impact previously unknown subsurface archaeological resources in areas unaffected by the original trench excavation. The measures proposed for mitigating impacts to previously unknown archaeological resources during the construction of the plant and linear facilities (below) would also serve to mitigate impacts from repairs occurring during operation of the plant.

Cumulative Impacts and Mitigation

Cumulative impacts to historic architectural resources (structures or districts) in the project vicinity may occur if the construction of other projects results in increasing numbers of structures of historic age being demolished. However, the largest group of industrial historic buildings remaining in the area is the Pier 70 Historic District, adjacent to the proposed project on the north. The CCSF and Port of San Francisco are studying adaptive reuse of these structures as part of future development projects. Thus, these structures would probably be preserved as a result of future projects, rather than impacted. The other group of historic buildings in the area is the residential, commercial, and industrial buildings in the Dogpatch Neighborhood west of Third Street. No specific projects proposed for this area are known, although changes are likely.

The construction of other projects in the same vicinity as the proposed project could affect unknown subsurface archaeological deposits (both prehistoric and historic). In particular, the construction of San Francisco Municipal Railway's Metro East Light Rail Maintenance and Operations Facility on the 13 acres to the west of the power plant site has the potential to impact the same kinds of archaeological resources as may be affected by the construction of the proposed power plant because the land for both has

the same history. Project proponents for the Light Rail project and for future projects in the Potrero area can mitigate impacts to as yet undiscovered subsurface archaeological deposits to less than significant by implementing mitigation measures 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).

COMPLIANCE WITH APPLICABLE LORS

If the conditions of certification, below, are properly implemented, SFERP would result in a less than significant impact on newly found cultural resources or on those known resources which may be impacted in a previously unanticipated manner. The project would therefore be in compliance with CEQA and the other applicable state laws, ordinances, regulations, and standards listed in Table 1.

The CCSF has only general language promoting historic preservation (primarily of historic structures) in its General Plan and its Central Waterfront Area Plan. The CCSF, however, has no specific LORS which apply to other kinds of cultural resources, and no cultural resources LORS with which a development project must comply by taking specific actions. The conditions of certification (below) require specific actions not just to promote but to effect historic preservation and mitigate impacts to all cultural resources in order to ensure CEQA compliance. Consequently, if SFERP implements these conditions, its actions would be consistent with the general historic preservation goals of the CCSF.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

No agency or public comments on the cultural resources impact assessment were received.

CONCLUSIONS AND RECOMMENDATIONS

Staff's cultural resources analysis has determined that SFERP would have no impact on significant archaeological resources, historic standing structures, historic districts, or ethnographic resources with the adoption and implementation of the conditions of certification **CUL-1** through **CUL-8**.

Staff recommends that the Commission adopt the following cultural resources conditions of certification (**CUL-1** to **CUL-8**, see below for list and details) which, as noted above, are consistent with the applicant's proposed mitigation measures. When properly implemented and enforced, staff believes that these conditions of certification would mitigate any impacts to unknown cultural resources located in the areas discussed in this assessment to less than significant.

These conditions are intended to facilitate the identification and assessment of previously unknown archaeological resources encountered during construction and to mitigate any significant impacts from the project on newly found resources assessed as significant. To accomplish this, the conditions provide for cultural resources awareness

training for construction workers, for the archaeological and Native American monitoring of ground-disturbing activities, for the recovery of significant data from discovered archaeological deposits, for the writing of a technical archaeological report on monitoring activities and findings, and for the curation of recovered artifacts and other data.

PROPOSED CONDITIONS OF CERTIFICATION

CUL-1 Prior to the start of ground disturbance (including grading), the project owner shall obtain the services of a Cultural Resources Specialist (CRS), and one or more alternates, if alternates are needed, to manage all monitoring, mitigation, and curation activities. The CRS may elect to obtain the services of Cultural Resource Monitors (CRMs) and other technical specialists, if needed, to assist in monitoring, mitigation, and curation activities. The project owner shall ensure that the CRS makes recommendations regarding the eligibility to the California Register of Historic Resources (CRHR) of any cultural resources that are newly discovered or that may be affected in an unanticipated manner. No ground disturbance shall occur prior to CPM (Compliance Project Manager) approval of the CRS, unless specifically approved by the CPM. Approval of a CRS may be denied or revoked for non-compliance on this or other projects.

CULTURAL RESOURCES SPECIALIST (CRS)

The resume for the CRS and alternate(s) shall include information demonstrating that the minimum qualifications specified in the U.S. Secretary of the Interior's Guidelines, including the minimum qualifications for a specialization in historical archaeology, as published at Title 36 of the Code of Federal Regulations, Part 61, are met. In addition, the CRS shall have the following qualifications:

1. A technical specialty in anthropology or history and historical archaeology; and
2. At least three years of archaeological resource mitigation and field experience in California.

The resume of the CRS shall include the names and telephone numbers of contacts familiar with the work of the CRS on referenced projects and shall demonstrate that the CRS has the appropriate education and experience to accomplish the cultural resource tasks that must be addressed during ground disturbance. In lieu of the above requirements, the resume shall demonstrate to the satisfaction of the CPM that the proposed CRS or alternate has the appropriate training and background to effectively implement the conditions of certification.

CULTURAL RESOURCES MONITOR (CRM)

CRMs shall have the following qualifications:

1. a BS or BA degree in anthropology, archaeology, historical archaeology, or a related field, and one year experience monitoring in California; or

2. an AS or AA degree in anthropology, archaeology, historical archaeology, or a related field, and four years experience monitoring in California; or

3. enrollment in upper division classes pursuing a degree in the fields of anthropology, archaeology, historical archaeology, or a related field, and two years of monitoring experience in California.

CULTURAL RESOURCES TECHNICAL SPECIALISTS

The resume(s) of any additional technical specialists, e.g., prehistoric archaeologist, historian, architectural historian, and/or physical anthropologist, shall be submitted to the CPM for approval.

Verification: At least 45 days prior to the start of ground disturbance, the project owner shall submit the resume of the CRS and alternate(s), if desired, to the CPM for review and approval.

At least 10 days prior to a termination or release of the CRS, or within 10 days after resignation 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 qualifications of the CRMs, at least five days prior to the CRMs beginning on-site duties. At least 10 days prior to beginning specialized technical tasks, the resume(s) of any additional technical specialists shall be provided to the CPM for review and approval.

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 on-site work and is prepared to implement the cultural resources conditions of certification.

CUL-2 Prior to the start of ground disturbance (including grading), if the CRS has not previously worked on the project, the project owner shall provide the CRS with copies of the AFC and the confidential cultural resources reports for the project. The project owner shall also provide the CRS and the CPM with maps and drawings showing the footprint of the power plant and all linear facilities. Maps shall include the appropriate USGS quadrangles and a map of the proposed plant site and linear facilities at an appropriate scale (e.g., 1:200 or 1” = 20’) for plotting archaeological features. If the CRS requests enlargements for the plant site or strip maps for linear facility routes, the project owner shall provide copies to the CRS and CPM. The CPM shall review submittals and, in consultation with the CRS, approve those maps and drawings that are appropriate for use in cultural resources planning activities. No ground disturbance shall occur prior to CPM approval of maps and drawings, unless specifically approved by the CPM.

If construction of the project will proceed in phases, maps and drawings not previously provided shall be submitted prior to the start of each phase. Written notification identifying the proposed schedule of each project phase shall be provided to the CRS and CPM. The project owner shall notify the CRS and CPM of any changes to the scheduling of the construction phases.

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

Verification: At least 40 days prior to the start of ground disturbance, the project owner shall submit the subject documents to the CRS and the subject maps and drawings to the CPM and CRS. The CPM will review the project owner's submittals in consultation with the CRS and approve maps and drawings suitable for cultural resources planning activities.

1. At least 15 days prior to the start of ground disturbance, if there are changes to any project-related footprint, the project owner shall provide to the CRS and CPM revised maps and drawings for those changes and an e-mail or letter from the CRS stating that cultural resources information, compiled during the siting phase of the project, has been received.

2. At least 15 days prior to each phase, if project construction is phased, the project owner shall provide to the CRS the subject maps and drawings, if not previously provided, and notify the CRS and CPM in writing, identifying the proposed schedule of each project phase.

3. On a weekly basis during ground disturbance, a current schedule of anticipated project activity shall be provided to the CRS and CPM by letter, email, or fax.

4. Within five (5) days of identifying any changes to the scheduling of construction phases, the project owner shall provide written notice to the CRS and CPM of the changes.

CUL-3 Prior to the start of ground disturbance (including grading), the project owner shall submit the Cultural Resources Monitoring and Mitigation Plan (CRMMP), as prepared by (or its preparation overseen by) the CRS, to the CPM for approval. The CRMMP shall be provided in the Archaeological Resource Management Report (ARMR) format, and, per ARMR guidelines, the author's name shall appear on the title page of the CRMMP. The CRMMP shall identify general and specific measures to minimize potential impacts to sensitive cultural resources. Implementation of the CRMMP shall be the responsibility of the CRS and the project owner. Copies of the CRMMP shall reside with the CRS, alternate CRS, each monitor, and the project owner's on-site manager. No ground disturbance shall occur prior to CPM approval of the CRMMP, unless specifically approved by the CPM.

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

1. A proposed research design that includes a discussion of archaeological research questions and testable hypotheses specifically applicable to the project area and a discussion of artifact collection, retention/disposal, and curation policies as functions of the research questions formulated in the research design. A programmatic treatment plan may be included in the CRMMP for limited resource types.

2. The following statement shall be added to the CRMMP's Introduction: "Any discussion, summary, or paraphrasing of the Conditions of Certification in this CRMMP is intended as general guidance and as an aid to the user in understanding the conditions and their implementation. If there appears to be any conflict between the Conditions and the way in which they have been summarized, described, or interpreted in the CRMMP, the Conditions, as written in the Energy Commission's Final Decision, supersede any interpretation of the Conditions in the CRMMP." The Cultural Resources Conditions of Certification shall be attached as an appendix to the CRMMP.

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

4. Identification of the person(s) expected to perform each of the archaeological tasks, their responsibilities; and the reporting relationships between project construction management and the mitigation and monitoring team.

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

6. A discussion of all avoidance measures (such as flagging or fencing) which will be used to prohibit or otherwise restrict access to sensitive cultural resource areas that are, or, once discovered, may need to be avoided during construction and/or operation, and identification of areas where these measures may be implemented. The discussion shall address how these measures would be implemented prior to the start of construction, or after discovery, and how long they would be needed to protect the resources from project-related effects.

7. A discussion of the requirement that all cultural resources encountered that cannot be treated programmatically shall be recorded on a DPR form 523, mapped, and photographed. In addition, a discussion shall be included of the requirement that all records produced and all archaeological materials collected and retained as a result of the archaeological investigations (survey, testing, monitoring, and data recovery) shall be curated in accordance with the State Historical Resources Commission's "Guidelines for the Curation of Archaeological

Collections," in 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 Code of Federal Regulations, Part 79.

8. A discussion of any requirements, specifications, or funding needed for the curation of the materials to be delivered for curation and how requirements, specifications, and funding shall be met. This shall include information indicating that the project owner will pay all curation fees and state that any agreements concerning curation will be retained and be available for audit for the life of the project. Also, the name and phone number of the contact person at the curating institution shall be provided.

9. A discussion of the availability of and the designated specialist's access to equipment and supplies necessary for photographing and site mapping, and for recovering, recording, and photographing all cultural materials encountered during construction that cannot be treated programmatically.

10. A discussion of the required Cultural Resources Report (CRR, see **CUL-4**).

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit the subject CRMMP. Ground disturbance activities may not commence until the CRMMP is approved, unless specifically approved by the CPM. A letter shall be provided to the CPM indicating that the project owner agrees to pay curation fees for any materials collected as a result of the archaeological investigations (survey, testing, monitoring, and data recovery).

CUL-4 The project owner shall submit the Cultural Resources Report (CRR) to the CPM for approval. The CRR shall be written by the CRS and shall be provided in the ARMR format. The CRR shall report on all field activities including dates, times, locations, samplings, analyses, and findings. All survey reports, Department of Parks and Recreation (DPR) 523 forms, and additional research reports not previously submitted to the California Historical Resources Information System (CHRIS) and the State Historic Preservation Officer (SHPO) shall be included as an appendix to the CRR. If the ARMR reports have previously been sent to the CHRIS, then receipt letters from the CHRIS shall be included in an appendix.

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

CUL-5 Prior to and for the duration of ground disturbance (including grading and landscaping), the project owner shall provide Worker Environmental Awareness Program (WEAP) training to all new workers within their first week of employment. The training shall be prepared by the CRS, may be conducted by any member of the archaeological team, and may be presented

in the form of a video. The CRS shall be available (by telephone or in person) to answer questions posed by employees. The project owner will require all trained workers to sign a WEAP Certification of Completion form. The training shall include:

1. A discussion of applicable laws and penalties under the law;

2. Samples or visuals of artifacts and visuals of archaeological deposits that might be found in the project area;

3. Instruction that the CRS, the alternate CRS, and the CRMs have the authority to halt construction to the extent necessary, as determined by the CRS, in the event of the discovery of or an unanticipated impact to a cultural resource;

4. Instruction that employees are required to halt work on their own in the vicinity of a potential cultural resources discovery and to contact their supervisor and the CRS or CRM, and that redirection of work shall be determined by the construction supervisor and the CRS;

5. An informational brochure that identifies reporting procedures in the event of a discovery;

6. A WEAP Certification of Completion form to be signed by each worker indicating that they have received the training; and

7. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

No ground disturbance shall occur prior to implementation of the cultural resources portion of the WEAP program, unless specifically approved by the CPM.

Verification: At least 30 days prior to the beginning of site mobilization, the CRS shall provide the training program draft text and graphics and the informational brochure to the CPM for review and approval, and the CPM will provide to the project owner a WEAP Certification of Completion form which the project owner shall require each WEAP-trained worker to sign. The project owner shall provide in the Monthly Compliance Report the WEAP Certification of Completion forms of persons who have completed the training in the prior month and a running total of all persons who have completed training to date.

CUL-6 The project owner shall ensure that the CRS, alternate CRS, or CRMs shall monitor ground disturbance (including grading and landscaping) full-time at the project site and for the full width and length of excavations for linear facilities (such as underground transmission lines, and water, gas, and sewer pipelines), except for the process water pipeline along Third and Marin Streets, to ensure there are no impacts to undiscovered cultural resources and to ensure that known cultural resources are not impacted in an unanticipated manner. If ground disturbance (such as grading for run-off

control) becomes necessary at the laydown or any other ancillary areas, full-time monitoring shall be conducted there as well. Full-time archaeological monitoring is defined as archaeological monitoring of all earth-moving activities on a construction site for as long as the activities are ongoing. Full-time archaeological monitoring may require one monitor per active earthmoving machine working in archaeologically sensitive areas. In the event that the CRS determines that full-time monitoring is not necessary in certain locations, a letter or e-mail providing a detailed justification for the decision to reduce the level of monitoring shall be provided to the CPM for review and approval at least 24 hours prior to any reduction in monitoring. Reduced monitoring will not be approved at the site of the new process water pumping plant and the underground transmission line splice boxes.

The project owner shall ensure that the CRS has an agreement in effect for the curation of artifacts recovered during project-related archaeological activities. The research design in the CRMMP shall govern the collection, treatment, retention/disposal, and curation of any archaeological materials encountered. On forms provided by the CPM, CRMs shall keep a daily log of any monitoring, any other cultural resources activities, and any instances of non-compliance with the conditions of certification and/or applicable LORS. Copies of the daily logs shall be provided to the CPM by the CRS. In addition, the CRS shall use these logs to compile a monthly summary report on the progress or status of cultural resources-related activities. If there are no monitoring activities, the summary report shall specify why monitoring has been suspended. The CRS may informally discuss cultural resources monitoring and mitigation activities with Energy Commission technical staff.

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

The CRS and/or the project owner shall notify the CPM by telephone or e-mail within 24 hours of any incidents of non-compliance with the Cultural Resources conditions of certification and/or applicable LORS, upon becoming aware of the situation. The CRS shall also recommend corrective action to resolve the problem or achieve compliance with the conditions of certification. When the issue is resolved, the CRS shall write a report describing the issue, the resolution of the issue, and the effectiveness of the resolution measures. This report shall be provided in the next Monthly Compliance Report (MCR).

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall provide to the CPM a copy of the agreement between the CRS, or between the environmental firm employing the CRS, and the curation facility(ies). At least 30 days prior to the start of ground disturbance, the CPM will provide to the CRS reproducible copies of forms to be used as daily monitoring logs and non-compliance reports. Each day the CRS shall provide copies of the legibly handwritten daily logs of the monitors to the CPM as emails or in some other form acceptable to the CPM. While

monitoring is on-going, the project owner shall include in each MCR a copy of the monthly summary report of cultural resources-related monitoring prepared by the CRS. Copies of daily logs shall be retained by the project owner on-site during construction.

CUL-7 A Native American monitor or monitors shall be obtained to monitor ground disturbance (including grading and landscaping) in areas where Native American artifacts may be discovered. Lists of concerned Native Americans, with contact information, and guidelines for monitoring shall be obtained from the Native American Heritage Commission. Preference in selecting a monitor or monitors shall be given to Native Americans with traditional ties to the area that shall be monitored.

Verification: At least one (1) week prior to ground disturbance in areas where there is a potential to discover Native American artifacts, 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 The project owner shall grant authority to halt construction to the CRS, alternate CRS, and the CRMs in the event previously unknown cultural resources sites or materials are encountered (discovery), or if known resources may be impacted in a previously unanticipated manner. Redirection of ground disturbance (including grading and landscaping) shall be accomplished under the direction of the construction supervisor in consultation with the CRS.

In the event cultural resources are found or impacts can be anticipated, construction shall be halted or redirected in the immediate vicinity of the find and shall remain halted or redirected 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 discovery, or by the following Monday morning if the cultural resources discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday. Notification to the CPM must include a description of the discovery (or changes in character or attributes), the action taken (i.e., work stoppage or redirection), a recommendation of eligibility, and recommendations for mitigation of any cultural resources discoveries, whether or not a determination of significance has been made.

2. The CRS has completed field notes, measurements, and photography for a Department of Parks and Recreation (DPR) 523 primary form for all cultural materials that cannot be treated programmatically. The 523 primary form will include in the Description entry a recommendation of the significance of the find. The completed forms shall be submitted to the CPM.

3. The CRS and the project owner have consulted with the CPM, and the CPM has concurred with the recommended eligibility of the discovery and approved the CRS's proposed data recovery, including the curation of the artifacts, or other appropriate mitigation; and

4. Any necessary data recovery and mitigation has been completed.

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 CRMs have the authority to halt construction activities within 100 feet of a cultural resources discovery, and that the project owner shall ensure that the CRS notifies the CPM within 24 hours of a discovery, or by Monday morning if the cultural resources discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday. For discovered cultural material that cannot be treated programmatically, completed DPR form 523s shall be submitted to the CPM for review and approval no later than 48 hours following the notification of the CPM, or 48 hours following the completion of data recordation/recovery, whichever is more appropriate for the subject cultural material. .

REFERENCES

Brock, Steven 2005 – (PB Power, Inc.). Personal communication to Beverly E. Bastian (California Energy Commission) 10/18/2005.

Brock, Steven 2006 – (PB Power, Inc.). Personal communication to Beverly E. Bastian (California Energy Commission) 1/27/2006.

Carrier, John L. 2005 – (CH2MHill). Email to William Pfanner (California Energy Commission) 12/1/2005.

CEC 2002a – Potrero Power Plant Unit 7 Project (00-AFC-04) Final Staff Assessment, placed on line at http://www.energy.ca.gov/sitingcases/potrero/documents/index.html#commission 2/13/2002.

ESA 1998. – (Environmental Science Associates). Draft Environmental Impact Report, Pacific Gas and Electric Company's Application for Authorization to Sell Certain Generating Plants and Related Assets. Application No. 98-01-008. Prepared for California Public Utility Commission 8/5/1998.

Loiachono, John (Southeast Waste Water Treatment Plant, City of San Francisco) Personal communication to Beverly E. Bastian (California Energy Commission) 1/27/06.

Mirant 2001a – (Mirant Corporation). Southern Energy California response to staff Data Requests, Set 4, Nos. 170 through 194, Potrero Power Plant Unit 7 Project (00-AFC-4). Submitted to California Energy Commission 3/27/2001.

Mirant 2001b – (Mirant Corporation). Mirant responses to Communities for a Better Environment, Data Requests, Nos. 1 through 113, Potrero Power Plant Unit 7 Project (00-AFC-4). Submitted to California Energy Commission 4/-/2001.

Mirant 2001c – (Mirant Corporation). Southern Energy California responses to staff Data Requests, Set 6, Nos. 216 through 253, Potrero Power Plant Unit 7 Project (00-AFC-4). Submitted to California Energy Commission 9/11/2003.

Moratto, Michael J. 1984 – California Archaeology, Orlando, Fla.: Academic Press.

Nelson, Marie 2004 – (California State Office of Historic Preservation). Personal communications to Gary Reinoehl 9/-/2003 and 8/-/2004.

Sanborn Insurance Company 1944 – Insurance Maps of San Francisco, Volume 6, November.

SECAL 2000a – (Southern Energy California). Application for Certification, Potrero Power Plant Unit 7 Project (00-AFC-4). Submitted to the California Energy Commission 5/31/2000.

SECAL2000b – (Southern Energy California). Data Response, Set 1, Nos. 1 through 139, Potrero Power Plant Unit 7 Project (00-AFC-4). Submitted to California Energy Commission 12/7/2000.

SECAL 2000c – (Southern Energy California). Data Response, Set 2, Nos. 140 through 161, Potrero Power Plant Unit 7 Project (00-AFC-4). Submitted to California Energy Commission 12/21/2000.

SECAL 2001a – (Southern Energy California). Amendment to the Application for Certification, Potrero Power Plant Unit 7 Project (00-AFC-4). Data Responses Nos. 30 – 32 (Cultural Resources), replacement AFC Section 8.3 (Cultural Resources) and replacement AFC Appendix R (Cultural Resources). Submitted to the California Energy Commission 1/31/2001.

SECAL 2001b – (Southern Energy California). Amendment to the Application for Certification, Potrero Power Plant Unit 7 Project (00-AFC-4). Appendix R1, Historic Resources Report: Southern Waterfront, San Francisco, California. Submitted to the California Energy Commission 1/31/2001.

SECAL 2001c – (Southern Energy California). Amendment to the Application for Certification, Potrero Power Plant Unit 7 Project (00-AFC-4). Appendix R2, Draft Historic Architecture Report: Station A Potrero Power Plant in the City and County of San Francisco. Submitted to the California Energy Commission 1/31/2001.

SECAL 2001d – (Southern Energy California). Amendment to the Application for Certification, Potrero Power Plant Unit 7 Project (00-AFC-4). Appendix R3, Historic Architecture Report: 435 23rd Street, City and County of San Francisco. Submitted to the California Energy Commission 1/31/2001.

SFERP 2004a – City and County of San Francisco/Blout (tn: 31130). Application for Certification for San Francisco Electric Reliability Project - 145-megawatt natural gas-fired peaking power plant located in San Francisco. Submitted to CEC/Therkelsen/Dockets 3/18/04.

SFERP 2004t – CH2MHill/Carrier (tn: 31854). Data Response Set 1A. Response to Staff's Data Requests dated 6/4/04. Submitted to CEC/Pfanner/Dockets 7/6/04.

SFERP 2004v – CH2MHill/Carrier (tn: 31894). Data Response Set 1C. Submitted to CEC/Pfanner/Dockets 7/15/04.

SFERP 2005n – CH2MHill/Carrier (tn: 34542). Data Response Set 3A. Submitted to CEC/Pfanner/Dockets 6/3/05. Includes Attachment CR-161, Doug Davy, James Bard, and Lori Durio, 6/3/2005. Archaeological Resources Management Report for the San Francisco Electric Reliability Project, San Francisco, California.

Prepared for San Francisco Public Utilities Commission, City and County of San Francisco, San Francisco, California.

SFERP 2005p – CH2MHill/Carrier (tn: 34544). Data Response, Set 3A: Attachment WM-184A. Submitted to CEC/Pfanner/Dockets 6/2/05. AGS, Inc., 1999. Final Site Characterization/Corrective Measure Study and Article 22A Soil Characterization Report, MUNI Metro East Light Rail Vehicle Maintenance and Operations Facility, San Francisco Municipal Railway. Prepared for San Francisco Municipal Railway, City and County of San Francisco, San Francisco, California.

SFERP 2005y – CH2MHill/Carrier (tn: 34982). Data Response Set #3C. Submitted to Dockets 7/19/05.

SFERP 2005z – CH2MHill/Carrier (tn: 34990). Informal Data Response Set # 7A. Submitted to Dockets 7/19/05.

SFERP 2005jj – CH2MHill/Carrier (tn: 35466). Data Response Set 3B & CARE Data Response Set 3D: Attachment CR-161R1. 9/13/2005. Rec'd 9/13/2005. Doug Davy, James Bard, and Lori Durio, 9/-/2005. [Revised] Archaeological Resources Management Report for the San Francisco Electric Reliability Project, San Francisco, California. Prepared for San Francisco Public Utilities Commission, City and County of San Francisco, San Francisco, California.

SFERP 2005kk – CH2MHill/Carrier (tn: 35617). Data Response Set 3E & Sarvey Response Set 1B: Attachment CR-173. 10/06/2005. Rec'd 10/07/2005. Geof Spaulding, 9/30/2005. Paleontologic Sensitivity of Subsurface Sediments of Islais Creek Estuary. Prepared for San Francisco Public Utilities Commission, City and County of San Francisco, San Francisco, California.

SFERP 2005ll – CH2MHill/Carrier (tn: 35651). Informal Data Response Set 8 (194 pgs.) 10/07/2005. Rec'd 10/07/2005.

SFERP 2005mm – CH2MHill/Carrier (tn: 35667). San Francisco Comments, Set 1. 10/12/2005. Rec'd 10/12/2005.

SFERP 2006c – CH2MHill/Carrier (tn: 36183). SFERP AFC Supplement B: Process Water Supply. POS. 1/11/2006. Rec'd 1/11/2006.

SFPD 2001a – Central Waterfront Cultural Resources Survey: Summary Report and Draft Context Statement.

SFPD 2001b – Central Waterfront Cultural Resources Survey: Appendix G, Dogpatch Context Statement.

SFPUC 2005a – San Francisco Public Utilities Commission/Hale (tn: 34403). Amendment A of the Application for Certification. Submitted to CEC/Therkelsen/Dockets 3/25/05.

URS/Dames & Moore 2000 – Potrero Power Plant Unit 7 Project: Research Design for Limited Subsurface Archaeological Investigations (Confidential). Submitted to Southern Energy Potrero 12/5/2000.

Wirth Associates Inc. 1979 – Potrero 7: Phase II, Archaeological Test Excavations. Prepared for Pacific Gas & Electric Company. Report S-14074 on file at the Northwest Center of the California Historical Resources Information System.

HAZARDOUS MATERIALS MANAGEMENT

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

SUMMARY OF CONCLUSIONS

Staff's evaluation of the proposed project (with staff's proposed mitigation measures) indicates that hazardous materials use would not present a significant impact to the public. With adoption of the proposed conditions of certification, the proposed project will comply with all applicable laws, ordinances, regulations and standards. In response to Health and Safety Code, section 25531 et seq., the applicant would be required to develop a Risk Management Plan. To insure adequacy of the Risk Management Plan, staff's proposed conditions of certification would require that the Risk Management Plan be submitted for concurrent review by United States Environmental Protection Agency, San Francisco Department of Public Health, and the California Energy Commission staff. In addition, staff's proposed conditions of certification require San Francisco Department of Public Health's review, and staff review and approval of the Risk Management Plan 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.

INTRODUCTION

The purpose of this Hazardous Materials Management analysis is to determine if the proposed San Francisco Electric Reliability Project (SFERP) has the potential to cause significant impacts on the public as a result of the use, handling, storage, or transportation of hazardous materials at the proposed 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. Employers must inform employees of hazards associated with their work and provide employees with special protective equipment and training to reduce the potential for health impacts associated with the handling of hazardous materials. The **Worker Safety and Fire Protection** section of this document describes the requirements applicable to the protection of workers from such risks.

Aqueous ammonia (29 percent ammonia in aqueous solution) is the only acutely hazardous material proposed to be used or stored at the SFERP in quantities exceeding the reportable amounts defined in the California Health and Safety Code, section 25532 (j) (SFPUC 2005a Table 8.12-4). Aqueous ammonia will be used for controlling oxides of nitrogen (NO_x) emissions through selective catalytic reduction. The use of aqueous ammonia significantly reduces the risk that would otherwise be associated with use of the more hazardous anhydrous form of ammonia. Use of the aqueous form eliminates the high internal energy associated with the anhydrous form which is stored as a liquefied gas at elevated pressure. The high internal energy associated with the anhydrous form of ammonia can act as a driving force in an accidental release, which can rapidly introduce large quantities of the material to the ambient air and result in high

down-wind concentrations. Spills associated with the aqueous form are much easier to contain than those associated with anhydrous ammonia, and emissions from such spills are limited by the slow mass transfer from the surface of the spilled material.

Other hazardous materials, such as mineral and lubricating oils, corrosion inhibitors and water conditioners, will be present at the proposed facility. Hazardous materials used during the construction phase include gasoline, diesel fuel, motor oil, hydraulic fluid, welding gases, lubricants, solvents, paint, and paint thinner. No acutely toxic hazardous materials will be used onsite during construction. None of these materials pose significant potential for off-site impacts as a result of the quantities on-site, their relative toxicity, their physical state, and/or their environmental mobility. Although no natural gas is stored, the project will also involve the handling of large amounts of natural gas. Natural gas poses some risk of both fire and explosion. Natural gas will be delivered through a new 900-foot long, 12-inch-diameter gas pipeline connecting to an existing PG&E natural gas transmission line (San Francisco Line 101) at the intersection of Illinois and 25th streets (SFPUC 2005a Section 2.1). The SFERP project will also require the transportation of aqueous ammonia to the facility. This document addresses all potential impacts associated with the use and handling of hazardous materials.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

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

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

Applicable Law	Description
Federal	
The Superfund Amendments and Reauthorization Act of 1986 (42 USC §9601 et seq.)	Contains the Emergency Planning and Community Right To Know Act (also known as SARA Title III)
The Clean Air Act (CAA) of 1990 (42 USC 7401 et seq. as amended)	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 (42 USC §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 both SARA Title III and the CAA are reflected in the California Health and Safety Code, section 25531, et seq.
49 CFR 172.800	U.S. Department of Transportation (DOT) requirement that suppliers of hazardous materials prepare and implement security plans.
49 CFR Part	Requires suppliers of hazardous materials to ensure that all their

1572, Subparts A and B	hazardous materials drivers are in compliance with personnel background security checks.
The Clean Water Act (CWA) (40 CFR 112)	Aims to prevent the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Requires a written Spill Prevention, Control, and Countermeasures (SPCC) plan to be prepared for facilities that store oil that my leak into navigable waters.
Title 49, Code of Federal Regulations, Part 190	Outlines gas pipeline safety program procedures.
Title 49, Code of Federal Regulations, Part 191	Addresses transportation of Natural and Other Gas by Pipeline: Annual Reports, Incident Reports, and Safety-Related Condition Reports, requires operators of pipeline systems to notify the 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	Addresses 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 also contains regulations governing pipeline construction, which must be, followed for Class 2 and Class 3 pipelines, and requirements for preparing a Pipeline Integrity Management Program.
State	
The California Health and Safety Code, section 25534	Directs facility owners, storing or handling regulated substances (formerly called “acutely hazardous materials”) in reportable quantities, to develop a Risk Management Plan (RMP) and submit it to appropriate local authorities, the United States Environmental Protection Agency (EPA), and the designated local administering agency for review and approval. The plan must include an evaluation of the potential impacts associated with an accidental release, the likelihood of an accidental release occurring, the magnitude of potential human exposure, any preexisting evaluations or studies of the material, the likelihood of the substance being handled in the manner indicated, and the accident history of the material. This new, recently developed program supersedes the California Risk Management and Prevention Plan (RMPP).
Title 8, California Code of Regulations, Section 5189	Requires facility owners to develop and implement effective safety management plans to insure that large quantities of hazardous materials are handled safely. While such requirements primarily provide for the protection of workers, they also indirectly improve public safety and are coordinated with the RMP process.
Title 8, California Code of Regulations,	Set forth requirements for design, construction and operation of vessels and equipment used to store and transfer ammonia. These sections generally codify the requirements of several industry

Section 458 and Sections 500 to 515	codes, including the American Society for Material Engineering (ASME) Pressure Vessel Code, the American National Standards Institute (ANSI) K61.1 and the National Boiler and Pressure Vessel Inspection Code. These codes apply to anhydrous ammonia but are also used to design storage facilities for aqueous ammonia.
California Health and Safety Code, section 41700	Requires that "No person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property."
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)	Prevents certain chemicals that cause cancer and reproductive toxicity to be discharged into sources of drinking water.
Local	
San Francisco Public Health Code Articles 21 and 22	Includes requirements for handling of hazardous materials, and enforced by the San Francisco Department of Public Health (SFDPH). The City and County of San Francisco administers the hazardous materials handling and ensures compliance with federal and state laws.
Article 80 of the San Francisco Fire Code	Incorporates the hazardous materials handling requirements of the Uniform Fire Code (Articles 79 and 80, which include minimum setback requirements for outdoor storage of ammonia). The administering agency for this authority is the San Francisco Fire Department.
Article 21A of the San Francisco Public Health Code	Specifies the requirements for handling of regulated substances including the preparation of an RMP, and is enforced by the SFDPH.

The Certified Unified Program Authority (CUPA) with responsibility to review RMPs and Hazardous Materials Business Plans is the San Francisco Department of Public Health (SFDPH). In regards to seismic safety issues, the site is located in Seismic Risk Zone 4. Construction and design of buildings and vessels storing hazardous materials will meet the seismic requirements of CCR Title 24 and 2001 California Building Code (SFPUC 2005a Section 2.3.1).

SETTING

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

- local meteorology;
- terrain characteristics; and

- location of population centers and sensitive receptors relative to the project.

METEOROLOGICAL CONDITIONS

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

Recorded wind speeds and ambient air temperatures are described in the Air Quality section (8.1) and Appendix 8.1 of the Application for Certification (AFC) (SFPUC 2005a). Staff agrees with the applicant that use of F stability (stagnated air, very little mixing), wind speed of 1.5 meters per second, and a temperature of 97 °F is appropriate for conducting the Offsite Consequence Analysis. Staff believes these represent a reasonably conservative scenario and thus reflects worst case atmospheric conditions.

TERRAIN CHARACTERISTICS

The location of elevated terrain 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 site topography is mostly flat, with an average elevation of about 13.5 feet above mean sea level. Terrain in the project vicinity ranges up to 700 feet above see level and exists in all directions except for east, where the San Francisco bay shoreline begins about 500 feet from the site (SFERP 2004d USGS Quad Maps, SFPUC 2005a Section 2.3.1).

LOCATION OF EXPOSED POPULATIONS AND SENSITIVE RECEPTORS

The general population includes many sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding a project site may have a large bearing on health risk. Table 8.12-2 of the AFC provides a list of sensitive receptors in the project vicinity, which are shown in Figures 8.6-1a and 8.6-1b (SFPUC 2005a). There are 233 schools and day care facilities, 15 hospitals, 32 senior care facilities, 221 churches, and 57 parks and recreation centers within a 3-mile radius of the site (SFPUC 2005a, Section 8.12.3). Table 8.4-2 of the AFC's Land Use section provides the distances to the nearest sensitive land uses (in a one mile radius) which include a church located 474 feet southwest of the project site.

The nearest sensitive receptor is a public park (Warm Water Cove Public Access area) located approximately 700 feet northeast of the project site, where some transients were found to be living at least temporarily in trailers and buses parked at the end of 24th street at the park. The nearest school (Starr King Elementary School) is located approximately 2,840 feet west of the site, and the nearest residence is located approximately 1,600 feet west of the site (SFPUC 2005a Section 8.12.3 and Section 8.4.2.3).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

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

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

Staff reviewed the applicant's proposed engineering 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, that 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 will 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 the public.

Staff reviewed and evaluated the applicant's proposed use of hazardous materials as described by the applicant (SFPUC 2005a, Section 8.12). Staff's assessment followed the five steps listed below:

- Step 1: Staff reviewed the chemicals and the amounts proposed for on-site use as listed in Table 8.12-4 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 and methods to keep vapors from spreading and administrative controls such as training emergency response crews.

- Step 5: Staff analyzed the theoretical impacts on the public of a worst-case spill of hazardous materials even with the mitigation measures proposed by the applicant. When mitigation methods proposed by the applicant are sufficient, no further mitigation is recommended. If the proposed mitigation is not sufficient to reduce the potential for adverse impacts to an insignificant level, staff will propose additional prevention and response controls until the potential for causing harm to the public is reduced to an insignificant level. It is only at this point that staff can recommend that the facility be allowed to use hazardous materials.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Small Quantity Hazardous Materials

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

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

During operations, hazardous chemicals such as Aluminum Sulfate, Sodium Aluminate, Sodium Hydroxide, Ferric Chloride, and other various chemicals (see **Hazardous Materials Appendix C** for a list of all chemicals proposed to be used and stored at SFERP), would be used and stored in relatively small amounts and represent limited off-site hazard due to their small quantities, low volatility, and/or low toxicity.

Additionally, SFERP is proposing to use a wet cooling system using recycled water. As proposed in an amendment to the project description (**SFERP 2006c)**, secondarily treated water will be taken from the Southeast Waste Water Treatment Plant (SEWWTP) at a location approximately 2,600 feet away from SFERP, and treated to tertiary standards on-site. The process water will be delivered in a new 8 to 10 inch pipeline connecting the SFERP to a pressurized manhole located near the intersection of Tulare and 3rd Streets. The secondary effluent will be treated on-site with ultra-filtration, disinfection, and reverse osmosis to meet Title 22 standards for tertiary treated water (SFPUC 2005a Section 8.14.5.1.1 and SFPUC 2005d). The circulating water in the cooling system would be conditioned further to control pH, minimize corrosion, and control for the formation of mineral scale and biofouling. Chemicals added for these purposed may include acid or caustic, polyacrylate polymer, phosphate based corrosion

inhibitor, and hypochlorite or other equivalent biocides (SFPUC 2005a Section 8.14.5.1.1). Any risks associated with chemical usage during cooling water treatment would be adequately mitigated through compliance with the appropriate federal, state, and local requirements for hazardous materials use, and compliance with staff's proposed conditions of certification.

Sodium hypochlorite, sodium hydroxide, and sulfuric acid will be stored on-site but do not pose a risk of off-site impacts because the volumes stored will be less than 900 gallons, they have relatively low vapor pressures, and spills would be confined to the site. Because of concern at another proposed energy facility in 1995, staff conducted a quantitative assessment of the potential for impact associated with sulfuric acid use, storage, and transportation. Staff determined no hazard would be posed to the public due to the extremely low volatility of this aqueous solution of sulfuric acid. However, in order to protect against risk of fire, staff proposes Condition of Certification **HAZ-5** which will require that no combustible or flammable material is stored within 50 feet of the sulfuric acid tank.

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

Large Quantity Hazardous Materials

Natural Gas

Natural gas poses a fire and/or possible explosion risk as a result of its flammability. Natural gas is composed of mostly methane, but also contains ethane, propane, nitrogen, butane, isobutene, and isopentane. It is colorless, odorless, and tasteless and is lighter than air. Natural gas can cause asphyxiation when methane is 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 possible explosion if a release were to occur under certain specific conditions. However, it should be noted that, due to its tendency to disperse rapidly (Lees 1998), natural gas is less likely to cause explosions than many other fuel gases, such as propane or liquefied petroleum gas, but it can explode under certain conditions (as demonstrated by the recent natural gas detonation in Belgium in July of 2004).

While natural gas will be used in significant quantities, it will not be stored on-site. It will be delivered by way of a 900-foot pipeline that would be built as part of the project to connect it to an existing PG&E natural gas transmission line at Illinois and 25th Streets. The risk of a fire and/or explosion on-site can be reduced to insignificant levels through adherence to applicable codes and development and implementation of effective safety management practices. The National Fire Protection Association (NFPA 85A) requires 1) the use of double block and bleed valves for gas shut-off; and 2) automated combustion controls. These measures will significantly reduce the likelihood of an explosion in gas-fired equipment. Additionally, start-up procedures would require air purging of the gas turbines prior to start-up, thus precluding 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. The proposed facility will require the installation of a new 900-foot-long gas pipeline. About 100 feet of the pipeline will be installed between the SFERP metering station (on the west side of the site) and 25th Street (directly north), and the remaining 800 feet will run directly west along 25th street to the existing tie-in on Illinois Street (SFPUC 2005a Section 6.2 and Figure 2-1).

Since the proposed facility will require the installation of a new gas pipeline off-site, impacts from this pipeline need to be evaluated. The new gas pipeline proposed for this project would be constructed, owned and operated by PG&E (SFPUC 2005a Section 1.5). The design of the natural gas pipeline is governed by laws and regulations discussed here. These LORS require use of high quality arc welding techniques by certified welders and inspection of welds. Many failures of older natural gas lines have been associated with poor quality welds, or corrosion. Current codes address corrosion failures by requiring use of corrosion resistant coatings and cathodic corrosion protection. Another major cause of pipeline failure is damage resulting from excavation activities near pipelines. Current codes address this mode of failure by requiring clear marking of the pipeline route. An additional mode of failure 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 and data from the National Response Center for the period 1990 - 2004, occur as a result of pipeline corrosion, pipeline construction or materials defects, rupture by heavy equipment excavating in the area such as bulldozers and backhoes, weather effects, and earthquakes. Given the gas line failures which occurred in the Marina District of San Francisco during the 1989 Loma Prieta earthquake, the January 1994 Northridge earthquake in Southern California, the January 1995 gas pipeline failures in Kobe, Japan, the January 19, 1995 gas explosion in San Francisco, the recent pipeline explosion in Belgium in July 2004, and the natural gas storage fire in Texas in August 2004, the safety of the gas pipeline is of paramount importance. However, it must be noted that those pipelines which failed in 1989 and 1995 were older (at least 20 years old) 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 recent 2004 Belgium gas pipeline explosion was due to construction equipment rupturing the line, not due to earthquake or structural failure. If loss of containment occurs as a result of pipe, valve, or other mechanical failure or external forces, significant quantities of compressed natural gas could be released rapidly. Such a release can result in a significant fire and/or explosion hazard, which could cause loss of life and/or significant property damage in the vicinity of the pipeline route. However, the probability of such an event is extremely low if the pipeline is constructed according to present standards.

According to DOT statistics, the frequency of reportable incidents is about 0.25 for all pipeline incidents per 1,000 miles per year or 2.5 x 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 Quake and in Kobe, Japan in January 1995.

The fourth category, “Other” includes equipment component failure, compressor station failures, operator errors and sabotage. The average annual service incident frequency for natural gas transmission systems varies with age, the diameter of the pipeline, and the amount of corrosion.

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

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

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

In the United States, extensive federal and state pipeline codes and safety enforcement minimize the risk of severe accidents related to natural gas pipelines. In November 2000, the DOT Office of Pipeline Safety proposed a program requiring the preparation of risk management plans for gas pipelines throughout the United States. These risk management plans will include the use of diagnostic techniques to detect internal and

external corrosion or cracks in pipelines and to perform preventive maintenance. The pipeline owner (PG&E) will be required to develop and implement these plans as per the regulation adopted May 2004 (49 CFR Part 192). The regulations prescribe minimum requirements for a pipeline Integrity Management Program to be prepared and followed by every operator of a pipeline segment located in a high consequence area. A high consequence area is defined as any location where the pipeline traverses a Class 3 or 4 area (see above) or other areas under specified circumstances. The integrity management program must contain the required elements as described in section 192.911 including an identification of all high consequence areas, a baseline assessment plan including methods of assessing pipeline integrity and a schedule for completing the assessment, an identification of threats to each pipeline segment including a risk assessment, an evaluation of mitigation measures, implementation procedures, and monitoring procedures. The regulations also include requirements for reassessment intervals, which range from 7 to 20 years depending on the type of reassessment and the operating percentage of the pipeline. As noted below, the SFERP gas pipeline will be installed in a Class 3 area.

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

The natural gas pipeline will be designed for Class 3 service and will meet California Public Utilities Commission General Order 112-E, 112-D, 58-A standards, and 49 CFR 192 standards for pipelines located in populated areas (SFPUC 2005a Sections 6.4 and 8.12.6). CPUC General Order 112-E, Section 125.1 requires that at least 30 days prior to the construction of a new pipeline, the owner must file a report with the commission that will include a route map for the pipeline. The natural gas pipeline must be constructed and operated in accordance with the Federal Department of Transportation (DOT) regulations, Title 49, Code of Federal Regulations (CFR), Parts 190, 191, and 192 (see Table 1 LORS).

Staff concludes that existing LORS are sufficient to ensure minimal risks of pipeline failure. Additionally, the gas pipeline constructed for this project will be only 900 feet long, which greatly reduces the risks of impacts to the public from a rupture or failure.

Aqueous Ammonia

Aqueous ammonia will be used 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 significant down-wind concentrations of ammonia gas. One 12,000-gallon capacity above-ground storage tank will be used to store the 29 percent aqueous ammonia, with a maximum stored quantity of 10,000 gallons (SFPUC 2005a Section 8.12.4.2).

Based on staff's analysis, as described above, aqueous ammonia is the only 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 that will be used and stored on-site. However, as with sodium hypochlorite solution, 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 aqueous ammonia, staff uses the four "bench mark" exposure levels of ammonia gas occurring 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, which is also the RMP level 1 criterion used by EPA and California; and 4) the level considered by the Energy Commission staff to be without serious adverse effects on the public for a one-time exposure of 75 ppm (considered by staff to be a *level of significance*). If the potential exposure associated with a potential release exceeds 75 ppm at any public receptor, staff will presume that the potential release poses a risk of significant impact. However, staff will also assess 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. A detailed discussion of the exposure criteria considered by staff and their applicability to different populations and exposure-specific conditions is provided in **Hazardous Materials Appendices A** and **B**.

Section 8.12.5 and Appendix 8.12A of the AFC (SFPUC 2005a) describe the modeling parameters used for the worst case accidental releases of aqueous ammonia in the applicant's Offsite Consequence Analysis (OCA). This modeling used the SLAB numerical air dispersion model for a worst-case release associated with a failure of the storage tank into the containment area and subsequent flow into the planned subsurface vault. An alternative scenario of a spill from the delivery tanker truck during loading operation was not modeled. The worst-case storage tank spill assumed a release of 10,000 gallons (3,413 pounds) of 29 percent aqueous ammonia in 10 minutes, winds of 1.5 meters per second, ambient temperature of 97°F, and category F stability. The spilled ammonia was assumed to spill into a diked area of 665 square feet, which has a 24-inch diameter drain opening into a subsurface vault. To assure the conservative nature of this analysis, the surface area of the secondary containment area (665 ft^2) and a release height of 0 meters above ground were used in the modeling, which assumes that the secondary containment drain is blocked. Ambient concentrations of ammonia were then calculated at 0, 1.6, 5, and 10 meters above ground level (SFPUC 2005a Appendix 8.12A).

The results indicated that concentrations exceeding 75 PPM in the worst-case scenario would extend about 31 meters (~102 feet) from the storage tank at a height of 1.6 meters above ground level, which is considered the breathing zone for humans. This distance extends west approximately 53 feet beyond the proposed facility fenceline into the proposed MUNI Operations and Maintenance Center site. This location is inaccessible to the public, and therefore no public access areas would be impacted as a

result of an accidental release. The maximum concentration at the north, south, and east site boundaries would be lower than 75 PPM due to the ammonia storage tank location on the western side of the facility. The modeling results show concentrations exceeding 2,000 ppm reaching up to 25.8 meters (84.6 feet) away from the ammonia storage tank, which would extend about 35 feet into the proposed MUNI site. The applicant has proposed additional mitigation measures to be implemented in collaboration with MUNI staff, such as ammonia censors that activate alarms and flashing lights to notify both SFERP and MUNI employees of an ammonia spill. (SFPUC 2005a Appendix 8.12A).

The applicant also modeled the worst case aqueous ammonia release scenario using the RMP*Comp program as recommended by the SFDPH. The results of this modeling show ammonia concentrations of 200 ppm extending 161 meters (528 feet) from the tank (SFPUC 2005a Appendix 8.12A). However, the RMP*Comp model is considered a planning tool that makes general estimates and therefore the SLAB modeling presents a more plausible scenario for the worst case accidental release of ammonia.

Staff reviewed the applicant's aqueous ammonia modeling calculations and conducted independent modeling of two accidental release scenarios: a release from the proposed SFERP storage tank and a release from a delivery truck during unloading. Staff used two models for these analyses, SCREEN 3 and the new California Air Resources Board Hotspots Analysis and Reporting Program (HARP) model. Both models produced similar and consistent results (see **Hazardous Materials Appendix D** for staff's modeling input, output, and figures). For the storage tank release scenario, the HARP model predicted an ammonia concentration of 95 ppm at the facility western fenceline (the nearest fenceline to the ammonia tank, approximately 46 feet away), and 0.2 ppm at the nearest residence (approximately 1,759 feet west of the western property boundary), and the SCREEN 3 model predicted a concentration of 94 ppm at the eastern fenceline, and 1.0 ppm at the nearest residence. HARP calculated the maximum concentration of ammonia to be 271 ppm at a location 20 feet from the ammonia tank, and SCREEN 3 predicted a maximum concentration of 127 ppm to occur at a location 30 feet from the tank.

For the truck unloading scenario, the HARP model predicted an ammonia concentration of 0.000014 ppm at the western fenceline, 0.00000023 ppm at the nearest residence, and a maximum concentration of 0.000038 ppm at a location 30 feet from the ammonia unloading area. The SCREEN 3 model could not be used to model this scenario because of limitations in this model.

According to these modeling results, the Energy Commission's level of significance (75 ppm) would not be reached at any off-site location. Since the lowest odor threshold for ammonia is about 5 ppm, it is doubtful that any odor would be noticed by any residential or sensitive receptor should an accidental release occur. Therefore staff concurs with the applicant's modeling and conclusions and believes that due to the engineering controls proposed by the applicant and those required by staff for the storage and transfer of aqueous ammonia, any accidental release of aqueous ammonia at the project site will not cause a significant impact. Therefore staff concludes that the use, storage, and handling of aqueous ammonia proposed for this project will not represent a significant risk to the public.

Urea SCR

Urea, $(NH_2)_2CO$, can be used as an alternative source of ammonia for selective catalytic reduction of NOx emissions at power plants. Urea, in contrast to gaseous anhydrous ammonia or the liquid aqueous ammonia, is a solid compound that does not require any special handling or storage precautions (Walker 2003). It is not flammable or reactive, has low acute and chronic toxicity, and does not pose the inhalation health hazards associated with the anhydrous or aqueous forms of ammonia. Urea is available in a dry form (pellets) that readily dissolve in water. Urea in dry form is approximately 46 percent nitrogen, more than aqueous ammonia solutions but less than anhydrous ammonia (Wojichowski 2002).

Urea undergoes hydrolysis to produce ammonia gas, carbon dioxide gas, and water vapor. Systems such as Ammonia On Demand (AOD™) and Urea to Ammonia (U2A™) are designed to hydrolyze urea at variable rates and inject the ammonia into the SCR reactor. Urea SCR systems can produce ammonia on-site at various rates from less than 30 lb/hr up to 10,000 lb/hr (Gialanella 2001). Systems have been installed successfully at various power plants including Canal Station Unit 1 in Sandwich, Massachusetts, Clifty Creek power plant, Kyger Creek power plant, Alamitos generating facility, and Huntington Beach California Station Units 1 & 2. Reports on NOx removal range from 70-90 percent reduction at typical exhaust temperatures of 300-425 °C (JM, product advertisement, undated) up to 93-94 percent NOx removal (Walker 2003). High efficiency of hydrolysis and high reliability have been reported (Walker 2000). Urea SCR systems use a “feedforward” system for determining the urea injection rate based on power plant operating parameters and exhaust temperatures (EPA 2000). Spent urea is recycled back into the mix tanks and all gas products (CO_2 and H_2O) are collected through vents and directed into the boiler flue gas duct ahead of the SCR, so the process has a low environmental impact (Walker 2000). The newest urea SCR systems provide 100 percent availability and “push start” button startups. Standard sizes have been developed in the ranges 125 to 4,000 lbs ammonia per hour. Operating systems are fully automatic and govern multiple hydrolyser and SCR systems (Walker 2003).

In comparison to aqueous and anhydrous ammonia, hydrolysis systems using urea have slightly higher capital costs but significantly lower operating costs. The increased initial investment in urea systems over aqueous or anhydrous ammonia can be paid back within a year because of the lower operating, maintenance, and compliance costs (Walker 2000). Cost effectiveness actually goes up for many SCR systems as the size of the boiler increases (EPA 1994).

The first commercial scale U2A™ system was started up in October 2000 at AES Alamitos Station and provided ammonia to an existing SCR system. Alamitos Unit 6 is a 480 MW, gas-fired B&W boiler, and the U2A™ for Alamitos was designed to produce 340 lb/hr ammonia.

Potential drawbacks of using urea SCR:

- Has only been used for approximately 4 years, not very long history of use and experience.

- May not be approved by local agencies for use at power plants because short history of tested performance.
- Relies on deliveries of large quantities of urea pellets.
- Requires continuous monitoring of ammonia levels to match concentration on NOx in exhaust (all ammonia SCR systems).
- High ammonia concentrations may cause a release of unreacted ammonia to the environment as increased ammonia slip (all ammonia SCR systems).
- Limited number of suppliers may make cost of transport high.
- May require specific storage conditions on-site that will minimize contact with moisture (dry urea is hygroscopic), or specific storage conditions for urea solution.
- Questions exist about the application of this technology to gas turbines because of the lack of adequate response time in providing ammonia on-demand.

Advantages of using urea SCR:

- Environmentally safe, no inhalation health hazard, no special handling requirements.
- Easy and safe transport, storage, and use.
- Not regulated.
- Low permitting costs.

According to EPA Region 9 Air Division, urea SCR will no doubt work for large power plants. However, Region 9 officials believe that urea may be less chemically efficient and more expensive to purchase, a direct contradiction to the opinion of vendors (EPA 2004). An expert from the Department of Energy's National Energy Technology Laboratory (NETL) supports EPA's view and found that the chemical inefficiency of urea may result from an incomplete hydrolysis process where not all of the urea is converted to ammonia. According to the NETL, urea SCR was designed for safety purposes, rather than for economic advantages, and the penalty of using it includes higher costs associated with running the hydrolysis unit which consumes energy. NETL is not aware of any documented problems with urea SCR technology, but also notes that it is a relatively new technology (DOE NETL 2004).

After evaluation, staff believes that although the use of a solid form of ammonia would indeed reduce or eliminate any risk of the storage and transport of aqueous ammonia, those risks are already below staff's level of significance, that is, are insignificant. Staff also believes that the on-site generation of any chemical, in this case ammonia gas, presents some risk of inefficient production or loss of ability to generate adequate amounts of ammonia on-demand, however short-term. Staff therefore concludes that in the absence of a finding of a significant impact that must be mitigated, the applicant is free to choose the method of supply of ammonia it desires and which it determines to be the most efficacious and cost-effective.

SCONOx

The SCONOx system is another alternative to the use of ammonia to control NOx emission from exhaust. This technology uses one catalyst for the reduction of both NOx

and CO, with zero ammonia slip (Czarnecki 2000). Industry claims that SCONOx can provide ammonia-free NOx emission reduction to levels below 2 ppm, and be successfully used in applications in the 5 to 500 MW range (EmeraChem 2002). SCONOx works by simultaneously oxidizing CO to CO_2 and NO to NO_2, and absorbing NO_2 on the surface of the catalyst by using a reaction with the potassium carbonate coating of the catalyst. This reaction produces potassium nitrites and nitrates that build up on the surface of the catalyst and cause the need to regenerate it periodically to maintain maximum NOx absorption rates.

SCONOx technology has been mostly used on small scale units, but a scaled-up system for use in 100 MW units and greater has been designed.

Some of the facilities that use SCONOx include:

- 32 MW turbine at the Federal Cogeneration facility in LA, installed 1996
- 25 MW facility at UCSD, installed 2001
- 25 MW City of Vernon power plant
- an industrial facility in Massachusetts (unknown MWs)
- 43 MW CTG at Redding Power Plant

Although SCONOx technology has not been used at larger scale facilities (500 MW), there is conjecture in the literature by EPA and the South Coast Air Quality Management District (SCAQMD) that the SCONOx technology can be scaled up to a larger facility and still achieve the same NOx emission reduction. This has not yet been proven and EPA staff has indicated that using SCONOx on larger scale facilities may work but not be cost effective (EPA 2003).

SCONOx has been proposed for a couple of large-scale plants, such as Otay Mesa (500 MW), where the applicant (Calpine) eventually determined SCR would work best for that site, and Nueva Azalea (552 MW), where SCAQMD had issued a temporary permit accepting the SCONOx proposal, but the project was dropped due to public opposition to the entire project (SCAQMD 2003a and 2003b).

Some of the drawbacks of SCONOx are:

- it has not been tested in larger facilities and therefore claims of application and efficiency remain unproven
- it is more costly than SCR to install and operate
- the companies that sell it are smaller than SCR companies, with less money to take care of major problems if they occur at larger facilities
- it has a very sensitive catalyst that is regenerated using hydrogen
- NOx emissions gradually rise over time requiring a 1 to 2-day shutdown every 6-12 months (depending on fuel quality and operation) to remove and regenerate the absorption modules off-site.

The SFERP applicant's Data Response AQ-7 (SFERP 2004q) stated that SCONOx would not work for the SFERP project because of recent experience at the Redding Power Plant (which uses SCONOx on its 43 MW CTG) demonstrating that the catalyst must be removed and washed at least twice a year to maintain control efficiency. This cleaning process requires a shutdown of the unit; thus, SCONOx would not be acceptable for a power plant like SFERP that needs to maintain reliability. Staff had evaluated the use of SCONOx prior to receipt of the applicant's Data Responses and had independently determined that the SCONOx equipment requires one to two-day shutdowns for cleaning every 6-12 months in order to maintain maximum levels of NOx control. Therefore, staff concludes that the use of SCONOx technology for this project is not viable.

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. 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 secondary containment areas surrounding each of the hazardous materials storage areas designed to contain accidental releases that might happen during storage or delivery;
- physical separation of stored chemicals in isolated containment areas separated by a noncombustible partition in order to prevent accidental mixing of incompatible materials which may result in the evolution and release of toxic gases or fumes;
- installation of an automatic sprinkler systems and an exhaust system for indoor hazardous materials storage areas;
- construction of a concrete secondary containment area surrounding the aqueous ammonia storage tank with a sloped floor that will drain any liquid through a 24-inch opening to a covered sump;
- construction of a bermed containment area surrounding the truck unloading area with a sloped floor draining into the spill vault under the storage tank through a 4-inch drain;
- process protective systems including continuous tank level monitors, temperature and pressure monitors, alarms, check valves, and emergency block valves; and
- ammonia sensors in the vicinity of the ammonia storage tank that would activate alarms and flashing lights to alert SFERP and MUNI employees that a spill has occurred. (Typical ammonia sensors in use at other power plants that use ammonia are activated at a range of 25 - 75 ppm of ammonia in the air. Activation of an alarm at these levels would provide ample opportunity for on-site workers to leave the area

and respond to a spill wearing proper Personal Protective Equipment. In order to provide protection for MUNI workers at the nearby MUNI maintenance yard (located immediately to the west of the power plant site), an alarm will also notify workers at the MUNI site. This will allow the MUNI workers to take proper emergency responsive actions.)

Administrative Controls

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

A worker health and safety program will be prepared by the applicant and will include (but is not limited to) the following elements (see **WORKER SAFETY/FIRE PROTECTION** section in this FSA for specific regulatory requirements):

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

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

The applicant will also prepare a Risk Management Plan (RMP) for aqueous ammonia as required by CalARP regulations and Condition of Certification **HAZ-2** that would include a program for prevention of accidental releases and responding to an accidental release of aqueous ammonia. A Hazardous Materials Business Plan (HMBP) will also be prepared by the applicant that would incorporate state requirements for the handling of hazardous materials (SFPUC 2005a Section 8.12.8.2.1).

On-site Spill Response

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

The San Francisco Hazardous Materials Team stationed at SFFD fire station No. 36 is located at 109 Oak Street approximately 4 miles from the project site and considered first responder for HazMat incidents. The SFFD has 61 trained hazmat specialist, 25 of them work at station No. 36. Backup support services and technical consulting will be provided by Rescue squads 1 and 2, the Bureau of Fire Prevention hazmat inspectors, industrial hygienists, environmental health inspectors from the San Francisco Department of Public Health, and the Coast Guard. Response time for hazmat incidents will be about 30 minutes (SFPUC 2005a Section 8.8.3.6.3).

Additionally, designated plant personnel will be assigned to a hazmat response team and receive first responder training, hazmat technical training, and training in mitigation and control measures (SFPUC 2005a Section 8.12.8.2.1).

Staff concludes that the hazardous materials response time is acceptable and that the SFFD HazMat Response Team is adequately trained and equipped to respond in a timely manner (CCSF 2004).

Transportation of Hazardous Materials

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

Staff reviewed the applicant's proposed transportation routes for hazardous materials delivery. The applicant stated that the exact route will be determined by the CHP before delivery of ammonia (SFPUC 2005a, Section 8.10.3.9). However, staff has analyzed the optional routes and has concluded that the best choice for the transportation of hazardous materials will be from I-280 to Cesar Chavez Street, to Illinois Street, to 25th Street, to the project site.

Ammonia can be released during a transportation accident and the extent of impact in the event of such a release would depend on the location of the accident 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:

- the skill of the tanker truck driver,
- the type of vehicle used for transport, and
- accident rates.

To address this concern, staff evaluated the risk of an accidental transportation release in the project area. Staff's analysis focused on the project area after the delivery vehicle leaves the main highway (I-280). Staff believes that it is appropriate to rely on the extensive regulatory program that applies to shipment of hazardous materials on California Highways to ensure safe handling in general transportation (see The Federal Hazardous Materials Transportation Law 49 USC §5101 et seq, The US 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 for additional information on regulations governing the transportation of hazardous materials.

To address the issue of tank truck safety, aqueous ammonia will be delivered to the proposed facility in Department of Transportation (DOT) certified vehicles with design capacity of 6,500 gallons. These vehicles will be designed to DOT Code MC-307. These are high integrity vehicles designed for hauling of caustic materials such as ammonia. Staff has, therefore, proposed Condition of Certification **HAZ-6** to ensure that regardless of which vendor supplies the aqueous ammonia, delivery will 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 and three federal government databases to assess the risks of a hazardous materials transportation accident.

Staff used the data from the Davies and Lees (1992) article which references the 1990 Harwood et al. study, to determine that the frequency of release 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 SFERP will require about 14 tanker truck deliveries of aqueous ammonia per year each delivering about 6,500 gallons. Each delivery will travel approximately 0.7 miles from I-280 to the facility along Cesar Chavez Street, to Illinois Street, to 25th Street, to the facility.

This would result in about 10 miles of delivery tanker truck travel in the project area per year (with a full load). Staff believes that the risk over this distance is insignificant. Data from the U.S. DOT show that the actual risk of a fatality over the past five years from all modes of hazardous material transportation (rail, air, boat, and truck) is approximately 0.1 in one million.

In addition, staff used a Transportation Risk Assessment model developed by staff in order to calculate the risk of an upset associated with aqueous ammonia delivery from the freeway to the facility. Results show a risk of 0.25 in one million for one trip and a risk of 1.72 in a million per year for 14 deliveries. This risk was calculated using accident rates on various types of roads (urban, one lane and two-lane) with distances traveled on each type of road computed separately. Although it is an extremely conservative model, the results show the risk of a transportation accident to be insignificant. 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.

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. 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.

Seismic Issues

The possibility exists that an earthquake 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 and pumps. 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. The effects of the Loma Prieta earthquake of 1989, the Northridge earthquake of 1994, and the earthquake in Kobe, Japan, in January 1995, heighten the concern regarding earthquake safety.

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 Resources and Hazards** and **Facility Design** in the AFC, staff notes that the proposed facility will be designed and constructed to the applicable standards of the 2001 California Building Code and the 1997 Uniform Building Code for Seismic Zone 4 (SFPUC 2005a Section 2.3.1). Therefore, on the basis of what occurred in Northridge with older tanks and the lack of failures during the Nisqually earthquake with newer tanks, staff determined that tank failures during seismic events are not probable and do not represent a significant risk to the public.

Site Security

This facility proposes to use hazardous materials that have been identified by the US 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), the US Department of Justice published a special report on Chemical Facility Vulnerability Assessment Methodology (US DOJ 2002), the North American Electric Reliability Council published Security Guidelines for the Electricity Sector in 2002 (NERC 2002), and the U.S. Department of Energy published a draft Vulnerability Assessment methodology for Electric Power Infrastructure in 2002 (DOE 2002). The energy generation sector is one of the 14 areas of Critical Infrastructure listed by the U.S. Department of Homeland Security.

The applicant has stated that a security plan will be prepared for the proposed facility, and will include a description of perimeter security measures, and procedures for

evacuating, notifying authorities of a security breach, conducting site personnel background checks, and site access. Perimeter security measures utilized for this facility may include security guards, security alarms, breach detectors, motion detectors, and video or cameral systems (SFPUC 2005a Section 8.12.8.2.5). In order to ensure that this facility or a shipment of hazardous material is not the target of unauthorized access, staff's proposed Conditions of Certification **HAZ-8** and **HAZ-9** address both a Construction Security Plan and an Operations Security Plan. These plans would require the implementation of Site Security measures consistent with the above-referenced documents and CEC guidelines.

The goal of these conditions of certification is to provide for the minimum level of security for power plants to protect California's electrical infrastructure from malicious mischief, vandalism, or domestic/foreign terrorist attacks. The level of security needed for this power plant is dependent upon the threat imposed, the likelihood of an adversary attack, the likelihood of adversary success in causing a catastrophic event, and the severity of consequences of that event. The results of the off-site consequence analysis prepared as part of the Risk Management Plan (RMP) will be used, in part, to determine the severity of consequences of a catastrophic event. In order to determine the level of security, the CEC staff will provide guidance in the form of a vulnerability assessment (VA) decision matrix modeled after the U.S. Department of Justice Chemical Vulnerability Assessment Methodology (July 2002), the NERC 2002 guidelines, and the U.S. Department of Energy VAM-CF model. Basic site security measures shall be required at all locations in order to protect the infrastructure and electrical power generation within the state.

These measures will include perimeter fencing and detectors, possibly guards, alarms, site access procedures for employees and vendors, site personnel background checks, and law enforcement contact in the event of security breach. Site access for vendors shall be strictly controlled. Consistent with current state and federal regulations governing the transport of hazardous materials, hazardous materials vendors will have to maintain their transport vehicle fleet and employ only drivers properly licensed and trained. The project owner will be required, through the use of contractual language with vendors, to ensure that vendors supplying hazardous materials strictly adhere to the U.S. Department of Transportation (DOT) requirements for Hazardous Materials vendors to prepare and implement security plans as per 49 CFR 172.800 and to ensure that all hazardous materials drivers are in compliance with personnel background security checks as per 49 CFR Part 1572, Subparts A and B. The CPM may authorize modifications to these measures, or may require additional measures depending on circumstances unique to the facility, and in response to site operator and/or industry-related security concerns.

CUMULATIVE IMPACTS AND MITIGATION

Staff reviewed the potential for the operation of the SFERP combined with existing facilities to result in cumulative impacts on the population within the area. Facilities in the project vicinity that have filed a Risk Management Plan and may contribute to a cumulative impact are listed in Table 8.12-9 of the AFC (SFPUC 2005a Page 8.12-31). In addition, staff reviewed inventory data received from the San Francisco Department of Public Health Hazardous Materials Division (SFDPH) on all facilities in the project

area (defined as approximately one-mile from SFERP) that have any hazardous materials used or stored on site. All facilities were reviewed and those that pose a risk of contributing to cumulative impacts were analyzed in greater detail. Those facilities store or use chemicals that may pose a risk of migrating offsite in the event of a release due to their quantity, mobility, physical state, and/or toxicity. Staff paid particular attention to facilities that store large amounts of compressed gas and to facilities that store significant quantities of materials such as sulfuric acid and ammonia (see **Hazardous Materials Appendix E** for a list of the most significant facilities with hazardous materials in the project vicinity).

Staff determined that the facility with the most potential to cause a cumulative impact is the Potrero Power Plant that uses aqueous ammonia for NO_x reduction and has installed an ammonia SCR system and storage tank. The Potrero Power Plant will store up to 20,000 gallons of 29.4 percent aqueous ammonia in one above-ground storage tank located approximately 0.35 miles (~1,875 feet) from the proposed SFERP aqueous ammonia storage tank. None of the other facilities reviewed in the project vicinity represent a real risk of causing a cumulative impact due to their location, the quantities stored on-site, and the low toxicity and/or low mobility of the materials present. The Offsite Consequence Analysis (OCA) conducted by Mirant as part of their RMP used EPA's RMP*Comp program, which provides a very general and conservative estimate of impacts. This modeling calculated that ammonia concentrations of 200 ppm would extend approximately 0.9 miles from the Potrero Power Plant site (SFPUC 2005a Section 8.12.7), a distance which staff disputes and believes it to be unusable for emergency planning purposes. In 2004, staff contacted Mirant and received a draft OCA conducted for the Potrero Power Plant as part of the draft RMP filed by Mirant (Mirant 2004a). Staff used Mirant's draft OCA to conduct an independent analysis and model the release of aqueous ammonia from the Potrero PP and the proposed SFERP simultaneously using the HARP model. Staff used a wind speed of 1.5 m/sec, stability class F, and ambient temperature of 112°F, which represent the worst-case scenario (see **Hazardous Materials Appendix F** for staff's modeling input, output, and figures). Staff determined that airborne impacts from an accidental release of aqueous ammonia at the transfer pad or storage tank area would be confined to the Potrero site.

Staff's modeling results show that in the unlikely event of a simultaneous release from both the proposed SFERP ammonia storage tank and the existing Potrero Power Plant ammonia storage tank, the plumes would not combine to produce airborne concentrations above that predicted to occur from a release from a single tank. Staff's modeling predicted that the maximum ammonia concentration would occur due to only one tank's emissions and not due to a co-mingling of releases from both tanks. Based on these results, CEC's level of significance (75 ppm) would not be reached at any off-site location and it is doubtful that an odor would even be noticed by most people (odor threshold is ~5 ppm for the most sensitive people). Therefore, no significant cumulative impacts are likely to occur from the use of aqueous ammonia at the SFERP and the Potrero Power Plant.

In order to assess the cumulative impacts associated with the transportation of aqueous ammonia, staff used the Transportation Risk Assessment model developed by staff to calculate the risk from aqueous ammonia deliveries to both the SFERP and the Potrero Power Plant. Mirant staff provided an estimate of truck deliveries per year (28

deliveries) which were added to the risk calculation for the SFERP ammonia deliveries. The results show a risk of 5.15 in a million per year for travel from the freeway to the facilities. Staff concludes that the risk of exposure to significant concentrations of aqueous ammonia during transportation to both facilities is insignificant because of the remote possibility of accidental release of a sufficient quantity to present a danger to the public. Staff's conclusion is based upon its own assessment of transportation of aqueous ammonia to both facilities and on data from the U.S. DOT.

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

COMPLIANCE WITH LORS

Staff concludes that construction and operation of the SFERP would be in compliance with all applicable LORS regarding long-term and short-term project impacts in the area of Hazardous Materials Management.

CONCLUSIONS

Staff's evaluation of the proposed project (with proposed mitigation measures) indicates that hazardous material use will pose no significant impacts on the public. Staff's analysis also shows that there will be no significant cumulative impact. With adoption of the proposed Conditions of Certification, the proposed project will comply with all applicable LORS. In response to Health and Safety Code, section 25531 et seq., the applicant will be required to develop an RMP. To insure adequacy of the RMP, staff's proposed Conditions of Certification require that the RMP be submitted for concurrent review by US EPA, San Francisco Department of Public Health, and Energy Commission staff. In addition, staff's proposed Conditions of Certification require San Francisco Department of Public Health'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.

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

Staff proposes seven 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 City and County and the Energy Commission Compliance Project Manager (CPM). **HAZ-2** requires that a RMP be prepared and submitted prior to the delivery of aqueous ammonia.

Staff believes that an accidental release of aqueous ammonia during transfer from the delivery tanker to the storage tank is the most probable accident scenario, and therefore proposes a condition (**HAZ-3**) requiring development of a safety management plan for the delivery of aqueous ammonia. The development of a Safety Management Plan addressing delivery of ammonia will further reduce the risk of any accidental release not addressed by the proposed spill prevention mitigation measures and the required RMP. **HAZ-4** requires that the aqueous ammonia storage tank be designed to certain rigid specifications, **HAZ-5** addresses the storage of sulfuric acid, and the transportation of hazardous materials is addressed in **HAZ-6,** & **7**. Site security during both the construction and operations phases is addressed in **HAZ-8** and **HAZ-9**.

PROPOSED CONDITIONS OF CERTIFICATION

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

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

HAZ-2 The project owner shall concurrently provide a Business Plan and a Risk Management Plan (RMP) to the Certified Unified Program Authority – (CUPA) (San Francisco Department of Public Health) and 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 for commissioning or operations, the project owner shall provide a copy of a final Business Plan to the CPM for approval. At least sixty (60) days prior to delivery of aqueous ammonia to the site, the project owner shall provide the final RMP to the CUPA for information and to the CPM for approval.

HAZ-3 The project owner shall develop and implement a Safety Management Plan for delivery of aqueous ammonia. 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 sixty (60) days prior to the delivery of aqueous ammonia to the facility, the project owner shall provide a safety management plan as described above to the CPM for review and approval.

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

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

HAZ-5 The project owner shall ensure that no flammable material is stored within 50 feet of the sulfuric acid tank.

Verification: At least sixty (60) days prior to receipt of sulfuric acid on-site, the project owner shall provide copies of the facility design drawings showing the location of the sulfuric acid storage tank and the location of any tanks, drums, or piping containing any flammable materials.

HAZ-6 The project owner shall direct all vendors delivering aqueous ammonia to the site to use only tanker truck transport vehicles which meet or exceed the specifications of DOT Code MC-307.

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

HAZ-7 The project owner shall direct all vendors delivering any hazardous material to the site to use only the route approved by the CPM (Interstate-280, to Cesar Chavez Street off-ramp, to Third Street, to Illinois St. to 25th Street, to the project site). The project owner shall obtain approval of the CPM if an alternate route is desired.

Verification: At least sixty (60) days prior to receipt of any hazardous materials on site, the project owner shall submit copies of the required transportation route limitation direction to the CPM for review and approval.

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

1. Perimeter security consisting of fencing enclosing the construction area;
2. Security guards;

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

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

HAZ-9 In order to determine the level of security appropriate for this power plant, the project owner shall prepare a Vulnerability Assessment and submit that assessment as part of the Operations Security Plan to the CPM for review and approval. The Vulnerability Assessment shall be prepared according to guidelines issued by the North American Electrical Reliability Council (NERC 2002), the U.S. Department of Energy (DOE 2002), and the U.S. Department of Justice Chemical Vulnerability Assessment Methodology (July 2002). Physical site security shall be consistent with the guidelines issued by the NERC (Version 1.0, June 14, 2002) and the DOE (2002) and will also be based, in part, on the use and storage of certain quantities of regulated substances (acutely hazardous materials) as described by the California Accidental Release Prevention Program (Cal-ARP, Health and Safety Code section 25531).

The project owner shall also prepare a site-specific Security Plan for the operational phase and shall be made available to the CPM for review and approval. The project owner shall implement site security measures addressing physical site security and hazardous materials storage. The level of security to be implemented will be determined by the results of the Vulnerability Assessment but in no case shall the level of security be less than that described as below (as per NERC 2002).

The Operation Security Plan shall include the following:

1. Permanent full perimeter fence or wall, at least 8 feet high;
2. Main entrance security gate, either hand operable or motorized;
3. Evacuation procedures;
4. Protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency;
5. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;
6. Site personnel background checks, including employee and routine on-site contractors [Site personnel background checks are limited to ascertaining that the employee's claims of identity and employment

history are accurate. All site personnel background checks shall be consistent with state and federal law regarding security and privacy.];

7. Site access controls for employees, contractors, vendors, and visitors;
8. Requirements for Hazardous Materials vendors to prepare and implement security plans as per 49 CFR 172.800 and to ensure that all hazardous materials drivers are in compliance with personnel background security checks as per 49 CFR Part 1572, Subparts A and B;
9. Closed Circuit TV (CCTV) monitoring system, recordable, and viewable in the power plant control room and security station (if separate from the control room) capable of viewing, at a minimum, the main entrance gate and the ammonia storage tank; and
10. Additional measures to ensure adequate perimeter security consisting of either:

    A. Security guards present 24 hours per day, 7 days per week.

    <u>or</u>

    B. Power plant personnel on-site 24 hours per day, 7 days per week and **all** of the following:

        1. The CCTV monitoring system required in number 9 above shall include cameras that are able to pan, tilt, and zoom (PTZ), have low-light capability, are recordable, and are able to view 100 percent of the perimeter fence, the ammonia storage tank, the outside entrance to the control room, and the front gate from a monitor in the power plant control room; **and**
        2. Perimeter breach detectors **<u>or</u>** on-site motion detectors.

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

<u>Verification:</u> At least 30 days prior to the initial receipt of hazardous materials on-site, the project owner shall notify the CPM that a site-specific Vulnerability Assessment and Operations Site Security Plan are available for review and approval.

REFERENCES

AIChE (American Institute of Chemical Engineers). 1989. Guidelines for Technical Management of Chemical Process Safety, AIChE, New York, NY 10017.

AIChE (American Institute of Chemical Engineers). 1994. Guidelines for Implementing Process Safety Management Systems, AIChE, New York, NY 10017.

API (American Petroleum Institute). 1990. Management of Process Hazards, API Recommended Practice 750; American Petroleum Institute, First Edition, Washington, DC, 1990.

ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.). 2002. Ammonia as a Refrigerant, Position Document dated January 17, 2002.

Baldcock, P.J. (1980). Accidental Releases of Ammonia: An Analysis of Reported Incidents. (Unknown source).

California Code of Regulations Title 19, Accidental Release Prevention Program. November 1998.

City and County of San Francisco (CCSF) 2004. Record of conversation with Fire Marshall Paul Chin during a conference call August 3, 2004.

CH2MHill 2004. E-mail received from John Carrier dated August 2, 2004.

Chemical Incident Reports Center Database, U.S. Chemical Safety Board. 2001.

Czarnecki, Larry et al. 2000. "SCONOx™ – Ammonia Free NOx removal Technology For Gas Turbines." Proceedings of 2000 International Joint Power Generation Conference, Miami Beach, Florida, July 23-26.

Davies, P.A. and Lees, F.P. 1992. "The Assessment of Major Hazards: The Road Transport Environment for Conveyance of Hazardous Materials in Great Britain." Journal of Hazardous Materials, 32: 41-79.

EmeraChem 2002. "NOx Abatement Technology for Stationary Gas Turbine Power Plants, An Overview of Selective Catalytic Reduction (SCR) And Catalytic Absorption (SCONOx™) Emission Control Systems."

Environmental Protection Agency (EPA). 1987. Technical Guidance for Hazards Analysis, Environmental Protection Agency, Washington, DC, 1987.

Environmental Protection Agency (EPA). 1988. Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Environmental Protection Agency, Research Triangle Park, NC, August 1988.

Environmental Protection Agency (EPA) 1994. “Alternative Control Techniques Document – NOx emissions from Industrial/Commercial/Institutional (ICE) Biolers.” EPA-453/R-94-022, March.

Environmental Protection Agency (EPA). 1998. Headquarters Press Release: Safety Alert on Ammonia Used as a Refrigerant, Environmental Protection Agency, Washington, DC, 1998.

Environmental Protection Agency (EPA) 2000. “Stationary Reciprocating Internal Combustion Engines, Updated Information on NOx Emissions and Control Techniques, Revised Final Report.” Prepared by EC/R Incorporated, September 1.

Environmental Protection Agency (EPA). 2000a. Chemical Accident Prevention: Site Security. Environmental Protection Agency, Office of Solid Waste and Emergency Response. February 2000.

Environmental Protection Agency (EPA). 2000b. Risk Management Guidance For Ammonia Refrigeration Environmental Protection Agency, Research Triangle Park, NC, 2000.

Environmental Protection Agency (EPA). 2001. Hazard of Ammonia Releases at Ammonia Refrigeration Facilities (Update) Environmental Protection Agency, Office of Solid Waste and Emergency Response. August 2001.

Environmental Protection Agency (EPA) 2003. Personal communications with Barbara Toole O’Neil, EPA Region 9, Air Division. January 10.

Environmental Protection Agency (EPA) 2004. Personal communications with Barbara Toole O’Neil, Region 9, Air Division, June 18.

FEMA (Federal Emergency Management Agency). 1989. Handbook of Chemical Hazard Analysis Procedures, Federal Emergency Management Agency, Washington, DC, 1989.

Gavahan, Robert 2003. E-mail from Robert Gavahan, Power Engineers Collaborative, October 21, 2003.

Gialanella, Mario, and Peters, H. James. 2001. “U2A™ – Urea to Ammonia Technology.” Hamon Research-Cottrell. Presented at 2001 DOE NETL CSR/CNSR conference.

Harwood, D.W., Viner, J.G., and E.R. Russell. 1990. "Truck Accident Rate Model for Hazardous Materials Routing." Transportation Research Record. 1264: 12-23.

Harwood, D.W., Viner, J.G., and E.R. Russell. 1993. "Procedure for Developing Truck Accident and Release Rates for Hazmat Routing." Journal of Transportation Engineering. 119(2): 189-199.

Johnson Matthey (JM) undated. “Urea SCR Systems For Controlling NOx From Stationary IC Engines” company advertisement.

Lees, F.P. 1998). Loss Prevention in the Process Industries, Vols. I, II and III. Second Edition, Butterworths.

Mirant Delta LLC 2004a. Fax from Tom Bertolini containing the Offsite Consequence Analysis section of the Draft RMP for the Potrero Power Plant. Dated 6/10/2004.

National Response Center Database. US Coast Guard. 2002

National Transportation Safety Board Database. US Department of Transportation. 2001

NFPA (National Fire Protection Association). 1987. NFPA 85A, Prevention of Furnace Explosions in Fuel Oil and Natural Gas Fired Single Burner Boiler Furnaces, National Fire Protection Association, Batterymarch Park, Quincy, MA, 1987.

North American Electric Reliability Council (NAERC) 2002. Security Guidelines for the Electricity Sector, Version 1.0, June 14, 2002.

NRC (National Research Council). 1979. Ammonia. Subcommittee on Ammonia. Committee on Medical and Biologic Effects of Environmental Pollutants. Division of Medical Sciences, Assembly of Life Sciences, National Research Council (NRC), Baltimore, Maryland, University Park Press (NTIS No. PB 278-027).

Perry. 1973. Perry's Chemical Engineers' Handbook, Sixth Edition, McGraw-Hill, USA.

Pet-Armacost, J.J., Sepulveda, J. and M. Sakude. 1999. "Monte Carlo Sensitivity Analysis of Unknown Parameters in Hazardous Materials Transportation Risk Assessment." Risk Analysis. 19(6): 1173-1184.

Rhyne, W.R. 1994. Hazardous Materials Transportation Risk Analysis. Quantitative Approaches for Truck and Train. Chapter 2: Transportation Quantitative Risk Analysis; and Chapter 3: Databases

San Francisco Department of Public Health (SFDPH) 2004a. Personal communication with Dr. Jim Ambrose, Chief Technical Inspector, CalARP Program. June 7, 2004.

San Francisco Department of Public Health (SFDPH) 2004b. Inventory data for facilities of interest in the project vicinity, received on CD July 28, 2004.

San Francisco Department of Public Health (SFDPH) 2004c. Additional Inventory data for facilities of interest in the project vicinity, received on CD August 27, 2004.

SFERP 2004a - City and County of San Francisco/Blout (tn: 31130). Application for Certification San Francisco Electric Reliability Project - 145-megawatt natural gas-fired peaking power plant located in San Francisco. Submitted to CEC/Therkelsen/Dockets on 3/18/04.

SFERP 2004d - CH2MHill/Carrier (tn: 31128). Sets of 7.5 Minute U.S. Geological Survey (USGS) Quad Maps Submitted to CEC/Pfanner/Dockets on 3/18/04.

SFERP 2004q – CH2MHill/Carrier (tn: 31854). Data Responses Set 1A. Response to Staff's Data Requests dated 6/4/04. Submitted to CEC/Pfanner/Dockets on 7/6/04.

SFPUC 2005a – San Francisco Public Utilities Commission/Hale (tn: 34403). Amendment A of the Application for Certification. Submitted to CEC/Therkelsen/Dockets on 3/25/05.

SFPUC 2005d – San Francisco Public Utilities Commission (tn: 36120). Amendment to the Project Description, Process & Cooling Water Supply. POS. 12/20/2005. Rec'd 12/22/2005.

SFERP 2006c – CH2MHill/Carrier (tn: 36183). SFERP AFC Supplement B: Process Water Supply. POS. 1/11/2006. Rec'd 1/11/2006.

South Coast Air Quality Management District (SCAQMD) 2003a.Personal communications with Yohn Yee, January 10.

South Coast Air Quality Management District (SCAQMD) 2003b. Personal communications with Engineer Chandra Bhatt, January 10.

Spencer, Herbert W. et al. 2001. "Start-Up and Operation of the First U2A^{TM} Urea To Ammonia Conversion System at AES Alamitos Station." DOE NETL.

Uniform Fire Code (UFC) 1997. International Fire Code Institute, Whittier, Ca.

U.S. Department of Energy, National Energy Technology Laboratory (DOE NETL) 2004. Personal communications with Bruce Lani, July 8.

U.S. Department of Energy (US DOE) 2002. Draft Vulnerability Assessment Methodology, Electric Power Infrastructure. Office of Energy Assurance, September 30, 2002.

U.S. Department of Justice (US DOJ) 2002. Special Report: Chemical Facility Vulnerability Assessment Methodology. Office of Justice Programs, Washington, D.C. July 2002.

USOSHA (United States Occupational Safety and Health Administration). 1993. Process Safety Management / Process Safety Management Guidelines For Compliance. U.S. Department of Labor, Washington, DC.

Vilchez, J.A., Sevilla, S., Montiel, H. and J. Casal. 1995. "Historical Analysis of Accidents in Chemical Plants and in the Transportation of Hazardous Materials." J. Loss Prev. Process Ind. 8(2): 87-96

Walker, Hamilton G. Jr. and James J. Ferrigan.2003. “Ammonia-On-Demand™ Installations at American Electric Power’s Clifty Creek and Kyger Creek Plants Provide 100% Availability and Safe Operation.” Presented at the 2003 DOE NETL CSR/CNSR conference.

Walker, Hamilton G. Jr. and Jeffrey J. Prickel. 2001. “Installation and Start-up of the First Large Scale AOD™ Process on two 1,300 MW Coal-Fired Midwest Utility Boilers.” National Energy Technology Laboratory, US DOE.

Walker, Hamilton. 2000. “Ammonia On Demand (AOD™) New Alternative For an Ammonia Supply System for SCR/SNCRs.” Environmental Elements Corporation.

Wojichowski, David L., and Egan, James T. 2002. “SCR and SNCR Reagent Cost Minimization.” Presented at the DOE NETL CSR/CNSR conference in Pittsburgh, May.

Hazardous Materials
Appendix A

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

September 2004

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

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

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

Hazardous Materials Appendix A Table-1
Acute Ammonia Exposure Guidelines

Guideline	Responsible Authority	Applicable Exposed Group	Allowable Exposure Level	Allowable* Duration of Exposures	Potential Toxicity at Guideline Level/Intended Purpose of Guideline
IDLH[2]	NIOSH	Workplace standard used to identify appropriate respiratory protection.	300 ppm	30 min.	Exposure above this level requires the use of "highly reliable" respiratory protection and poses the risk of death, serious irreversible injury or impairment of the ability to escape.
IDLH/10[1]	EPA, NIOSH	Work place standard adjusted for general population factor of 10 for variation in sensitivity	30 ppm	30 min.	Protects nearly all segments of general population from irreversible effects
STEL[2]	NIOSH	Adult healthy male workers	35 ppm	15 min. 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.

References for Hazardous Materials Appendix A, Table 1

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

EPA. 1987. U.S. Environmental Protection Agency, Technical Guidance for Hazards Analysis, EPA, Washington, D.C.

NRC. 1985. National Research Council, Criteria and Methods for Preparing Emergency Exposure Guidance Levels (EEGL), short-term Public Emergency Guidance Level (SPEGL), and Continuous Exposure Guidance Level (CEGL) Documents, NRC, Washington, D.C.

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

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

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

Abbreviations for Hazardous Materials Appendix A, Table 1

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

Hazardous Materials
Appendix B

Summary of Adverse Health Effects of Ammonia

September 2004

SUMMARY OF ADVERSE HEALTH EFFECTS OF AMMONIA[1]

638 PPM

WITHIN SECONDS:

- Significant adverse health effects;
- Might interfere with capability to self rescue;
- Reversible effects such as severe eye, nose and throat irritation.

AFTER 30 MINUTES:

- Persistent nose and throat irritation even after exposure stopped;
- irreversible or long-lasting effects possible: lung injury;
- Sensitive people such as the elderly, infants, and those with breathing problems (asthma) experience difficulty in breathing;
- Asthmatics will experience a worsening of their condition and a decrease in breathing ability, which might impair their ability to move out of area.

266 PPM

WITHIN SECONDS:

- Adverse health effects;
- Very strong odor of ammonia;
- Reversible moderate eye, nose and throat irritation.

AFTER 30 MINUTES:

- Some decrease in breathing ability but doubtful that any effect would persist after exposure stopped;
- Sensitive persons: experience difficulty in breathing;
- Asthmatics: may have a worsening condition and decreased breathing ability, which might impair their ability to move out of the area.

64 PPM

WITHIN SECONDS:

- Most people would notice a strong odor;
- Tearing of the eyes would occur;
- Odor would be very noticeable and uncomfortable.

[1] Source: Alvin Greenberg, Ph.D., QEP

- Sensitive people could experience more irritation but it would be unlikely that breathing would be impaired to the point of interfering with capability of self rescue
- Mild eye, nose, or throat irritation
- Eye, ear, & throat irritation in sensitive people
- Asthmatics might have breathing difficulties but would not impair capability of self rescue

22 or 27 PPM

WITHIN SECONDS:

- Most people would notice an odor;
- No tearing of the eyes would occur;
- Odor might be uncomfortable for some;
- Sensitive people may experience some irritation but ability to leave area would not be impaired;
- Slight irritation after 10 minutes in some people.

4.0, 2.2, or 1.6 PPM

- No adverse effects would be expected to occur;
- Doubtful that anyone would notice any ammonia (odor threshold 5 - 20 PPM);
- Some people might experience irritation after 1 hr.

Hazardous Materials
Appendix C

Hazardous Materials Proposed for Use at the SFERP

June 2005

(revised February 1, 2006)

Hazardous Materials Appendix C Table 1: Hazardous Materials Proposed for Use at the SFERP[a]

Material	CAS No.	Application	Location	Hazardous Characteristics	Maximum Quantity On Site	CERCLA SARA RQ[b]
Aluminum Sulfate	10043-01-3	Coagulant for plant makeup water	Water treatment building	Health: moderately toxic by ingestion Physical: none	800 gallons	5,000 lb
Antiscalant		Prevent scale in reverse osmosis membranes	Water treatment building	Health: low toxicity, mainly irritation	200 gallons	n/a
Aqueous Ammonia 29 % solution	1336-21-6	NO_X Emissions Control	East and adjacent to treated water storage tank	Health: irritation to permanent damage from inhalation, ingestion, and skin contact Physical: reactive, vapor is combustible	10,000 gallons	100 lb
Citric Acid 50 %	77-92-9	pH control of upstream of reverse osmosis equipment	Wastewater treatment building	Health: skin and mucous membrane irritant and seer eye irritant Physical: reactive with strong bases and oxidizers	100 gallons	-
Cleaning chemicals/ Detergents	None	Periodic cleaning	Shop or warehouse area	Health: various Physical: various	20 gallons	100 gallons
Hypersperse MS 1310	7705-08-0	Prevent scale in reverse osmosis membranes	Water treatment building	Health: may cause irritation to skin and eyes Physical: None	200 gallons	-
Ferric Chloride	77-92-9	Coagulant for plant makeup water	Water treatment building	Health: burns eyes and skin, ingestion may cause stomach pain, nausea, vomiting, shock, and diarrhea Physical: heat sensitive	400 gallons	1,000 lb
Ferric Sulfate	10028-22-5	Coagulant for plant makeup water	Water treatment building	Health: irritates mucous membranes, respiratory tract, and lung tissue if inhaled; burns skin and eyes;	400 gallons	1,000 lb

				ingestion can cause stomach irritation, burns, liver cirrhosis and fibrosis of pancreas Physical: reactive		
Laboratory Reagents (liquid)	None	Water/wastewater laboratory analysis	Water treatment building	Health: various Physical: various	20 gallons	-
Laboratory Reagents (solid)	None	Water/wastewater laboratory analysis	Water treatment building	Health: various Physical: various	100 lb	-
Mineral Generator Lubrication Oil	None	Lubricate rotating equipment	Contained within storage tanks on equipment skids	Health: hazardous if ingested Physical: may be flammable/combustible	1,570 gallons	42 gallons
Mineral Transformer Insulating Oil	8012-95-1	Transformers/switchyard	Contained within transformers and electrical switches	Health: hazardous if ingested Physical: may be flammable/combustible	21,000 gallons	42 gallons
NALCOLYTE 8799 (Coagulant Aid Polymer)	7647-14-5 205077000 00-5062P	Coagulant for plant makeup water	Water treatment building	Health: prolonged contact may cause irritation to skin and eyes Physical: reactive with strong oxidizers	400 gallons	-
NALCO 8305 Plus (Corrosion Inhibitor)	None	Cooling tower cooling water corrosion inhibitor	Near chiller cooling tower	Health: irritant to eyes, skin, and respiratory tract Physical: reactive	200 gallons	-
NALCO TRASAR 23263 (Dispersant)	64665-57-2	Cooling tower cooling water dispersant	Near chiller cooling tower	Health: none Physical: none	200 gallons	-
Polyacrylate (Various Scale Inhibitors)	Various	Cooling tower scale inhibitor	Near chiller cooling towers	Health: sight to moderate toxicity; irritant to skin and eyes Physical: reactive with strong acids	400 gallons	-
Sodium Bisulfite (NALCO 7804)	7631-90-5	Remove free chlorine in reclaimed water upstream of reverse osmosis system and wastewater	Water treatment building and wastewater treatment building	Health: irritation to eyes, skin, and lungs; may be harmful if ingested Physical: reactive with strong acids and oxidizers	450 gallons	- 5,000 lb

		treatment				
Sodium Bromide (NALCO STABREX st40)	1310-73-2	Cooling tower biocide and process water pretreatment	Near chiller cooling towers and water treatment building	Health: irritation to skin, eyes, respiratory tract; can cause damage to central nervous system if ingested Physical: reactive	200 gallons	1,000 lb
Sodium Hydroxide (50 %)	1310-73-2	pH control upstream of reverse osmosis equipment and wastewater treatment	Water treatment building and wastewater treatment building	Health: irritant to tissue in presence of moisture; strong irritant if ingested Physical: reactive	425 gallons	1,000 lb
Sodium Hypochlorite (10.13-12 %)	7681-52-9	Biocide to treat inlet reclaimed water/cooling tower biocide and process water pretreatment/and wastewater treatment	Water treatment building/ near chiller cooling tower/ Wastewater treatment building	Health: toxic by ingestion; strong irritant to tissue Physical: reactive with ammonia and organic materials; flammable with organic materials	400 gallons	100 lb
Sulfuric Acid (93-98 %)	7664-93-0	Enhance back flush of ultra filter system/ cooling tower cooling water pH control	Water treatment building/ near chiller cooling tower	Health: strong irritant to all tissues, may cause minor burns to permanent damage Physical: reactive	400 gallons	1,000 lb
Synthetic Turbine Lubrication Oil	None	Lubricate rotating equipment	Contained within storage tanks on equipment skids	Health: hazardous if ingested Physical: may be flammable/combustible	560 gallons	42 gallons

a. Source: SFPUC 2005a Tables 8.12-3, 8.12-4, and 8.12-5.

b. Reportable quantities for a pure chemical, per the Comprehensive Environmental Response, Compensation, and Liability Act.

Hazardous Materials
Appendix D

Protocol for Aqueous Ammonia Spill Analysis

June 2005

AQUEOUS AMMONIA SPILL ANALYSES

1. AQUEOUS AMMONIA STORAGE TANK SPILL AT SFERP

The following assumptions were made in the HARP and SCREEN3 analyses of potential impacts due to an aqueous ammonia spill from the on-site aqueous ammonia storage tank at SFERP.

Dispersion Analysis Using Harp

Used screening meteorological data (provided in HARP)

Area source:	24 inch diameter drain to underground storage tank (1.8 ft x 1.8 ft)
Release height:	4 feet (assumed; this is min height allowed in HARP)
Emission rate:	2.7 g/m^2/sec (derived using QR algorithm), which is equivalent to 6.26 lb/hour ammonia
Urban	
Fine grid:	500 m with 10 m resolution
Receptors modeled:	Nearest residence Nearest sensitive receptor Fenceline receptor/nearest workplace
Distances determined to:	75 ppm 2 ppm (odor threshold)

Dispersion Analysis Using SCREEN3

Area source, Urban

Area source:	24 inch diameter drain to underground storage tank (0.54 m x 0.54 m)
Emission rate:	2.7 g/m^2/sec (derived using QR algorithm)
Stability class:	6
Wind speed:	1.5 m/sec
Receptors modeled:	Nearest residence Nearest sensitive receptor Fenceline receptor/nearest workplace
Distances determined to:	75 ppm 2 ppm (odor threshold)

2. AQUEOUS AMMONIA TRUCK UNLOADING SPILL AT SFERP

The following assumptions were made in the HARP analysis of potential impacts due to an aqueous ammonia spill during truck unloading at SFERP.

Dispersion Analysis Using Harp

Used screening meteorological data (provided in HARP)

Area source:	4 inch diameter drain to underground storage tank

	(0.3 ft x 0.3 ft)
Release height:	4 feet (assumed; this is min height allowed in HARP)
Emission rate:	2.7 $g/m^2/sec$ (derived using QR algorithm), which is equivalent to 0.17 lb/hour ammonia
Urban	
Fine grid:	500 m with 10 m resolution
Receptors modeled:	Nearest residence Nearest sensitive receptor Fenceline receptor/nearest workplace
Distances determined to:	75 ppm 2 ppm (odor threshold)

Dispersion Analysis Using SCREEN3

Could not use SCREEN3 for this small drain size.

Hazardous Materials Appendix D Table 1: Aqueous Ammonia Storage Tank Spill at SFERP

SFERP: AQUEOUS AMMONIA STORAGE TANK SPILL

ALGORITHM

$$QR = \frac{(0.0035)(u^{0.78})(MW^{(2/3)})(A)(VP)}{(T)}$$

INPUT

Wind speed (u)	1.5	m/sec
Stability class	F	
Terrain	Urban	
Molecular weight (MW)	17	g/g-mole
Vapor pressure (VP)	332	mm Hg
Temperature	112	°F
Temperature (T1)	44	°C

VARIABLES

Diameter of drain	24	in
Area of drain in feet	3.14	ft^2
Side length of drain	1.77	ft
Area of drain in meters	0.29	m^2
Side length of drain	0.54	m

EMISSIONS (used in SCREEN3)

QR	0.10	lb/min
QR	0.79	g/sec
QR	2.7	g/m2/sec

EMISSIONS (used in HARP)

QR	6.26	lb/hr
QR	5.48E+04	lb/yr

Concentrations at discrete distances using SCREEN3:

Distance (feet)	Distance (meters)	Airborne Concentration (µg/m3)	Airborne Concentration (ppm)	
30	9	8.81E+04	127	Maximum concentration
46	14	6.50E+04	94	Fenceline receptor/nearest workplace
56	17	5.04E+04	73	approx. 75 ppm
400	122	1.41E+03	2	2 ppm
958	292	2.81E+02	0.4	Warm Water Cove Public Access Area
1,759	536	9.76E+01	0.1	Nearest residence

Concentrations at discrete distances using HARP:

Distance (feet)	Distance (meters)	Airborne Conc. (µg/m3)	Airborne Conc. (ppm)	
20	6	1.88E+05	271	Maximum concentration
20	6	1.61E+05	232	2nd max concentratin
46	14	6.56E+04	95	Fenceline receptor/nearest workplace
59	18	5.20E+04	75	75 ppm
479	146	1.40E+03	2.0	2 ppm
958	292	3.73E+02	0.5	Warm Water Cove Public Access Area
1,759	536	1.37E+02	0.2	Nearest residence

NOTE:
The receptor at maximum conc. is located on-site, about 20 feet from the ammonia storage tank.
The fenceline receptor/nearest workplace is located on the western property boundary, about 46 feet from the tank.
The receptor at 2 ppm is located approximately 479 feet west of the western property boundary.
The nearest sensitive receptor is located approximately 550 feet north of the northern property boundary at Warm Water Cove (approx. 958 feet from the ammonia storage tank).
The nearest residence is located approximately 1,659 feet west of the western property boundary (approx. 1,759 feet from the ammonia storage tank).

Aqueous ammonia vapor pressure obtained from EPA 1999; represents 30% aqueous ammonia, wind speed of 1.5 m/sec
EPA 1999. "Risk Management Program Guidance for Offsite Consequence Analysis." Office of Solid Waste and Emergency Response. April. www.epa.gov/ceppo/

Hazardous Materials Appendix D Table 2: Aqueous Ammonia Truck Unloading Spill at SFERP

SFERP: AQUEOUS AMMONIA TRUCK UNLOADING SPILL

ALGORITHM

$$QR = \frac{(0.0035)(u^{0.78})(MW^{(2/3)})(A)(VP)}{(T)}$$

INPUT

Wind speed (u)	1.5	m/sec
Stability class	F	
Terrain	Urban	
Molecular weight (MW)	17	g/g-mole
Vapor pressure (VP)	332	mm Hg
Temperature	112	°F
Temperature (T1)	44	°C

VARIABLES

Diameter of drain	4	in
Area of drain in feet	0.087	ft^2
Side length of drain	0.30	
Area of drain in meters	0.0081	m^2
Side length of drain	0.090	m

EMISSIONS (used in SCREEN3)

QR	0.0029	lb/min
QR	0.022	g/sec
QR	2.7	g/m2/sec

EMISSIONS (used in HARP)

QR	0.17	lb/hr
QR	1.52E+03	lb/yr

Could not use SCREEN3 for this small drain size.

Concentrations at discrete distances using HARP:

Distance (feet)	Distance (meters)	Airborne Conc. (µg/m3)	Airborne Conc. (ppm)	
30	9	2.63E-02	3.79E-05	Maximum concentration
46	14	9.60E-03	1.38E-05	Fenceline receptor/nearest workplace
958	292	1.65E-03	2.38E-06	Nearest sensitive receptor
1,759	536	1.59E-04	2.29E-07	Nearest residence

NOTE:

The receptor at maximum conc. is located on-site, about 28 feet from the ammonia storage tank.

The fenceline receptor/nearest workplace is located on the western property boundary, about 46 feet from the tank.

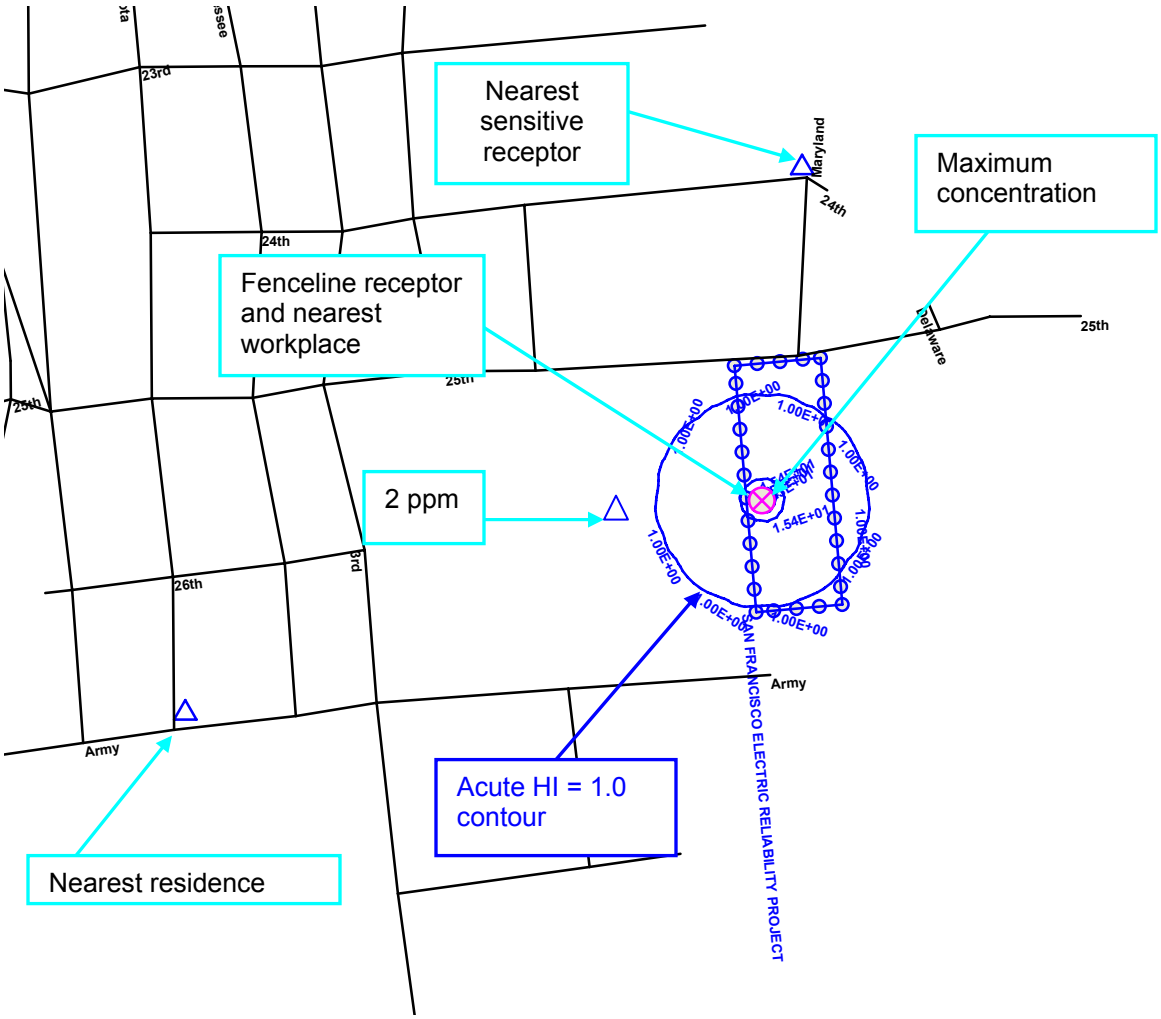
The nearest sensitive receptor is located approximately 550 feet north of the northern property boundary at Warm Water Cove.

The nearest residence is located approximately 1,659 feet west of the western property boundary.

Aqueous ammonia vapor pressure obtained from EPA 1999; represents 30% aqueous ammonia, wind speed of 1.5 m/sec

EPA 1999. "Risk Management Program Guidance for Offsite Consequence Analysis." Office of Solid Waste and Emergency Response. April. www.epa.gov/ceppo/

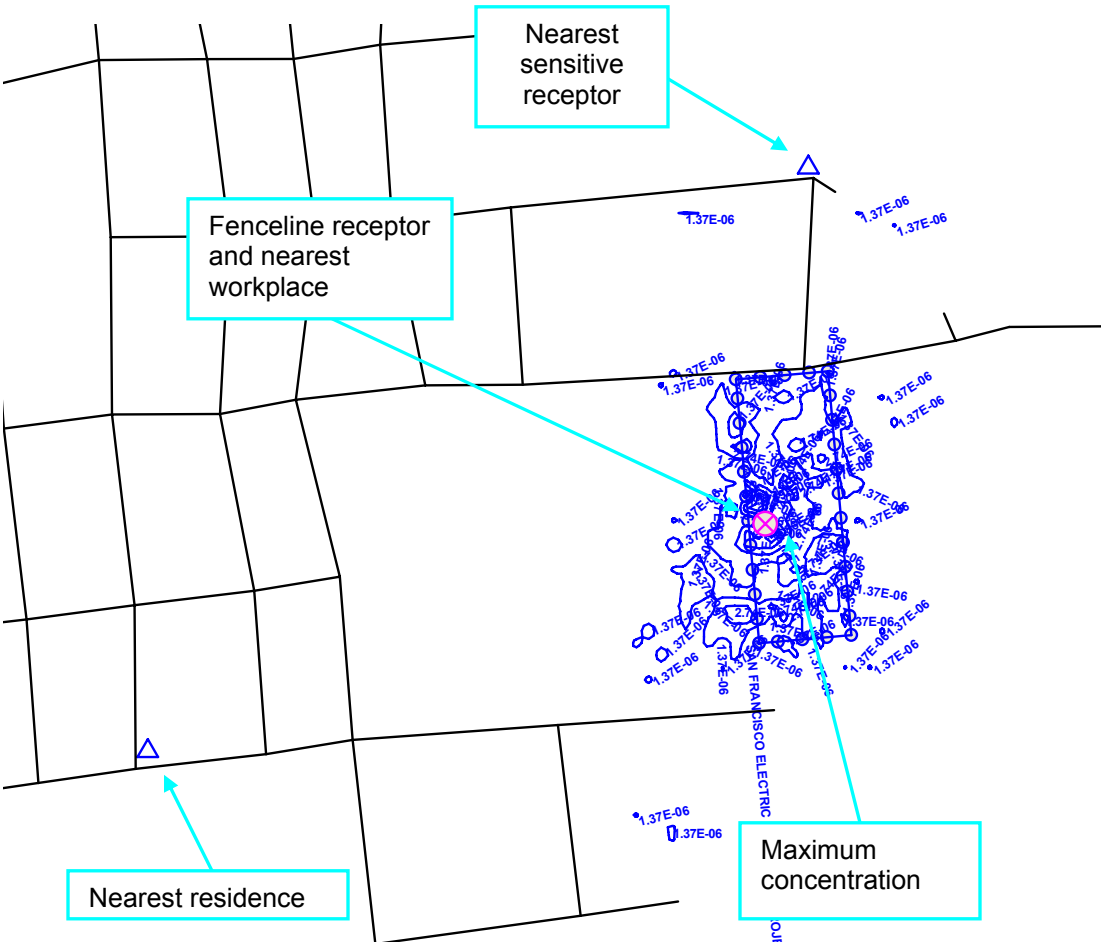
Hazardous Materials Appendix D Figure 1: SFERP Aqueous Ammonia Storage Tank Spill, Fine Grid (spill at SFERP only)



Receptor	UTM Coordinates (m)	Distance	Concentration ug/m3	ppm
Maximum conc.	554380, 4178273	20 ft from Aq. Ammonia tank	1.9E+05	271
2nd max conc.	554370, 4178273	20 ft from Aq. Ammonia tank	1.6E+05	232
Fenceline	554361, 4178272	46 ft west of Aq. Ammonia tank	6.6E+04	95
75 ppm	554380, 4178253	59 ft from Aq. Ammonia tank	5.2E+04	75
2 ppm	554230, 4178283	479 ft from Aq. Ammonia tank	1.4E+03	2.0
Nearest sensitive receptor (Warm Water Cove)	554410, 4178560	550 ft north of property	3.7E+02	0.5
Nearest residence	553872, 4178085	1,859 ft west of property	1.4E+02	0.2

Note: Blue circles are boundary receptors of SFERP
Pink circle containing an X is the location of the ammonia storage tank
Contours represent acute hazard index values

Aqueous Ammonia Truck Unloading Spill, Fine Grid (spill at SFERP only)



Receptor	UTM Coordinates (m)	Distance	Concentration ug/m3	ppm
Maximum conc.	554380, 4178263	28 ft from aq. ammonia tank	2.6E-02	3.8E-05
Fenceline	554361, 4178272	46 ft west of aq. ammonia tank	9.6E-03	1.4E-05
Nearest sensitive receptor (Warm Water Cove)	554410, 4178560	550 ft north of property	1.7E-03	2.4E-06
Nearest residence	553872, 4178085	1,659 ft west of property	1.6E-04	2.3E-07

Note: Blue circles are boundary receptors of SFERP
Pink circle containing an X is the location of the ammonia storage tank
Contours represent acute hazard index values

Hazardous Materials
Appendix E

Facilities That May Contribute to a Hazardous Materials Cumulative Impact

June 2005

Hazardous Materials Appendix E Table 1: Facilities in the Project Vicinity That May Contribute to a Hazardous Materials Cumulative Impact

Facility	ID # (& Index for Figure 1)	Address	Materials Of Interest*	Total Amount Stored On Site**	Distance From SFERP (in miles)
ALHAMBRA WATER	12	2217 Revere AV	Propane	34000 ft^3	1.5
American Linen Alsco	12131	1575 Indiana St	Laundry Detergent, Bleach, Liquid Antichlor, Sulfuric Acid, Kerosene, Lubricants, Acetylene, Oxygen, Aragon, Carbon Dioxide	601 ft^3 11605 gal	0.4
ANCHOR BREWING CO.	1835	1705 MARIPOSA ST	**Anhydrous ammonia** Polyciar 10	347932 ft^3 1522 gal	1.3
AUTO CHLOR SYSTEM OF NO CA	9848	97125TH ST	Potassium Hydroxide, Alcohols, Phosphoric Acid, Ammonium Hydroxide, Autochlor Concentrate No. 17	17074 gal	0.4
Baker Distributing Co	4867	1501 MINNESOTA ST	Refrigerant gasses Nitrogen, Carbon Dioxide, Acetylene, Oxygen (liquid)	250500 ft^3 200 gal	0.3
C.J. FIGONE COLD STORAGE	3829	42017TH ST	**Anhydrous ammonia** Bleach Lubricants	83520 ft^3 148 gal	1.1
CCSF/CENTRAL SHOPS/ADMIN SVCS	2283	2323 Cesar Chavez ST	Fuels Break Fluid Antifreeze Sulfuric Acid	116246 ft^3 986 gal	0.95
CCSF/DPW/BSR/ Asphalt Plant	9386	1801 Jerrold Av	Propane, Anhydrous Aluminum Sulfate, Oxygen, Acetylene, Asphalt Materials, Paint	13806 ft^3 28910 gal	1.0
CCSF/DPW/ Buildings & Ground	9428	2323 Cesar Chavez St	Paint, Solvent, Cleaner, Dynamite, TNT	12797 ft^3 5161 gal	1.1
CCSF/PTD/MUNI /Maintenance	22948	1399 Marin St	Fuels, Diesel fuel, Waste oil, lubricants	19430 gal	0.4
CCSF/PTD/MUNI /WAYS & STRUCTURES MAINTENANCE	26108	700 Pennsylvania Av	Oils, Diesel Fuel, Solvent, Thinner, Petroleum, Cleaners, Adhesives, Acetylene, Propane, Oxygen, Aragon, Carbon Dioxide	26133 ft^3 1000 gal	0.7
CCSF/PTD/MUNI /Woods	7601	1095 Indiana St	Solvents, Motor Oil, Adhesive, Paint, Acetylene	5892 ft^3 5942 gal	0.53
CCSF/PUC/WPC/ SEP/ NORTH SIDE And SOUTH SIDE	2011 9550	750 PHELPS ST 1701 JERROLD AV	Sodium Hypochlorite, Sodium Bisulfite, Phosphoric Acid, Propane, Gasoline, Oxygen, Argon,	9840 ft^3 176825 gal 105374 ft^3 40183 gal	0.86

			Acetylene, Hydrogen, Paints, Thinners, Oils, Disinfectant Cleaners, Lab Chemicals.		
CIRCOSTA IRON & METAL CO INC	10089	1801 EVANS AV	Solvent, Oils, Acetylene, Oxygen, Diesel Oil, Propane, Antifreeze, Gasoline	3954 ft^3 16704 gal	0.75
DARLING INTERNATIONAL Inc	2724	429 Amador ST, Pier 92	Sodium Hydroxide Sulfuric Acid Acetylene Sodium Hypochloride	3650 ft^3 9760 gal	0.45
DORSETT & JACKSON CO	9363	100117TH ST	Butanol Ethylene Glycol	817 ft^3 10821 gal	1.1
GROWERS REFRIGERATION INC	3446 (not on map)	2050 GALVEZ AV	**Anhydrous ammonia**	591 ft^3 1136 gal	0.87
Lawson Roofing Co., Inc.	10015	1495 Tennessee St	Propane, Petroleum, Asphalt Materials	53134 ft^3 475 gal	0.39
LIGHT SODA ON TAP	4377	2291 PALOU AV	Carbon Dioxide, Nitrogen, Helium, Various small amounts of compressed gasses, R12 (Liquefied gas)	155506 ft^3 54 gal	1.4
MacKenzie Warehouse	21691	1601 Mariposa St	Solvents, Petroleum, Paint, R 134 Freezer	278 ft^3 13621 gal	1.3
PAN GLO SERVICES	4656	1550 CUSTER AV	Solvents, Alkali, Glycol, Oxygen, Acetylene Phosphoric Acid Propane	1068 ft^3 18062 gal	0.6
PG&E/Potrero G.C. Yard	23400	1201 Illinois ST	Solvents, Fuels, Nitrogen, Paints, Propane, Butane, Xylene, Acetone, Methyl-propyl-ketone	12496 ft^3 892.53 gal	0.3
PG&E/Potrero Switchyard	25464	1201 Illinois St	Batteries (Sulfuric Acid), Sulfur Hexafluoride, Nitrogen, Diesel fuel, Oils, Gasoline, Paints	423 ft^3 42580 gal	0.3
Potrero, LLC (Mirant)	23264	1201 Illinois ST	Aqueous ammonia, Sodium Hypochlorite, Sodium Hydroxide, Hydrogen.	20,000 gal 2,000 gal 600 gal 5,850 ft^3	0.35
SAN FRANCISCO PETROLEUM COMPANY	667	2121 3RD ST	Gasoline Diesel Fuel Solvent Kerosene Motor Oil Grease	101,000 gal	0.9
SF Dry Dock Inc	26128	Pier 70	Welding Gasses, Fuels (Gasoline, Diesel, Kerosene), Cilicon Base, Oils, Corrosion Inhibitors, Adhesives, Paint, Paint Products,	17000 ft^3 17438 gal	0.83

			Xylene.		
TRAYER ENGINEERING CORP.	2824	898 PENNSYLVANIA AV	Aragon Carbon Dioxide Oxygen Helium Sulfur Hexafluoride Acetylene Nitrogen Hydrogen	51233 ft^3 13752 gal	0.58
WESTERN PRINTING INK CORP	62	777 TENNESSEE ST	Ink Flush Varnish	6046 gal	0.6
White Cap Construction Supply Inc	22363	122506th St	Waste Oil	51009 ft^3 1187 gal	1.56
Airgas NCN	26828	52523rd ST	Argon, Nitrogen Helium, Neon, Carbon Dioxide, Oxygen, Nitrous Oxide, Propane, Methatne, Acetylene, Hydrogen.	213000 ft^3	0.28
MV Transportation	26872	355003rd St	Glass Cleaner, Freon, Antifreeze, Waste Oil, Hydraulic Oil, Diesel Fuel	400 ft^3 11350 gal	0.65
Nella Oil/#437	27428	269003rd St	Natural Gas, Gasoline, Diesel Fuel, Bio Diesel.	30000 ft^3	0.45

* Staff only included in this table liquid and gas materials that may contribute to a hazardous materials cumulative impact.
**Source: inventory data received on CDs from the SFDPH (SFDPH 2004b; SFDPH 2004c). Amounts stated in ft^3 are gas, and amounts stated in gallons are liquids.

Hazardous Materials
Appendix F

Protocol for Simultaneous Aqueous Ammonia Storage Tank Spills at SFERP and Mirant Potrero

June 2005

PROTOCOL FOR SIMULTANEOUS AQUEOUS AMMONIA STORAGE TANK SPILLS AT SFERP AND MIRANT POTRERO

The following assumptions were made in the HARP and SCREEN3 analyses of potential impacts due to a simultaneous aqueous ammonia spill from the on-site aqueous ammonia storage tanks at SFERP and Mirant (approximately 1875 feet apart).

Dispersion Analysis Using Harp

Used screening meteorological data (provided in HARP)	
Area source - SFERP:	24 inch diameter drain to underground storage tank (1.8 ft x 1.8 ft)
Area source - Mirant:	42 inch diameter drain to underground storage tank (3.1 ft x 3.1 ft)
Release height:	4 feet (assumed; this is min height allowed in HARP)
Emission rate:	2.7 $g/m^2/sec$ (derived using QR algorithm), which is equivalent to 6.26 lb/hour ammonia for SFERP and 19.2 lb/hour ammonia for Mirant
Urban	
Fine grid:	500 m with 10 m resolution
Receptors modeled:	Nearest residence Nearest sensitive receptor SFERP fenceline receptor/nearest workplace
Distances determined to:	75 ppm 2 ppm (odor threshold)

Hazardous Materials Appendix F Table 1: Simultaneous Aqueous Ammonia Storage Tank Spills at SFERP and Mirant Potrero

SFERP & MIRANT: SIMULTANEOUS AQUEOUS AMMONIA STORAGE TANK SPILL

ALGORITHM

$$QR = \frac{(0.0035)(u^{0.78})(MW^{(2/3)})(A)(VP)}{(T)}$$

INPUT

Wind speed (u)	1.5	m/sec
Stability class	F	
Terrain	Urban	
Molecular weight (MW)	17	g/g-mole
Vapor pressure (VP)	332	mm Hg
Temperature	112	°F
Temperature (T1)	44	°C

VARIABLES	**SFERP**	**MIRANT**	
Diameter of drain	24	42	in
Area of drain in feet	3.14	9.62	ft^2
Side length of drain	1.77	3.10	ft
Area of drain in meters	0.29	0.89	m^2
Side length of drain	0.54	0.95	m

EMISSIONS (used in HARP)

	SFERP	**MIRANT**	
QR	0.10	0.32	lb/min
QR	6.26	19.17	lb/hr
QR	5.48E+04	1.68E+05	lb/yr
QR	0.79	2.42	g/sec
QR	2.7	2.7	g/m2/sec

Concentrations at discrete distances using HARP:

Distance (feet)	Distance (meters)	Airborne Conc. (µg/m3)	Airborne Conc. (ppm)	
7	2	9.37E+05	1,350	Maximum concentration (2 m from Mirant tank)
26	8	4.44E+05	640	2nd highest concentration (8 m from Mirant tank)
128	39	5.23E+04	75	Distance from Mirant ammonia tank
1,345	410	2.25E+03	3	SFERP fenceline receptor/nearest workplace (410 m from Mirant tank)
873	266	1.89E+03	2.7	Warm Water Cove Public Access Area (266 m from Mirant tank)
1,063	324	1.40E+03	2.0	Distance from Mirant ammonia tank (324 m or 1110 feet from SFERP property)
1,759	536	3.13E+02	0.5	Nearest residence to SFERP

NOTE:

The receptor at maximum conc. is located on the Mirant site, about 7 feet from the ammonia storage tank.

75 ppm occurs on Mirant site, approximately 39 meters (128 feet) from the Mirant ammonia tank.

The SFERP fenceline receptor/nearest workplace is located at the northeastern corner of SFERP, approximately 441 feet from SFERP ammonia tank and 1,346 feet from Mirant ammonia tank.

The nearest sensitive receptor is located approximately 550 feet north of the northern SFERP property boundary at Warm Water Cove, 873 feet from the Mirant ammonia tank.

The receptor at 2 ppm is located 324 m (1,063 feet) from the Mirant tank, approximately 700 feet from SFERP northern property boundary.

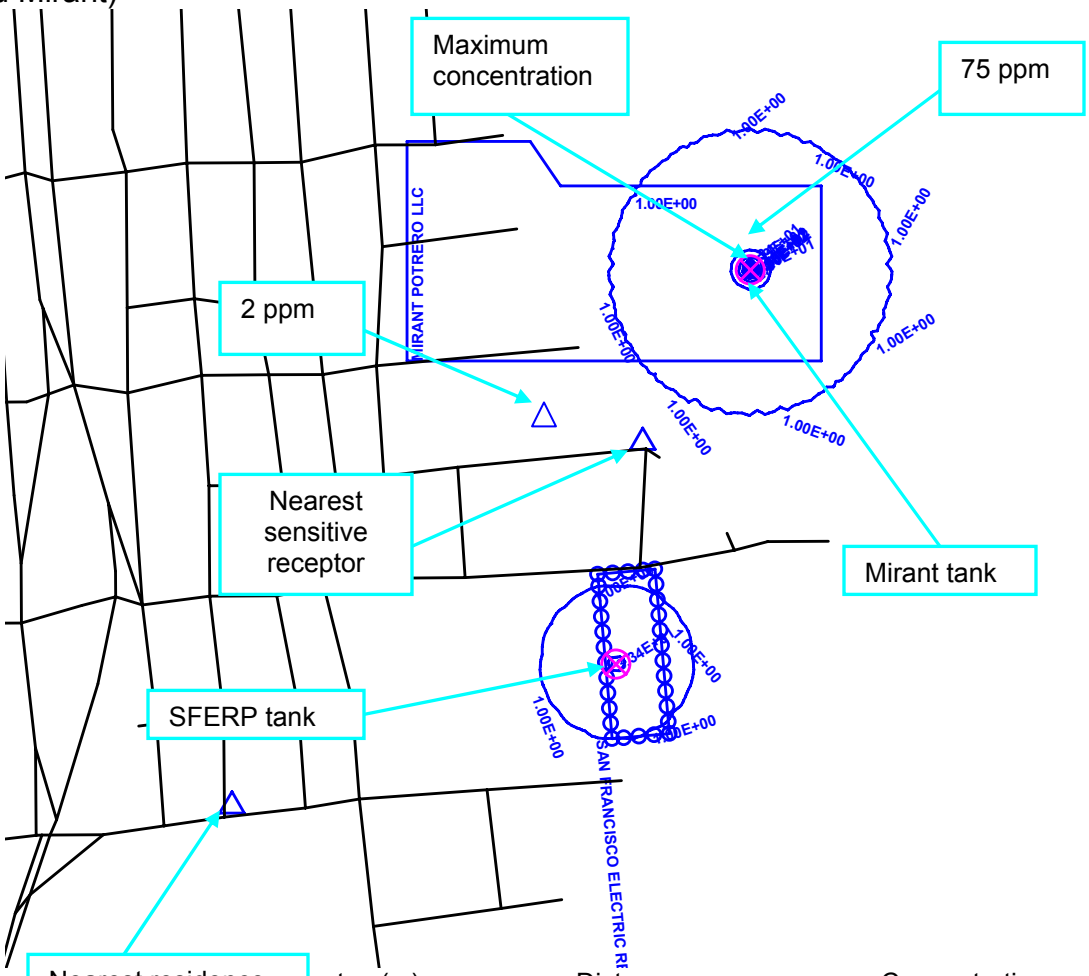
The nearest residence to SFERP is located approximately 1,659 feet west of the western property boundary, which is 3,200 feet from Mirant ammonia tank.

Aqueous ammonia vapor pressure obtained from EPA 1999; represents 30% aqueous ammonia, wind speed of 1.5 m/sec

EPA 1999. "Risk Management Program Guidance for Offsite Consequence Analysis." Office of Solid Waste and Emergency Response. April. www.epa.gov/ceppo/

Hazardous Materials Appendix F Figure 1: Simultaneous Aqueous Ammonia Tank Spills at SFERP and Mirant Potrero, Fine Grid

Simultaneous Aqueous Ammonia Tank Spill, Fine Grid (simultaneous spills at SFERP and Mirant)



Recep	nates (m)	Distance	Concentration ug/m3	ppm
Maximum conc.	554550, 4178783	7 ft from Mirant tank	9.37E+05	1,350
2nd highest conc.	554550, 4178793	26 ft from Mirant tank	4.44E+05	640
75 ppm	554560, 4178823	128 ft from Mirant tank	5.23E+04	75
SFERP Fenceline	554426, 4178394	1,345 ft from Mirant tank	2.25E+03	3
Nearest sensitive receptor (Warm Water Cove)	554410, 4178560	550 ft north of SFERP property	1.89E+03	2.7
2 ppm	554290, 4178593	1,063 ft from Mirant tank (700 feet from SFERP property)	1.40E+03	2.0
Nearest residence to SFERP	553872, 4178085	1,659 ft west of SFERP property	3.13E+02	0.5

Note: Blue circles are boundary receptors of SFERP
Pink circle containing an X is the location of the ammonia storage tank
Contours represent acute hazard index values

LAND USE

Testimony of David Flores

SUMMARY OF CONCLUSIONS

The project would comply with all applicable land use laws, ordinances, regulations and standards. The proposed power plant would be compatible with existing and planned land uses because: 1) it is consistent with the current general plan and zoning designations for the property; 2) it is compatible with the heavy industry and port character of the immediately adjacent land uses north and south of the site, and with the commercial character of the land use on 25th Street; and 3) the project does not abut any zoned residential areas.

INTRODUCTION

The land use analysis of the San Francisco Electric Reliability Project (SFERP) focuses on two main issues: the project's consistency with local land use plans, ordinances, and policies; and the project's compatibility with existing and planned land uses. In general, a power plant and its related facilities have the potential to create impacts in the areas of noise, dust, air emissions, public health, traffic, and visual resources, as well as other environmental areas. These individual resource topics are discussed in separate sections of this document.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

LAND USE Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Responsible Agencies	Description
Federal	The proposed project is not located on federally administered public lands; therefore, it is not subject to federal regulations pertaining to land use.
State	The authority to regulate land use and development on private property is delegated to local jurisdictions by the state. As a result, there are no specific state-level land use LORS applicable to the project or the site.
Local	
Port of San Francisco	The Port of San Francisco has jurisdictional authority as to what is built within their boundary areas, but to minimize confusion between agency entitlement processes, they adopted the City of San Francisco's Central Waterfront Area Plan in 1997. This Plan defines acceptable uses, policies and land use information applicable to all properties under the Port's jurisdiction.

City/County of San Francisco General Plan Objectives and Policies-Part 1	Land Use, Industry, and Urban Design elements of the City/County of San Francisco General Plan/Central Waterfront Area Plan The overall goal of this plan is to create a physical and economic environment conducive to the retention and expansion of San Francisco's industrial and maritime activities. This goal is set forth in order to reverse the pattern of economic decline in the area and establish a land base for the industrial and maritime components of the San Francisco economy.
City/County of San Francisco Zoning Code	Zoning is the specific administrative tool used by a jurisdiction to implement its General Plan land use policies, and is often more specifically defined than General Plan designations. The CCSF has zoned the SFERP property as M-2 Heavy Industry. This zoning designation applies to all lands bay-ward of Third Street in the vicinity of the power plant.

SETTING

The SFERP site consists of approximately four acres and is situated within Potrero Point along the eastern shoreline of the San Francisco Bay between Central Basin in the north and Islais Creek Channel in the south. This area of San Francisco is referred to as the Central Waterfront and is dominated by industrial uses. The site is bounded by Illinois Street and San Francisco Bay, between 25th and 26th Streets. Site access is by way of 25th Street, approximately 900 feet east of Illinois Street.

PROJECT SITE AND VICINITY DESCRIPTION

LAND USE Figure 1 shows the existing land uses in the project vicinity. Potentially sensitive land uses within the affected area are shown in **LAND USE Table 1**. This table does not list residential properties or live/work units, which are discussed below.

Industrial and commercial uses predominate in the immediate site vicinity. Pier 70 (i.e., a Port of San Francisco property) is approximately one mile north of the SFERP site. Current uses at Pier 70 include general industry within an M-2 Heavy Industry zone. The existing Potrero Power Plant is located at Illinois Street between 22nd and 23rd Streets.

The generation unit would be erected on a site owned by the City/County of San Francisco (CCSF). There are no permanent structures on the site, although a temporary concrete batch plant occupies the northern portion of the project site. The area immediately east of the project site, within the proposed staging area, is currently used as a trailer storage facility for a trucking operation.

The closest residentially zoned areas occur south and west of the SFERP. The Bayview-Hunters Point neighborhood is less than one mile south of the site at its nearest point. To the west, closer residential areas occur on Potrero Hill, along Third Street, and in the small community known as Dogpatch on Third Street near 22nd

Street. Dogpatch is the nearest residentially zoned area to the project (approximately 0.75 miles to the northwest).

LAND USE – Table 1
Potentially Sensitive Land Uses within the Affected Area

Land Use[1]	Approximate Distance from the Proposed Project Site[2]
Supreme Master Ching Hai International (Lecture and Publishing Center)	474 feet
Warm Water Cove Park	705 feet
Islais Creek Channel (Park)	1,721 feet
St. Stephen Baptist Church	2,364 feet
Starr King Elementary School	2,844 feet
Daniel Webster Elementary School	4,630 feet
Youngblood Coleman Playground	4,596 feet
Potrero Hill Playground	4,228 feet
St. Teresa's Church	4,720 feet
Potrero Library	4,624 feet
First Russian Christian Church	4,911 feet
Esprit Park	3,620 feet
Rise Institute (Teacher Support Center)	3,023 feet
Pathfinders Mission Baptist Church	4,288 feet
New Beginning Church of God	5,080 feet

[1] Does not include residential land uses

[2] The affected environment consists of the area within one mile (5,280 feet) of the generating plant site.

The relative scarcity of housing throughout San Francisco has led the CCSF to allow live/work lofts in areas not zoned for residential use. From 1997 through 2000, the San Francisco Planning Commission approved approximately 3,000 live/work units in the city. In the year 2000, 1,626 new housing units were constructed in the city, of which 464 were live/work units. Reflecting the trend of building residential loft units in non-residential areas, San Francisco's 2000 Housing Inventory (a statistical report of San Francisco's housing production trends and projections) indicates that 38 percent of new housing construction occurred in industrial and heavy commercial zoning districts, 19 percent occurred in the south of Market area within commercial zoning districts, and 11 percent occurred in neighborhood commercial zoning districts.

The Central Waterfront area has also experienced an increase in residential units in previously non-residential areas through the development of live/work units. As a result, the residential population in the vicinity of the SFERP has increased through infiltration of live/work units. As discussed in the AFC (pg. 8.4-12), applications for 398 housing units have recently been approved or are pending approval in the Central Waterfront area which contain neighborhood commercial, mixed industrial/Commercial, and Light Industrial zoned areas.

Planned Local Land Use Changes

The CCSF and the Port of San Francisco are engaged in extensive planning and development activities in the vicinity of the SFERP site.

Approximately one mile north of the SFERP site, at the Port of San Francisco's Pier 70, plans call for mixed uses in the future, including approximately 610,000 square feet of commercial office and/or research and development space; 100,000 feet of retail/commercial space; and 240,000 square feet of public access and recreational uses. There is no set schedule for this development; however, it is anticipated that about 150,000 square feet of arts and non-profits space is expected to be developed within the next two years, and 500,000 square feet of commercial space would be developed in the next 3-5 years.

To the west, the San Francisco Municipal Railway (MUNI) construction is underway at the Third Street Light Rail Extension. Station stops along the route in the vicinity of Third Street are expected to encourage commercial and, perhaps, residential development. In support of the new transit line, MUNI is constructing a new Metro East Operating and Maintenance Facility which would be built on approximately 13-17 acres at 25th and Illinois Streets for storing, maintaining and dispatching light rail vehicles. Construction work has not begun on this site.

On January 22, 2003, CCSF released the public review draft of the Central Waterfront Neighborhood Plan. The plan does not propose any housing projects east of Illinois Street, due to the existence and nature of viable industrial uses in the area. The plan does call for mixed use residential between Tennessee Street and Illinois Street from 23rd Street to 25th Street.

There has been community opposition to earlier drafts of the Central Waterfront Neighborhood Plan that proposed housing along 24th Street. Concerns seemed to be based primarily on the perceived environmental hazards stemming from the existing Potrero power plant. To date, this neighborhood plan is still under review and receiving public comments. An initial study for the San Francisco eastern neighborhoods rezoning and community plans was made available to the public on December 17, 2005 for a 30-day review and comment period. Further hearings will be scheduled in the future.

The CCSF planning staff has formulated a Preferred Concept Plan for the Central Waterfront that proposes to increase the supply of housing in the planning area, but continues to designate the area east of Third Street for industrial uses.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The Guidelines to the California Environmental Quality Act (CEQA), Appendix G, note that a project may have a significant effect on land use if the project would, among other things:

- Physically divide an established community, or
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project.

A project may also have a significant impact on land use if it would create unmitigated noise, dust, public health hazard or nuisance, traffic or visual impacts, or when it precludes or unduly restricts existing or planned future uses.

When determining if a project is in conformance with ordinances or regulations, Energy Commission staff typically meets and consults with applicable agencies to determine conformity and, when necessary, "to attempt to correct or eliminate any noncompliance" [Pub. Resources Code, Sect. 25523(d)(1)]. The land use laws, ordinances, regulations, standards (LORS) and policies applicable to the project have been analyzed below to determine the extent to which the SFERP is consistent or at variance with each requirement or standard.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Power Plant Site

The site is within a Heavy Industry zone and is bounded by industrial and port activities to the north and south. To the west, an existing structure on Illinois Street has been converted for commercial (office) use. The proposed project represents further development of a site already committed to industrial use and, therefore, would not introduce a new industrial use into a non-industrial area. The site and neighboring waterfront properties are designated in the General Plan and the Planning Code for heavy industry use. Current CCSF land use policies, as expressed in the San Francisco General Plan and the subset Central Waterfront Area Plan, indicate that industrial and residential uses are planned to continue in this area in the future. Note that the CCSF is currently in the process of formulating a neighborhood plan for the Central Waterfront area, which may result in proposals to change current land use designations.

Mixed commercial uses are encroaching on the area and, to the extent that land is not valued for industrial or port activities, port officials are accommodating these changes within future plans being drafted or in the preliminary stages of development. Residential uses have also encroached on the area due to the fact that live/work units are allowed in most areas of the city regardless of zoning. Many live/work units have been approved in the vicinity of the SFERP site in recent years. These are being allowed in full knowledge of the industrial and port nature of the existing land uses. Due to concerns about encroachment of residential units on existing industrial areas, the CCSF has established a permanent Industrial Protection Zone that would exclude residential uses. The SFERP is not located within the boundaries of the Industrial Protection Zone.

As indicated earlier, the CCSF planning staff has formulated a Preferred Concept Plan for the Central Waterfront that proposes to increase the supply of housing in the planning area. We agree with the City that these uses of new housing can be compatible, particularly if the City's policy of continued industrial use is made extremely clear to housing developers and potential new residents. Prospective new residents

need to be aware of the potential discomforts of noise, occasional visible water vapor plumes, and delivery vehicles in the power plant site vicinity and surrounding industrial uses.

The construction laydown area for SFERP is immediately east of the project site and would not conflict with existing or planned land uses in this industrialized area. Temporary, construction-related impacts at the project site, such as increased noise and dust, may affect adjacent land uses. With applicant and staff proposed mitigation, these construction impacts are not expected to be significant. Please see the **AIR QUALITY** and **NOISE** sections of this Final Staff Assessment (FSA) for discussions of impacts and mitigation. Staff has found that operation of the SFERP would not cause significant, unmitigated adverse noise, dust, public health hazard or nuisance, or traffic impacts on nearby land uses.

Linear Facilities

The SFERP project would require construction of offsite linear facilities such as electric transmission lines, natural gas and domestic water lines. Recycled water is to be used by the SFERP for cooling purposes.

Construction of the project's linear facilities would require excavating portions of local roadways, and could temporarily restrict vehicle and pedestrian access to adjacent land uses. If necessary, detours and alternative routes would be provided to maintain access to study area land uses. See the **TRAFFIC AND TRANSPORTATION** section of this FSA for further discussions of impacts and mitigation. Any restriction of access to existing land uses would be temporary, and would not result in a significant impact to adjacent land uses.

CUMULATIVE IMPACTS AND MITIGATIONS

A cumulative impact consists of an impact that is created as a result of the combination of the proposed project together with other projects causing related impacts. When the proposed project is viewed together with the effects of other projects in the area, cumulative impacts may be significant. A number of projects are proposed for development in the SFERP vicinity that could contribute to cumulative effects. These include new residential and commercial projects in the vicinity of the SFERP site, as well as various public works projects and one major new mixed-use development project (Mission Bay). **LAND USE Figure 4** presents a list and map (aerial photo) of proposed or recently approved housing projects in the vicinity of the SFERP. Significant projects in the general vicinity of the SFERP site include the following:

- **Pier 70**. Immediately north of the SFERP site, extensive development of port, industrial, and commercial activities is proposed for Pier 70, an established industrial and port area. Portions of the Pier 70 site that front along Illinois Street are planned for mixed commercial opportunities. There is no specific schedule for the Pier 70 development, although about 650,000 square feet of floor area is anticipated to be built in the next five years.
- **MUNI Metro East Light Rail Maintenance and Operations Facility**. Immediately west of the SFERP site, MUNI is proposing a new facility for the storage, maintenance, and operation of MUNI's new light rail vehicles. The facility would

consist of a main shop and administration building, a paint and body shop building, a small reception structure, a vehicle storage yard, and parking lot. Construction is currently underway, and is anticipated to be completed in approximately 30 months.

- **Rebuilding of the San Francisco General Hospital Medical Center**. In accordance with California Senate Bill 1953, which requires all California acute care hospitals to perform seismic improvements to existing buildings, the San Francisco General Hospital's Main Building would be rebuilt so that a new conforming building would be in place by the year 2013. The San Francisco General Hospital is located approximately one mile west from the SFERP along Potrero Avenue west of Highway 101, between 22nd and 23rd Streets.
- **Mission Bay**. Mission Bay is a 303-acre redevelopment project located approximately 1.5 miles north of the SFERP site, generally north of Mariposa Street and east of Interstate 280. Mission Bay is planned for approximately 6,000 housing units and over 10,000 residents. The development would also include over 5 million square feet of office, research, and manufacturing uses; 750,000 square feet of retail; 45 acres of parks and recreation; and a 500-room hotel. A new 43-acre health sciences campus for the University of California at San Francisco is currently under development at Mission Bay and would eventually contain 2.65 million square feet of space for research, instruction, and supporting uses.
- **Hunters Point Naval Shipyard Superfund Site cleanup and redevelopment project**. The former Hunters Point Naval Shipyard is located approximately one mile southwest of the SFERP site. The existence of toxic contamination at the shipyard facilities was confirmed in 1987, and the shipyard has been on the Environmental Protection Agency's National Priorities List for toxic remediation since 1989. The Navy is currently in the process of remediating contamination at the shipyard. When the cleanup is complete, the property would be transferred to the CCSF for reuse. The CCSF designated a portion of the shipyard property as a redevelopment project area and adopted a Redevelopment Plan in 1997. The CCSF Redevelopment Agency selected a master developer for the project in 1999 and approved a Preliminary Development Concept Plan. No new development has yet been initiated at the shipyard, pending transfer of the property from the Navy.
- **Hunters Point Power Plant.** The Hunters Point Power Plant is an existing power plant owned by PG&E, which is located at 1000 Evans Avenue, about 0.5 miles southeast of the SFERP. The Hunters Point Power Plant consists of gas-fired steam boilers designed to run continuously for long periods and distillate-fired combustion turbines designed to meet emergency conditions and/or back up the steam units. CCSF, PG&E and community leaders are currently discussing decommissioning and possible demolition of this power plant if other energy sources become available to provide the electricity needs to the San Francisco peninsula.
- **The Port of San Francisco** prepared the Waterfront Land Use Plan to promote expansion of cargo and maritime uses on Port lands, and to enhance wetlands, public access, and open space. In 2000, the Port prepared a Supplemental EIR for the Waterfront Land Use Plan addressing specific proposals for interim uses, long-term uses, and capital improvements in the Southern Waterfront, which includes the waterfront area in the vicinity of the SFERP. Proposals in the general vicinity of the SFERP included:

1. A commercial building with 63 housing units at Cesar Chavez Street and Third Street.
2. A concrete ready-mix facility, including bulk cargo barge and rail transport, at Pier 80.
3. Pier 90-94 Backlands, a 44-acre site in the initial planning phase for a distribution and warehouse complex.
4. Pier 70 Opportunity Area (about sixty-five acres of mixed use commercial, public access, and recreational maritime uses, discussed above).

As discussed earlier in this analysis, a substantial amount of residential development has occurred in the Central Waterfront area in recent years, including numerous live/work projects in non-residential areas. The nearest (approximately 1,200 feet) residential project in the vicinity of the SFERP is a live/work project at 1300 Illinois Street (near 23rd and Illinois Street). The project consists of 175 new residential units. Other recently constructed or proposed residential projects in the Central Waterfront area are listed and identified in **LAND USE Figure 4**.

The SFERP is consistent with the City's long-range planning policies for industrial development in this area; therefore, cumulative land use impacts are not considered significant.

The proposed project is not expected to make a significant contribution to regional impacts related to new development and growth. The SFERP is planned to serve the CCSF's existing and anticipated electrical needs of its jurisdictional boundaries.

COMPLIANCE WITH LORS

SAN FRANCISCO GENERAL PLAN

The San Francisco General Plan contains ten elements, which set forth goals, objectives, and policies for the physical development of the city. The General Plan also includes Area Plans with objectives and policies for specific geographic areas of the city. The project site is in the Central Waterfront planning area that extends from Pier 48 in the north to Islais Creek in the south. **LAND USE Figure 2** shows the General Plan designations in this area, including the plant site.

1. Objective 1 of the Central Waterfront Plan is to "strengthen and expand land use essential to realizing the economic potential of the subareas" and Policy 1 encourages "the intensification and expansion of industrial and maritime uses." There are numerous other policies that call for the retention, expansion, and protection of industrial activity in this area. With this in mind, the development of new residential is not precluded.

2. Objective 6 of the Plan is to "retain and improve existing residential uses and develop a limited quantity of new housing. "Therefore, the CCSF's policies imply that industrial uses and residential uses can be compatible providing that the adverse environmental impacts of new development can be adequately mitigated (see Objective 1, Policy 3).

San Francisco Planning Code (Zoning Ordinance)

The SFERP site is within an M-2 Heavy Industry use zone. **LAND USE Figure 3** shows the zoning applicable to the area of the project. Permitted uses include steam power plants. Because the Planning Code specifically cites steam power plants as permitted uses but does not identify any other type of power plant as being permitted, staff requested a determination from the CCSF's Zoning Administrator during the processing of the Potrero Power Plant Unit 7 application as to whether a gas-fired power plant would be considered a permitted use in the M-2 zoning district. In a letter dated August 8, 2001, the Zoning Administrator determined that the type of power plant proposed by the Potrero applicant (Mirant) is permitted in the M-2 district. The Zoning Administrator further stated that other types of power plants would also be permitted in the M-2 district because the "steam " reference is outdated due to the fact that this Code section has not been updated in many years.

The site is within a 40-X Height and Bulk Zoning District, which imposes on development a height limit of 40 feet and a floor area ratio (FAR) of 5:1 (meaning a building may have a floor area equal to up to five times the site's square footage). The project's three exhaust stacks exceed the height criteria for the zoning district; but structures and equipment necessary for industrial operations are exempt as long as they do not contain separate floors [San Francisco Planning Code Section 260(b)(2)(M)].

The SFERP proposal meets the requirements of the industrial zoning district and is exempt from this particular standard.

To ensure that SFERP conforms to the CCSF's Zoning Code, staff recommends that the Commission require the following conditions of certification:

- **LAND-1** requiring compliance with the design and performance standards for the "M-2" Zoning District;
- **LAND-2** requiring compliance with the City's parking standards; and
- **LAND-3** requiring compliance with the City's outdoor advertising regulations applicable to any close up signs erected (either temporary or permanent).

San Francisco Design Review

Design review for industrial projects is conducted by the assigned city planner. It is informal and relies on guidance provided in the General Plan. There is no specific design review checklist applicable to industrial projects. The assigned planner can call on an internal design review committee if deemed appropriate, which has not occurred on this project.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

The San Francisco Bay Conservation and Development Commission staff (BCDC) responded that although a small portion of the drainage facilities are within their jurisdiction, they would not require public access to the shoreline.

However, to meet the McAteer-Petris Act, BCDC has requested that a future conveyance, such as a culvert or bridge be required to accommodate further expansion of the San Francisco Bay Trail in the location of the proposed drainage facilities. See the **Soils and Water Section** of this report for a further discussion of this requirement.

CONCLUSIONS

The proposed building and exhaust stacks would exceed the CCSF's height limitations on structures in the Central Waterfront; however, these are exempt "structures and equipment necessary for the operation of industrial plants."

The CCSF General Plan's Commerce and Industry Element and the Central Waterfront Area Plan clearly establish that the Central Waterfront east of Third Street is an area planned for industrial and maritime uses. The Central Waterfront Area Plan emphasizes the importance of industrial and maritime uses over other uses to improve the economic base of the city. The overall goal of the Plan is "to create a physical and economic environment conducive to the retention and expansion of San Francisco's industrial and maritime activities … to reverse the pattern of economic decline in the area and to establish a land base for the industrial and maritime components of the San Francisco economy."

The CCSF Planning Department has formulated a preliminary Preferred Concept Plan for the Central Waterfront that proposes to increase the supply of housing in the planning area, but continues to designate the area east of Third Street for industrial uses. This Plan is currently being reviewed for possible future adoption. It would be inappropriate and speculative to base any analysis of consistency with local land use policies on unadopted plans. Therefore, we must base our analysis on adopted plans, which constitute the CCSF's official policies, while acknowledging that the CCSF is in the process of updating and possibly revising these policies.

Staff is concerned that there may be some ambiguity about the City's goals of retaining and developing industrial uses, while also encouraging the development of new housing in the area. We agree with the City that these uses of new housing can be compatible, particularly if the City's policy of continued industrial use is made extremely clear to housing developers and potential new residents. New housing occupants need to be aware of the potential discomforts (possibly through a deed disclosure) such as noise, occasional visible water vapor plumes, and delivery vehicles in the power plant site vicinity and surrounding industrial uses.

Staff believes that the project is consistent with the City's land use designation and zoning for the site. Furthermore, the project would not disrupt or divide the physical arrangement of an established community. As indicated in this analysis, the project is surrounded by industrial uses, and the project would not preclude or restrict existing or planned land uses in the area.

From the land use perspective, staff recommends that the Commission certify the project and adopt the following conditions of certification if it approves the project.

CONDITIONS OF CERTIFICATION

LAND-1 The project owner shall comply with the minimum design and performance standards for the Heavy Industrial Zone District set forth in the City /County of San Francisco Zoning Ordinance.

Verification: At least 30 days prior to the start of construction, the project owner shall submit written documentation, including evidence of review by the City/County of San Francisco that the project conforms with the minimum design and performance standards of the Zoning Ordinance.

LAND-2 The project owner shall comply with the parking standards established by the City/County of San Francisco's Zoning Ordinance (Article 1.2 of the City Planning Code).

Verification: At least 30 days prior to start of construction, the project owner shall submit to the Compliance Project Manager (CPM), written documentation, including evidence of review by the City and County of San Francisco that the project conforms to all applicable parking standards.

LAND-3 The project owner shall ensure that any signs erected (either permanent or for construction only) comply with the outdoor advertising regulations established by the City/County of San Francisco's zoning ordinance (Article 6 of the City Sign Ordinance).

Verification: At least 30 days prior to start of construction, the project owner shall submit to the CPM, written documentation, including evidence of review by the City/County of San Francisco, that all erected signs would conform to the zoning ordinance.

REFERENCES

BCDC 2005a – San Francisco Bay Conservation & Development Commission (tn: 35974). Recommendations from BCDC on the PSA for San Francisco. 11/22/2005. Rec'd 11/28/2005.

Port of San Francisco. 2000. Waterfront Land Use Plan, January 2000.

San Francisco General Plan, 1996 (as amended).

San Francisco Planning Department. 2000. Southern Waterfront Supplemental Draft Environmental Impact Report, September 2000.

San Francisco Zoning Administrator. 2001. Letter in response to a request for written determination pursuant to Planning Code § 307(a). August 8.

SFPUC 2005a – San Francisco Public Utilities Commission/Hale (tn: 34403**).** Amendment A of the Application for Certification. Submitted to CEC/Therkelsen/Dockets on 3/25/05.

SFERP2004a - City and County of San Francisco/Blout Application for Certification San Francisco Electric Reliability Project - 145-megawatt natural gas-fired peaking power plant located in San Francisco.

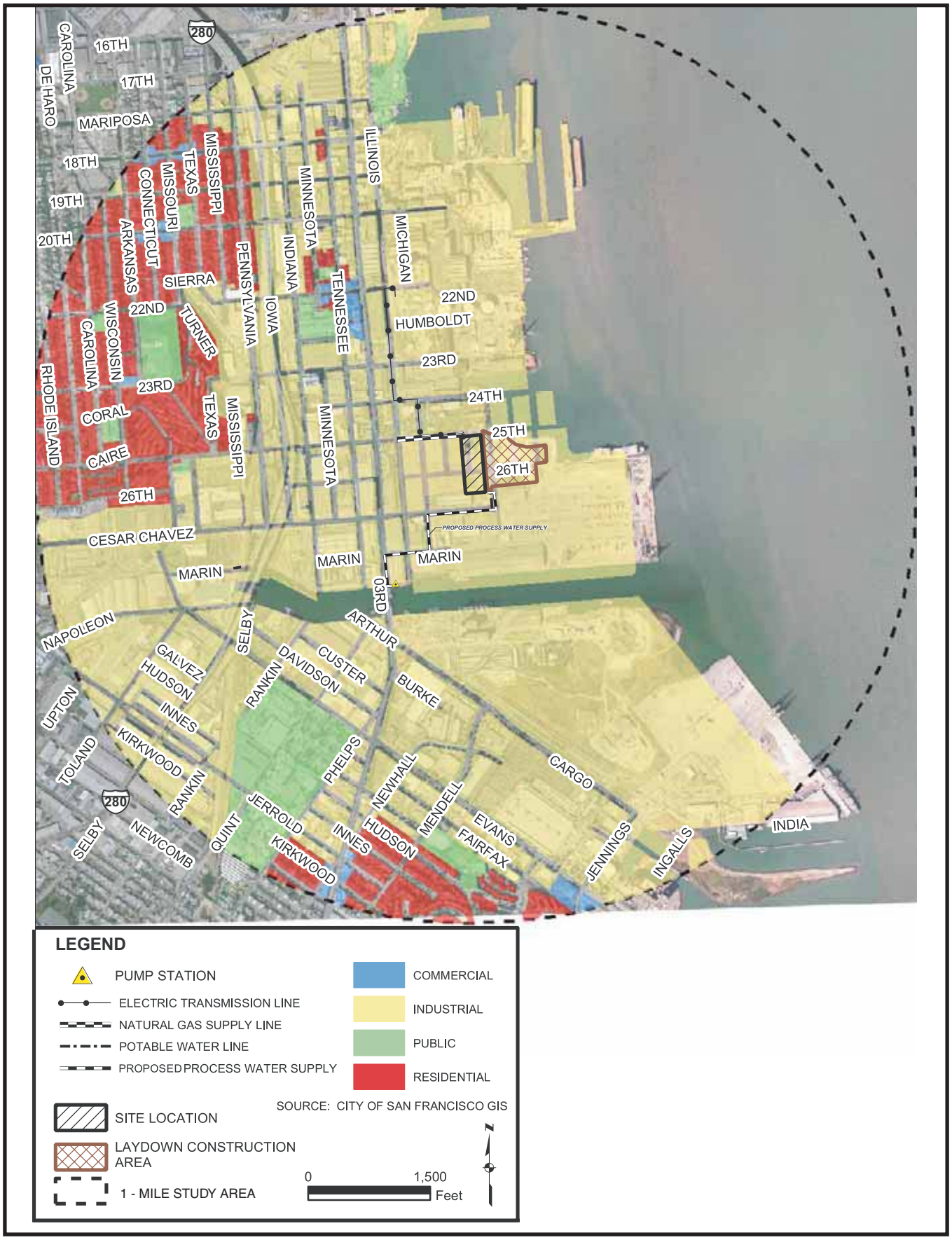
SFERP2004b - CH2MHill/Carrier**.** Transmittal of Appendix 5, System Impact Study. Submitted to CEC/Pfanner/Dockets on 3/18/04.

SFERP2005-CH2MHill/Carrier. PSA Comments. Submitted to CEC/Pfanner/Dockets on October 31, 2005

The Central Waterfront Neighborhood Plan, December 2002.

LAND USE - FIGURE 1

San Francisco Electric Reliability Project Supplement A - Existing Land Use Designations in the Study Area

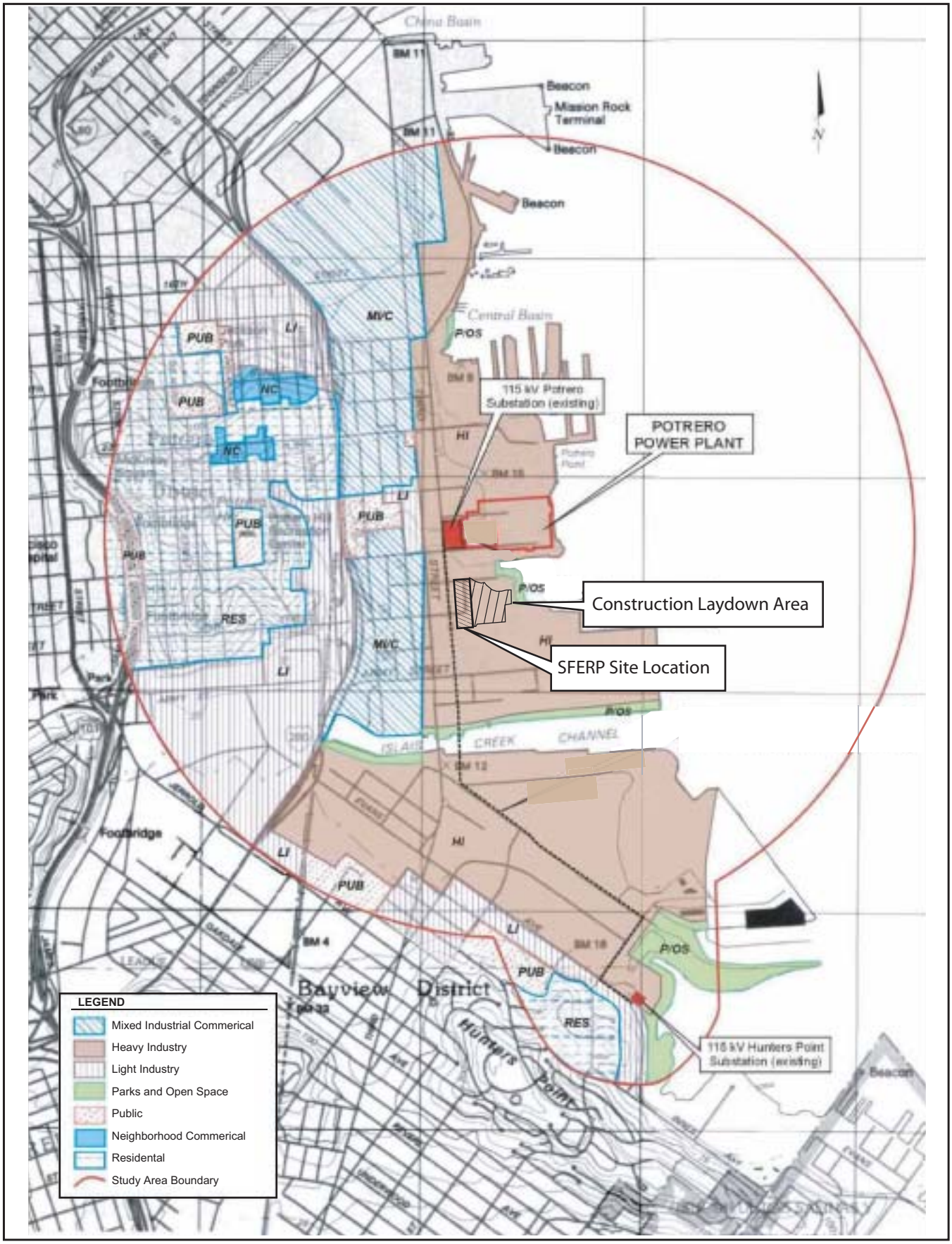


CALIFORNIA ENERGY COMMISSION, SYSTEMS ASSESSMENT & FACILITIES SITING DIVISION, FEBRUARY 2006

SOURCE: AFC - Supplement A - Fig 8.4-2

LAND USE - FIGURE 2

San Francisco Electric Reliability Project Supplement A - General Plan Map

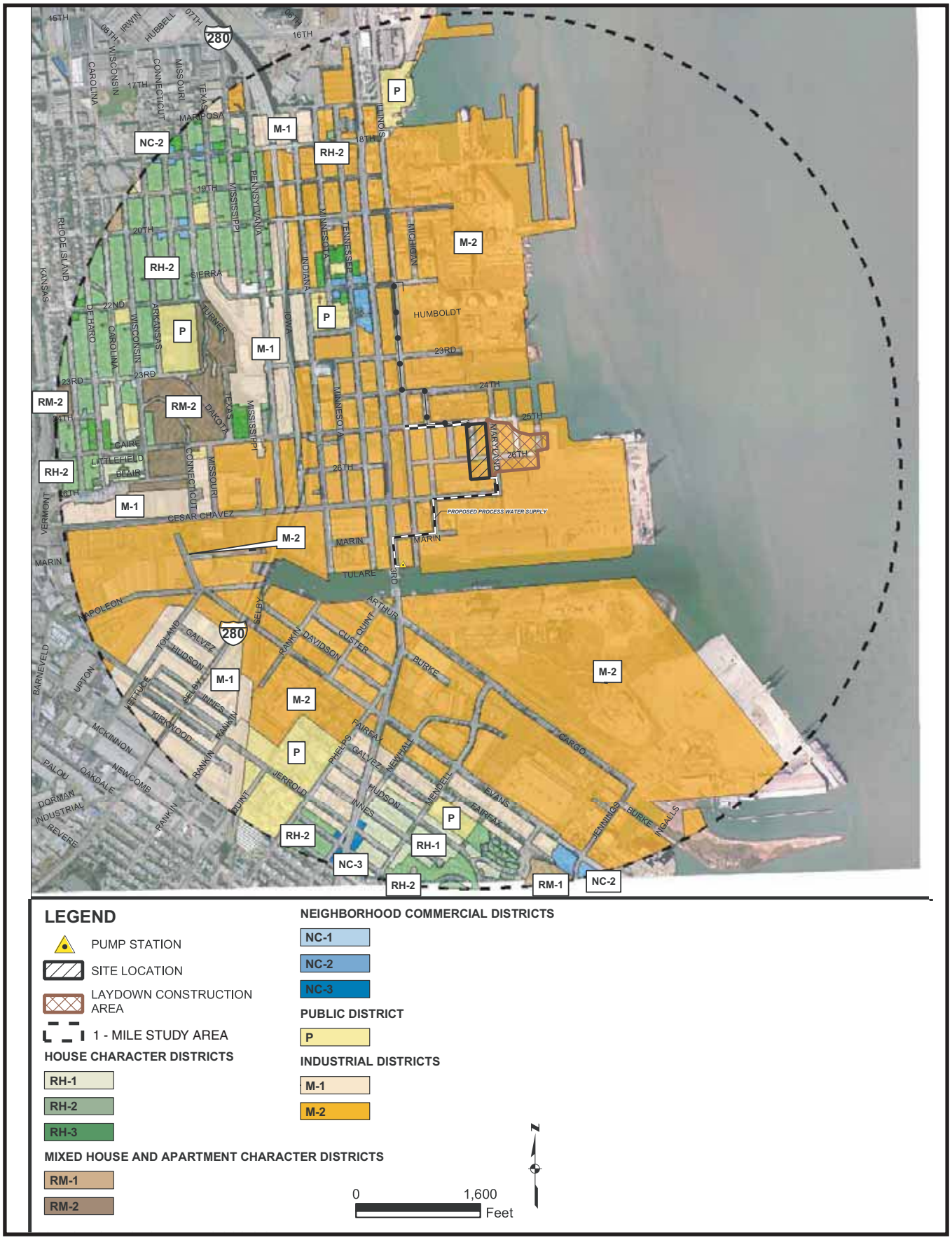


CALIFORNIA ENERGY COMMISSION, ENERGY FACILITIES SITING & ENVIRONMENTAL PROTECTION DIVISION, FEBRUARY 2006

SOURCE: Dames & Moore Figure 8.4-1

LAND USE - FIGURE 3

San Francisco Electric Reliabilty Project Supplement A - Zoning Designations in the Study Area

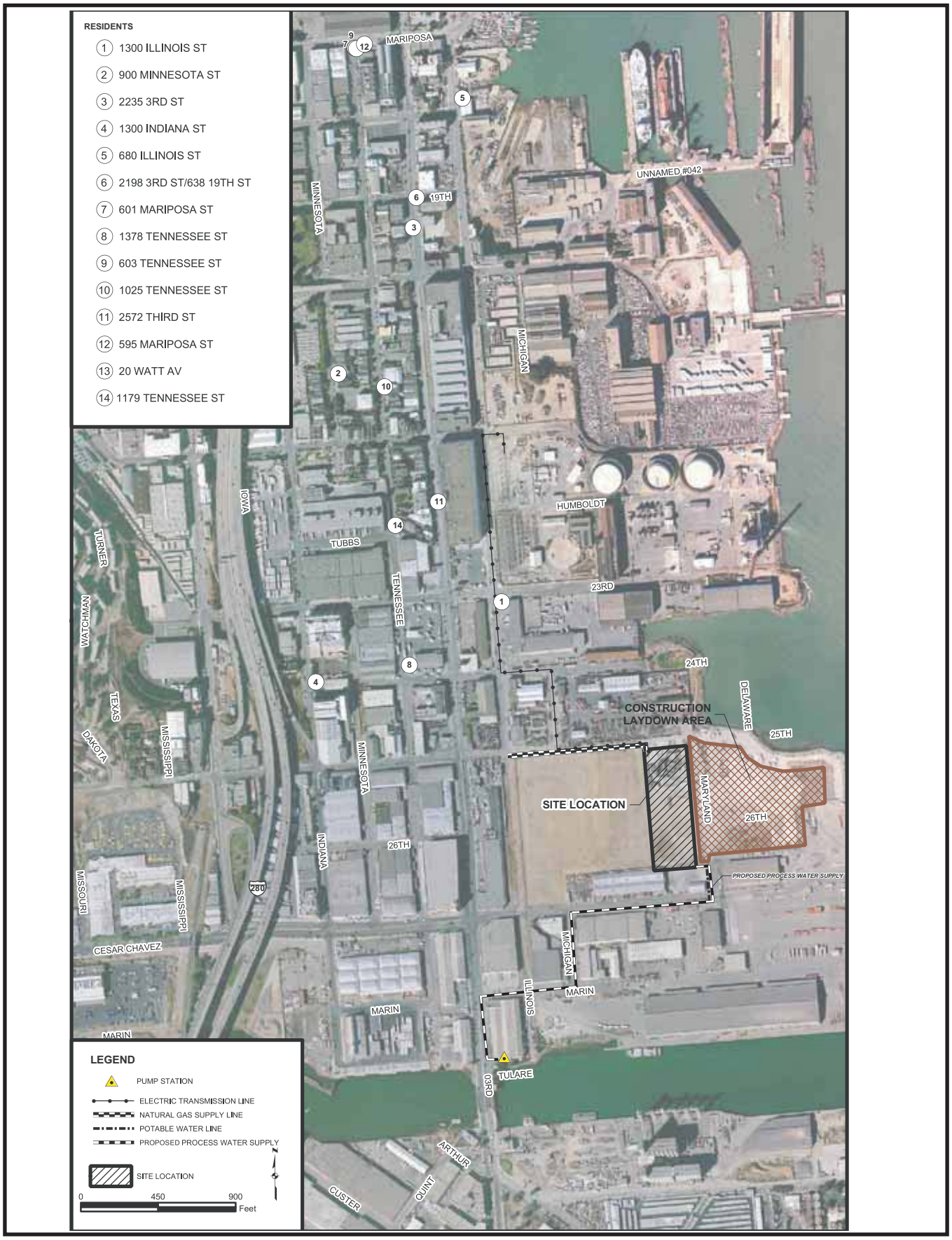


CALIFORNIA ENERGY COMMISSION, SYSTEMS ASSESSMENT & FACILITIES SITING DIVISION, FEBRUARY 2006

SOURCE: AFC - Supplement A - Fig 8.4-3

LAND USE - FIGURE 4

San Francisco Electric Reliability Project Supplement A - Locations of Proposed or Recently Approved Housing



CALIFORNIA ENERGY COMMISSION, SYSTEMS ASSESSMENT & FACILITIES SITING DIVISION, FEBRUARY 2006

SOURCE: AFC - Supplement A - Fig 8.4-5

NOISE AND VIBRATION

Testimony of Steve Baker

SUMMARY OF CONCLUSIONS

The San Francisco Electric Reliability Project, if built and operated in conformance with the proposed conditions of certification below, would comply with all applicable noise and vibration laws, ordinances, regulations and standards and would produce no significant adverse noise or vibration impacts, either direct or cumulative. The applicant has proposed appropriate mitigation, in the form of good design practice and inclusion of necessary project equipment, that would avoid any significant adverse impacts.

INTRODUCTION

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

The purpose of this analysis is to identify and examine the likely noise and vibration impacts from the construction and operation of the San Francisco Electric Reliability Project (SFERP), and to recommend procedures to ensure that the resulting noise and vibration impacts would be adequately mitigated to comply with applicable laws, ordinances, regulations and standards (LORS). For an explanation of technical terms employed in this section, please refer to **NOISE Appendix A** immediately following.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

NOISE Table 1
Laws, Ordinances, Regulations and Standards

Applicable LORS	Description
Federal (OSHA): 29 U.S.C. § 651 et seq.	Protects workers from the effects of occupational noise exposure
State (Cal-OSHA): Cal. Code Regs., tit. 8, §§ 5095-5099	Protects workers from the effects of occupational noise exposure
Local: San Francisco Police Code, Article 29, §§ 2901, 2907-2909	Limits noise emissions from construction and from continuous noise sources

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 during which the worker is exposed (see **NOISE Appendix A, Table A4** immediately following this section). The regulations further specify a hearing conservation program that involves monitoring the noise to which workers are exposed, assuring that workers are made aware of overexposure to noise, and periodically testing the workers' hearing to detect any degradation.

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

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

STATE

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

The State of California, Office of Noise Control, prepared 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 five dBA.

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

LOCAL

Article 29 of the San Francisco Police Code, entitled Regulation of Noise, is the local ordinance that regulates noise created by construction and operation of a project such as the SFERP (CITYSF 2004a).

Construction Noise

Section 2907(b) of Article 29 limits the noise from construction equipment to 80 dBA measured at a distance of 100 feet. Impact tools and equipment need not meet this limit, but must be equipped with available intake and exhaust mufflers. In addition, pavement breakers and jackhammers must be equipped with acoustical shields or shrouds.

Section 2908 limits noisy construction work, i.e., noise that exceeds the ambient noise level by 5 dBA or more at the nearest property line, to the hours between 7:00 a.m. and 8:00 p.m., unless a special permit has been issued by the City Director of Public Works.

Operational Noise

Section 2901.11 of Article 29 sets a criterion whereby any noise that exceeds the ambient noise level by 5 dBA or more, measured at the nearest property line, is considered excessive or offensive, and a violation of the Code. Section 2903 prohibits the creation of any such excessive or offensive noise where it can affect any hospital, or can affect any school or church while that facility is in use.

Section 2909(a) establishes limits for the noise that can be caused at the property line of a district based upon its zoning. Of interest in this case are the following limits:

NOISE Table 2
Operational Noise Limits Based on Zoning District

Noise Limit (dBA)		
Zoning District	Time Period	
	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.
RM-1, RM-2	55	50
M-2	75	75

Source: CITYSF 2004a, section 2909(a)

SETTING

The project site lies in an industrialized neighborhood that is zoned M-2, Heavy Industry (see **NOISE Figure 1**). The nearest sensitive noise receptors are dwelling units and offices in a 21-unit building at the corner of Minnesota and 25th Streets, approximately 1,600 feet west of the project site in an area zoned M2, referred to as Location R1 (see **NOISE Figure 2**) (SFPUC 2005a, Amendment A, §§ 1.3, 8.5.4; Fig. 8.5-1; SFERP 2005n, Data Response 181). Other sensitive noise receptors include a row of residences along Tubbs Street, approximately 2,100 feet northwest of the site, and a work/live loft building on the SW corner of 23rd and Minnesota Streets, approximately 2,200 feet from the project site in the M-2 zone. Both the loft building and the residences along Tubbs Street are shielded from power plant noise by intervening buildings. Other sensitive receptors are residences on Potrero Hill to the west, over

2,700 feet from the project site in an area zoned RM-2, Mixed House and Apartment Character District (SFERP 2004a, AFC § 8.5.4; Figures 8.4-3, 8.5-1). The area surrounding the project site is fairly noisy, due to freeway and surface street traffic, marine activities, airplane overflights, and the sounds of commerce.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

California Environmental Quality Act

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

1. exposure of persons to, or generation of, noise levels in excess of standards established in the local General Plan or noise ordinance, or applicable standards of other agencies;
2. exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
3. substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or
4. substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The Energy Commission staff, in applying item 3 above to the analysis of this and other projects, has concluded that a potential for a significant noise impact exists where the noise of the project plus the background exceeds the background by 5 dBA L_{90} or more at the nearest sensitive receptor.

Staff considers it reasonable to assume that an increase in background noise levels up to 5 dBA in a residential setting is insignificant; an increase of more than 10 dBA is 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];
2. the duration and frequency of the noise;
3. the number of people affected;
4. the land use designation of the affected receptor sites; and
5. public concern or controversy as demonstrated at workshops or hearings, or by correspondence.

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

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

Ambient Noise Monitoring

In order to establish a baseline for comparison of predicted project noise to existing ambient noise, the applicant has presented the results of an ambient noise survey (SFERP 2004a, AFC § 8.5.4.1; Tables 8.5-5, 8.5-6, 8.5-7). This survey was performed in August and October, 1999, by the applicant for the Potrero Power Plant Unit 7 Project (00-AFC-4). The SFERP is to be constructed on a site approximately 1,500 feet south of the Potrero Unit 7 project; its noise impact on its surroundings will be very similar to the previously proposed project on the Potrero property. Further, little has changed in the noise regime near the project site, so this survey remains valid. The live/work lofts that were under construction during the original ambient noise survey have been completed; they appear here as the residential receptor at ML-1 (Measuring Location 1).

Long-term (25 consecutive hours) noise measurements were recorded at the live/work lofts at the southwest corner of 23rd and Minnesota Streets, referred to as ML-1. Short-term (one hour) measurements were taken at various times throughout the day and night at ML-1, and at three other locations (refer to **NOISE Figure 1**):

- ML-2: Southern boundary of the Potrero Power Plant site.
- ML-3: Western boundary of the Potrero Power Plant site, adjacent to the electrical substation.
- ML-4: On a hillside in a residential district on Potrero Hill, near the intersection of 22nd and Missouri Streets, west of Interstate Highway 280.

The applicant performed additional ambient noise monitoring on February 22 and 23, 2005, at ML-5, located at the Army Street Mini Storage on Cesar Chavez and Indiana

[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 industrial noise regulations adopted by European jurisdictions. If the project would create an increase in ambient noise no greater than 10 dBA at nearby sensitive receptors, and the resulting noise level would be 40 dBA or less, the project noise level would likely be insignificant.

Streets. This provides a measure of the ambient noise regime at the dwelling units at the corner of Minnesota and 25th Streets, referred to as R1, which represent the nearest residential receptors (SFPUC 2005a, Amendment A, § 8.5.4.1; Table 8.5-8).

The ambient noise monitoring surveys recorded L_{eq} (energy average) and L_{90} (background) noise levels. These figures are summarized in **NOISE Table 3**:

NOISE Table 3:
Ambient Noise Survey Results

Measuring Location	Noise Level (dBA)	
	L_{eq}	L_{90}
ML-1: Live/work Lofts, 23rd & Minnesota Streets	65 (daytime)[1] 57 (nighttime)[2]	59 (daytime)[1] 49 (nighttime)[2]
ML-2: Southern Property Boundary	64 (daytime)	56 (daytime)
ML-3: Western Property Boundary	62 (daytime)	59 (daytime)
ML-4: Potrero Hill Neighborhood	55 (daytime) 50 (nighttime)	53 (daytime) 47 (nighttime)
ML-5: Army Street Mini Storage	68 (daytime) 59 (nighttime)	66 (daytime) 53 (nighttime)

Source: SFERP 2004a, AFC Tables 8.5-5, 8.5-6, 8.5-7; SFPUC 2005a, Amendment A, Table 8.5-8
[1] Staff calculation, average of four quietest consecutive hours of the daytime (up to 8 p.m., the limit of noisy construction work)
[2] Staff calculation, average of four quietest consecutive hours of the nighttime

DIRECT IMPACTS AND MITIGATION

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

Construction Impacts and Mitigation

Construction noise is usually considered a temporary phenomenon. Construction of the SFERP is expected to last approximately 12 months (SFPUC 2005a, Amendment A, § 2.2.14).

Compliance with LORS

Construction of an industrial facility such as a power plant is typically noisier than permissible under usual noise ordinances. In order to allow the construction of new facilities, construction noise during certain hours of the day is commonly exempt from enforcement by local ordinances. However, the City of San Francisco Police Code, Article 29 specifically addresses construction noise, limiting both the loudness and the time of day of construction noise:

- Section 2907(b) of Article 29 limits the loudness of noise from construction equipment to 80 dBA measured at a distance of 100 feet. Impact tools, pavement breakers and jackhammers must be equipped with available mufflers, acoustical shields or shrouds.
- Section 2908 limits the time of day during which noisy construction work may occur. Noise that exceeds the ambient noise level by 5 dBA or more at the nearest property

line may only be performed during the hours between 7:00 a.m. and 8:00 p.m., unless a special permit has been issued by the City Director of Public Works.

The applicant has predicted construction noise levels; they are summarized here in **NOISE Table 4**. Note that, while the applicant provided estimates at distances of 375 and 1,500 feet, staff has translated these figures into predicted noise levels at 100 feet (for compliance with § 2907(b) of the Police Code) and 1,600 feet (the nearest sensitive receptor):

NOISE Table 4
Predicted Construction Noise Levels

Receptor/Distance	Highest Noise Level (dBA L_{eq})
100 feet	82
ML-5 (1,600 feet)	58

Source: SFERP 2004a, AFC Table 8.5-9; SFPUC 2005a, Amendment A, Table 8.5-10; and staff calculations

While **NOISE Table 4** shows that construction noise, measured at 100 feet, could exceed the limit in Section 2907(b) by 2 dBA, this table represents a rough and very conservative estimate. As noted by the applicant (SFERP 2004a, AFC § 8.5.5.2.2, p. 8.5-9), the source figures used to produce this estimate are from studies conducted 33 years ago. Construction equipment has grown noticeably quieter in the intervening years; staff thus believes that actual construction noise will, in fact, comply with Section 2908, that is, a limit of 80 dBA at 100 feet. In the event that actual construction noise should exceed this limit and annoy nearby workers or residents, staff proposes Conditions of Certification **NOISE-1** and **NOISE-2**, which would establish a Noise Complaint Process that requires the applicant to resolve any problems caused by construction noise.

The applicant commits to performing noisy construction work during daytime hours, that is, 7 a.m. to 8 p.m., unless a special permit is issued by the City Director of Public Works (SFERP 2004a, AFC § 8.5.5.2.2, p. 8.5-10; § 8.5.6.3: SFPUC 2005a, Amendment A, § 8.5.5.2.2, p. 8.5-11; § 8.5.6.3). This would satisfy the requirement of Section 2908. To ensure that these hours are, in fact, adhered to, staff proposes Condition of Certification **NOISE-6**.

The applicant has stated that pile driving is anticipated (SFPUC 2005a, Amendment A, § 8.5.5.2.3). Pile driving would be performed in compliance with the applicable LORS. Section 2907(b) of the Police Code requires that impact tools be equipped with applicable mufflers and shrouds. Section 2908 of the Code limits such noisy work to the daytime hours. Staff believes that pile driving would be performed in compliance with applicable LORS.

CEQA Impacts

Since construction noise typically varies continually with time, it is most appropriately measured by, and compared to, the L_{eq} (energy average) metric. As seen in **NOISE Table 4** above, construction noise at the nearest sensitive receptor, the dwelling units at R-1 (represented by ML-5), may reach 58 dBA. The ambient daytime L_{eq} level at ML-5, as seen in **NOISE Table 3** above, is 68 dBA. The addition of construction noise to the ambient would not increase the ambient level at all. In fact, construction noise at R-1

should be practically unnoticeable. Construction noise should not create an adverse impact at R-1, the nearest sensitive receptor.

Construction noise at the Potrero Hill neighborhood, represented by ML-4, would be quieter than at ML-5 due to its greater distance from the project site. The distance from the site to ML-4 is greater than 2,700 feet,[2] compared to 1,600 feet from the site to ML-5. This would yield construction noise levels at ML-4 lower than 54 dBA, lower than the daytime Leq at ML-4 of 55 dBA (NOISE Table 3, above). Combining these yields 57 dBA, an increase of 2 dB. Such an increase is typically barely noticeable, and unlikely to cause annoyance. Staff thus concludes that project construction will create no significant adverse impacts at ML-4. To ensure this, staff proposes Conditions of Certification NOISE-1 and NOISE-2, which would establish a Noise Complaint Process to resolve any complaints regarding construction noise.

Linear Facilities

New off-site linear facilities would include a 0.5-mile long secondary treated effluent supply pipeline to supply project water needs, a 900-foot long, 12-inch diameter natural gas pipeline from the existing PG&E load center, a sanitary wastewater discharge line to the City's combined sewer system, and an underground 115 kV transmission line to the existing Potrero substation (SFPUC 2005a, Amendment A, § 2.1; SFPUC 2005d).

Construction of linear facilities typically moves along at a rapid pace, thus not subjecting any one receptor to noise impacts for more than two or three days. Section 2907(b) of the Police Code limits the noise that may be produced by construction equipment to 80 dBA at 100 feet, and requires impact tools such as jackhammers to be muffled and shrouded. Further, Section 2908 of the Police Code limits the hours of noisy construction work to 7 a.m. until 8 p.m. With these restrictions, staff believes that construction of the project linears will create noise impacts that are less than significant. To ensure compliance with these restrictions, staff proposes Condition of Certification **NOISE-6**.

Vibration

The only construction operation likely to produce vibration that could be perceived off-site would be pile driving. The applicant anticipates that pile driving will be required for construction of the SFERP (SFPUC 2005a, Amendment A, § 8.5.5.2.3). The nearest sensitive receptors are 1,600 feet (0.3 mile) distant at R-1. It is highly unlikely that vibration from pile driving could produce significant impacts at that distance.

Pile Driving

Pile driving noise is predicted to reach 74 dBA at a distance of 1,500 feet (SFPUC 2005a, Amendment A, Table 8.5-11); correcting this for the distance to the nearest residential receptors at R1, a distance of 1,600 feet, yields noise levels of approximately 71 dBA. This is substantially below the limit of 80 dBA specified in Section 2907(b) of the Police Code. Further, the applicant commits to performing pile driving during daytime hours, to comply with Section 2908 of the Police Code. To ensure that pile driving will take place during the daytime, staff proposes Condition of Certification **NOISE-6**.

[2] Staff calculation, scaled from SFERP 2004a, AFC Figure 1-2.

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 (SFERP 2004a, AFC Table 8.5-3; §§ 8.5.3.1.2, 8.5.3.2.1, 8.5.5.2.1; SFPUC 2005a, Amendment A, § 8.5.5.2.1). To ensure that construction workers are, in fact, adequately protected, staff has proposed Condition of Certification **NOISE-3**.

Operation Impacts and Mitigation

The primary noise sources of the SFERP include the gas turbine generators, gas turbine air inlets, exhaust stacks, natural gas fuel compressors, electrical transformers, and various pumps and fans. Staff compares the projected project noise with applicable LORS, in this case, the Police Code. In addition, staff evaluates any increase in noise levels at sensitive receptors due to the project in order to identify any significant adverse impacts.

Proposed noise mitigation measures include the following equipment for each of the three gas turbine generator units (SFERP 2004a, AFC §§ 2.2.4, 8.5.5.3.6):

- metal acoustical enclosure;
- inlet air filter/chiller;
- selective catalytic reduction unit; and
- exhaust stack silencer.

In addition, the applicant plans to avoid the creation of annoying tonal (pure-tone) noises by balancing the noise emissions of various power plant features during plant design (SFERP 2004a, AFC § 8.5.5.3.5).

Note that landscaping will not be relied upon to provide noise attenuation. While a dense forest can muffle sound, the landscaping possible around an industrial site such as the SFERP typically offers no measurable benefit.

Compliance with LORS

The applicant performed noise modeling to determine the project's noise impacts on sensitive receptors (SFPUC 2005a, Amendment A, § 8.5.5.3.4). Project operating noise at ML-1 (the live/work loft building) and at R-1 (the nearest residences) is projected to be less than 54 dBA L_{eq}; operating noise at ML-4 (the Potrero Hill neighborhood) would not exceed 47 dBA L_{eq}.

Section 2901.11 of the Police Code prohibits noise that exceeds the ambient, at the receiving property line, by 5 dBA or more. This LORS requires comparison with the ambient L_{eq} level. As seen in **NOISE Table 3** above, nighttime L_{eq} levels at ML-1, ML-4 and ML-5 (representing the dwellings at R1, those nearest the project site) are lower than daytime levels, so staff compares projected power plant noise to these nighttime levels:

NOISE Table 5
Comparison of Nighttime L_{eq} Levels

Receptor	Nighttime Ambient Level, dBA L_{eq}	Power Plant Noise Level, dBA L_{eq}	Exceedance, dBA
ML-1: Live/Work Lofts	57	54	-3
ML-4: Potrero Hill Neighborhood	50	47	-3
ML-5: Army Street Mini Storage	59	54	-5

As seen in **NOISE Table 5**, power plant noise is predicted to be less than the ambient level at ML-1, ML-4 and ML-5. The project would thus comply with Section 2901.11 of the Police Code.

Section 2909(a) of the Police Code limits the noise that can be caused at the property line of a receptor in certain zoning districts. ML-1 and ML-5 lie in a district zoned M-2, Heavy Industry, while ML-4 and the Potrero Hill neighborhood lie in a district zoned RM-2, Mixed House and Apartment Character District (SFERP 2004a, AFC Figure 8.4-3). As seen in **NOISE Table 2** above, the permissible noise limits are:

NOISE Table 6
Noise Comparison Based on Zoning District

Receptor	Zoning District	Power Plant Noise Level dBA L_{eq}	Noise Limit dBA		Exceedance dBA	
			Daytime 7a.m.-10p.m.	Nighttime 10p.m.-7a.m.	Day-time	Night-time
ML-1, ML-5	M-2	54	75	75	-21	-21
ML-4	RM-2	47	55	50	-8	-3

As seen in **NOISE Table 6**, the project will not exceed the prescribed limits at either ML-1, the live/work loft building, ML-5, near the dwellings at R1, or ML-4, the Potrero Hill neighborhood. The project would thus comply with Section 2909(a) of the Police Code. To ensure compliance, staff has proposed Condition of Certification **NOISE-4**.

CEQA Impacts

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

In most cases, a power plant will be intended to operate around the clock for much of the year. Staff evaluates project noise emissions by comparing them to the nighttime

ambient background level; this assumes the potential for annoyance due to power plant noise is greatest at night when residents are trying to sleep. Nighttime ambient noise levels are typically lower than the daytime levels; differences in background noise levels of 5 to 10 dBA are common. Staff believes it is prudent to average the lowest nighttime hourly background noise level values to arrive at a reasonable baseline for comparison with the project's predicted noise level.

Adverse impacts, as defined in CEQA, can be detected by comparing predicted power plant noise levels to the ambient nighttime background noise levels at the nearest sensitive receptors, as shown in **NOISE Table 7**:

NOISE Table 7
Operational Noise Impacts at Nearest Sensitive Receptors

Receptor	Ambient Noise Level (dBA L_{90})[1]	Power Plant Noise Level (dBA L_{eq})[2]	Resultant Noise Level (dBA)	Change (dBA)
ML-1: Live/Work Lofts	49	54	55	+6
ML-4: Potrero Hill Neighborhood	47	47	50	+3
ML-5: Army Street Mini Storage	53	54	57	+4

[1] Source: SFERP 2004a, AFC Table 8.5-6; SFPUC 2005a, Amendment A, Table 8.5-8; and staff calculation, average of four quietest consecutive hours of the nighttime
[2] Source: SFERP 2004a. AFC Table 8.5-5, 8.5-7; SFPUC 2005a, Amendment A, § 8.5.5.3.4, Table 8.5-8

The increase in noise at ML-1, the live/work lofts, as seen in **NOISE Table 7**, would be approximately 6 dBA. As described above (under Method and Threshold for Determining Significance), staff regards an increase of up to 5 dBA as a clearly less than significant impact, and an increase of more than 10 dBA as a clearly significant impact. An increase of 6 dBA, in a relatively noisy neighborhood such as that encompassing ML-1, would typically represent a less than significant impact. Further influencing this conclusion is the fact that the land at ML-1 is zoned M-2, Heavy Industry. Staff therefore believes that an increase of 6 dBA amounts to a less than significant impact.

The increase in noise at R-1, the nearest residences (represented by ML-5), would be approximately 4 dBA. Such an increase is barely noticeable. Additionally, these residences lie on land zoned M-2, Heavy Industry. Such an increase is clearly an insignificant impact.

The increase in noise at ML-4, the Potrero Hill neighborhood, would be approximately 3 dBA. Such an increase is barely detectable, and clearly constitutes a less than significant impact.

Staff therefore concludes that the power plant operating noise would not pose a significant adverse impact on any sensitive receptors.

Tonal Noises

One possible source of annoyance would be strong tonal noises. Tonal noises are individual sounds (such as pure tones) that, while not louder than permissible levels,

stand out in sound quality. The applicant plans to address overall noise in design, and to take appropriate measures, as necessary, to eliminate tonal noises as possible sources of annoyance (SFERP 2004a, AFC § 8.5.5.3.5; SFPUC 2005a, Amendment A, § 8.5.5.3.5). To ensure that tonals do not cause annoyance, staff proposes Condition of Certification **NOISE-4**.

Linear Facilities

All water and gas piping and the electric transmission interconnection line will lie underground, and will be silent during operation.

Vibration

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

The operating components of a simple cycle power plant consist of high-speed gas turbines, compressors, and various pumps. All of these pieces of equipment must be carefully balanced in order to operate; permanent vibration sensors are attached to the turbines and generators. The applicant explains that it is unlikely that any vibration would be felt beyond the equipment (SFERP 2004a, AFC § 8.5.5.3.6). Energy Commission staff agrees with this estimate, and agrees with the applicant that groundborne vibration from the SFERP will be undetectable by any likely receptor.

Airborne vibration (low frequency noise) can rattle windows and objects on shelves, and can rattle the walls of lightweight structures. The SFERP's chief source of airborne vibration would be the gas turbines' exhaust. In a power plant such as the SFERP, however, the exhaust must pass through the selective catalytic reduction (SCR) modules and the stack silencers before it reaches the atmosphere. The SCRs act as efficient mufflers; the combination of SCR units and stack silencers makes it highly unlikely that the SFERP would cause perceptible airborne vibration effects.

Worker Effects

The applicant has acknowledged the need to protect plant operating and maintenance workers from noise hazards, and has committed to comply with applicable LORS (SFERP 2004a, AFC § 8.5.5.3.1; SFPUC 2005a, Amendment A, § 8.5.5.3.1). 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. To ensure that plant operation and maintenance workers are, in fact, adequately protected, Energy Commission staff has proposed condition of certification **NOISE-5**.

CUMULATIVE IMPACTS AND MITIGATION

The only other noise sources of which staff is aware that are near enough to the SFERP to hold the potential for significant cumulative noise impacts are (see the **Land Use** portion of this document):

- **Pier 70**. While industrial and commercial development is forecast for this area north of the SFERP site, there is no specific schedule for that development. Construction is expected to last five years or so.

- **MUNI Metro East Light Rail Maintenance and Operations Facility**. MUNI has commenced construction of this facility immediately west of the SFERP site. Construction is projected to take 30 months, or until March 2008. While construction of the SFERP would occur concurrently, construction noise from the SFERP is predicted to reach a level of only 58 dBA at the nearest sensitive receptor. Combined with similar levels of construction noise from the MUNI facility, worst case noise at this receptor would be only 61 dBA, and only during the daytime. This is a level five to seven dB lower than the daytime ambient levels (see NOISE Table 3), and would be largely unnoticeable. It is unlikely that construction noise emissions from the two projects could combine to produce significant impacts at any sensitive receptor locations. During operation, noise from the MUNI facility, which would consist chiefly of intermittent noises from vehicle movement and power tool use, would be unlikely to add to the steady noise from the SFERP to produce significant cumulative impacts at any sensitive receptors.

A power plant such as the SFERP would fit into this industrial neighborhood; the quality and loudness of its noise emanations would tend to blend with the overall noise regime in its neighborhood. Since the project is expected to comply with all applicable noise LORS, and to present no significant direct impacts, staff deems it highly unlikely that the SFERP would produce significant cumulative noise impacts.

FACILITY CLOSURE

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

RESPONSE TO AGENCY AND PUBLIC COMMENTS

No comments were received from governmental agencies or from members of the public.

CONCLUSIONS

The SFERP, if built and operated in conformance with the proposed conditions of certification below, would comply with all applicable noise and vibration LORS, and would produce no significant adverse noise impacts, either direct or cumulative. While a power plant such as the SFERP could be designed and built to produce unacceptable noise impacts, the applicant has proposed appropriate mitigation, in the form of good design practice and inclusion of necessary project equipment, that would avoid any such impacts.

PROPOSED CONDITIONS OF CERTIFICATION

NOISE-1 At least 15 days prior to the start of ground disturbance, the project owner shall notify all residents within one-half mile of the site and the linear facilities, by mail or other effective means, of the commencement of project construction. At the same time, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction and operation of the project. 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 Compliance Project Manager (CPM) a statement, signed by the project owner's project manager, stating that the above notification has been performed, and describing the method of that notification, verifying that the telephone number has been established and posted at the site, and giving that telephone number.

NOISE COMPLAINT PROCESS

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

- Use the Noise Complaint Resolution Form (below), or a functionally equivalent procedure acceptable to the CPM, to document and respond to each noise complaint;
- Attempt to contact the person(s) making the noise complaint within 24 hours;
- 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 five days of receiving a noise complaint, the project owner shall file a copy of the Noise Complaint Resolution Form, with the local jurisdiction and 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 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 RESTRICTIONS

NOISE-4 The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that operation of the project will not cause noise levels due to plant operation alone to exceed 47 dBA L_{eq} measured near the intersection of 22nd and Missouri Streets (monitoring location ML-4).

The measurement of power plant noise for the purposes of demonstrating compliance with this condition of certification may alternatively be made at a location, acceptable to the CPM, closer to the plant (e.g., 400 feet from the plant boundary) and this measured level then mathematically extrapolated to determine the plant noise contribution at the affected residence. However, notwithstanding the use of this alternative method for determining the noise level, the character of the plant noise shall be evaluated at the affected residential location (ML-4) to determine the presence of pure tones or other dominant sources of plant noise.

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.

A. When the project first achieves a sustained output of 80 percent or greater of rated capacity, the project owner shall conduct a 25-hour community noise survey at monitoring site ML-4, or at a closer location acceptable to the CPM. This survey during power plant operation (with all three combustion turbine units operating at a sustained output of at least 80 percent) shall also include measurement of one-third octave band sound pressure levels to ensure that no new pure-tone noise components have been introduced.

B. If the results from the noise survey indicate that the power plant noise level (L_{eq}) at the affected receptor site exceeds the above value 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 indicate that pure tones are present, mitigation measures shall be implemented to eliminate the pure tones.

Verification: The survey shall take place within 30 days of the project first achieving a sustained output of 80 percent or greater of rated capacity. Within 15 days after completing the survey, the project owner shall submit a summary report of the survey to the CPM. Included in the survey report will be a description of any additional mitigation

measures necessary to achieve compliance with the above listed noise limits, and a schedule, subject to CPM approval, for implementing these measures. When these measures are in place, the project owner shall repeat the noise survey.

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

NOISE-5 Following the project first achieving a sustained output of 80 percent or greater of rated capacity, the project owner shall conduct an occupational noise survey to identify the noise hazardous areas in the facility.

The survey shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations, sections 5095-5099 (Article 105) and Title 29, Code of Federal Regulations, section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure.

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

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

CONSTRUCTION TIME RESTRICTIONS

NOISE-6 Heavy equipment operation and noisy construction work relating to any project features shall be restricted to the times of day delineated below, unless a special permit has been issued by the City Director of Public Works:

Any Day	7 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.

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

EXHIBIT 1 - NOISE COMPLAINT RESOLUTION FORM

San Francisco Electric Reliability Project
(04-AFC-1)

NOISE COMPLAINT LOG NUMBER _____

Complainant's name and address:

Phone number: _____

Date complaint received: _____
Time complaint received: _____

Nature of noise complaint:

Definition of problem after investigation by plant personnel:

Date complainant first contacted: _____

Initial noise levels at 3 feet from noise source _____ dBA Date: _____

Initial noise levels at complainant's property: _____ dBA Date: _____

Final noise levels at 3 feet from noise source: _____ dBA Date: _____

Final noise levels at complainant's property: _____ dBA Date: _____

Description of corrective measures taken:

Complainant's signature: _____ Date: _____

Approximate installed cost of corrective measures: $ _____
Date installation completed: _____
Date first letter sent to complainant: _____ (copy attached)
Date final letter sent to complainant: _____ (copy attached)

This information is certified to be correct:

Plant Manager's Signature: _____ Date: _____

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

REFERENCES

CITYSF2004a — City of San Francisco Police Code, Article 29, Regulation of Noise. June 21, 2004.

SFERP2004a — City and County of San Francisco/Blount (tn: 31130). Application for Certification, San Francisco Electric Reliability Project — 145 megawatt natural gas-fired peaking power plant located in San Francisco. Submitted to CEC/Therkelsen/Dockets on 3/18/04.

SFERP2004q — CH2MHill/Carrier (tn: 31854). Data Responses Set 1A. Response to Staff's Data Requests dated 6/4/04. Submitted to CEC/Pfanner/Dockets on 7/6/04.

SFPUC2005a — San Francisco Public Utilities Commission/Hale (tn: 34403). Amendment A of the Application for Certification. Submitted to CEC/Therkelsen/Dockets on 3/25/05.

SFPUC2005d — San Francisco Public Utilities Commission (tn: 36120). Amendment to the Project Description, Process & Cooling Water Supply. POS. 12/20/2005. Rec'd 12/22/2005.

SFERP 2005n — CH2MHill/Carrier (tn: 34542). Data Response Set 3A. Submitted to CEC/Pfanner/Dockets on 6/3/05.

NOISE APPENDIX A
FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

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

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

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

In order to help the reader understand the concept of noise in decibels (dBA), Noise Table A2 has been provided to illustrate common noises and their associated sound levels, in dBA.

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

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

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

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

Subjective Response to Noise

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

- Subjective effects of annoyance, nuisance, dissatisfaction.
- Interference with activities such as speech, sleep, and learning.
- Physiological effects such as anxiety or hearing loss.

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

One way to determine a person's subjective reaction to a new noise is to compare the level of the existing (background) noise, to which one has become accustomed, with the level of the new noise. In general, the more the level or the tonal variations of a new

noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

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

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

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

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

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

Combination of Sound Levels

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

Noise Table A3
Addition of Decibel Values

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

Source: Architectural Acoustics, M. David Egan, 1988

Sound and Distance

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

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

Worker Protection

OSHA noise regulations are designed to protect workers against the effects of noise exposure, and list permissible noise level exposure as a function of the amount of time to which the worker is exposed:

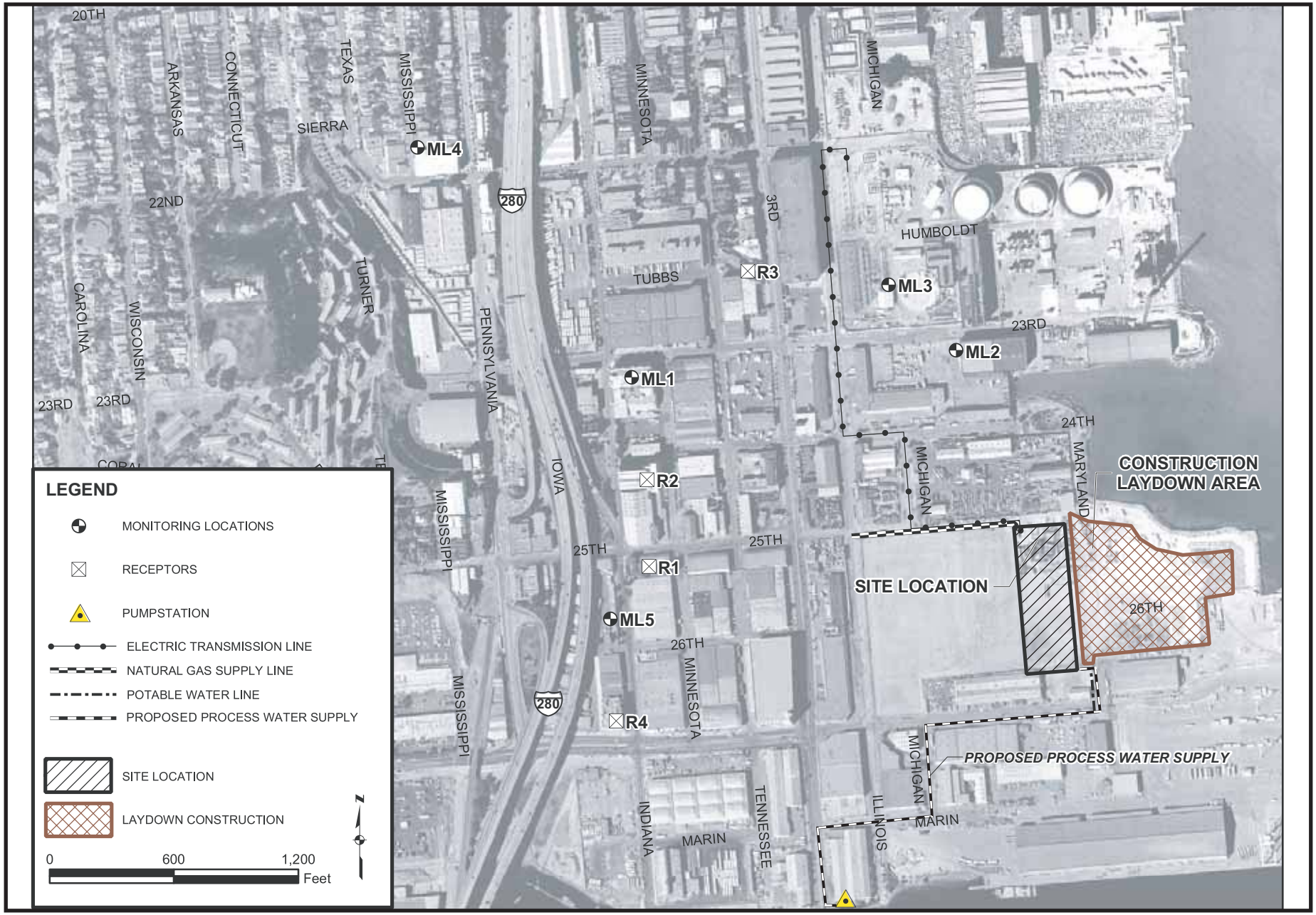
Noise Table A4
OSHA Worker Noise Exposure Standards

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

Source: 29 C.F.R. § 1910.95

NOISE AND VIBRATION - FIGURE 1

San Francisco Electric Reliability Project Supplement A - Noise Monitoring Locations and Receptors



SOURCE:SFPUC 2005a, Figure 8.5-1

NOISE AND VIBRATION - FIGURE 2

San Francisco Electric Reliability Project Supplement A - Receptor R1

CALIFORNIA ENERGY COMMISSION, SYSTEMS ASSESSMENT & FACILITIES SITING DIVISION, FEBRUARY 2006

SOURCE:SFERP 2005n, p.16

PUBLIC HEALTH

Testimony of Alvin J. Greenberg, Ph.D.

SUMMARY OF CONCLUSIONS

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

INTRODUCTION

The purpose of this Final Staff Assessment (FSA) is to determine if toxic emissions from the proposed San Francisco Electric Reliability Project would have the potential to cause significant adverse public health impacts or to violate standards for public health protection. If potentially significant health impacts are identified, staff will evaluate mitigation measures to reduce such impacts to insignificant levels.

Although staff addresses potential impacts of regulated or criteria air pollutants in the **Air Quality** section of this FSA, **Public Health Appendix A** at the end of this section provides information on the health effects of such pollutants. Impacts on public and worker health from accidental releases of hazardous materials are examined in the **Hazardous Materials Management** section. Health effects from electromagnetic fields are discussed in the **Transmission Line Safety and Nuisance** section. Pollutants released from the project in wastewater streams to the public sewer system are discussed in the **Soil and Water Resources** section. Plant releases in the form of hazardous and nonhazardous wastes are described in the **Waste Management** section.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

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

Applicable Law	Description
Federal	
Clean Air Act section 112 (42 U.S. Code section 7412)	Requires new sources which emit more than ten tons per year of any specified hazardous air pollutant (HAP) or more than 25 tons per year of any combination of HAPs to apply Maximum Achievable Control Technology (MACT).
State	
California Health and Safety Code section 41700	This section states that "no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any

	considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property."
California Code of Regulations, Title 22, Section 60306	Requires that whenever a cooling system uses recycled water in conjunction with an air conditioning facility and a cooling tower that creates a mist that could come into contact with employees or members of the public, a drift eliminator shall be used and chlorine, or other, biocides shall be used to treat the cooling system recirculating water to minimize the growth of Legionella and other micro-organisms.
Local	
Bay Area Air Quality Management District Regulation 2, Rule 5	This rule requires a risk assessment or risk screening analysis to be performed for new or modified facilities that emit one or more toxic air contaminants.

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. The surrounding neighborhoods consist mostly of Dogpatch, Potrero Hill, Bayview, and Hunters Point and include all or part of zip codes 94107 and 94124.

SITE AND VICINITY DESCRIPTION

Land uses in the vicinity of the proposed project are predominantly industrial, with residential and commercial uses located west of an industrial band of land uses along the waterfront (SFPUC 2005a Section 8.4.2.1). Currently, land at the proposed site is zoned as Heavy Industry (M-2). The natural gas pipeline proposed to be constructed for this project will be 900-feet long and will run west adjacent to 25th street from a metering station located on the western side of the project site. The land along the pipeline route is also zoned Heavy Industrial. The project will also require the installation of an approximately 2,600 foot water pipeline to convey secondary treated effluent obtained from the Southeast Waste Water Treatment Plant (SEWWTP) at a pressurized manhole located near the intersection of Tulare and 3rd Streets. The water will then be treated to Title 22 tertiary standards on-site.

The nearest residence is located approximately 1,600 feet west of the site. There are over 500 sensitive receptors including 233 schools and day care facilities, 15 hospitals, 32 senior care facilities, 221 churches, and 57 parks and recreation centers within a 3-

mile radius (SFPUC 2005a, Section 8.12.3). There also appear to be some transient residents at Warm Water Cove Park located about 700 feet northeast of the project site. The closest church is located 474 feet southwest of the project site. As mentioned above, the location of sensitive receptors near the proposed site is an important factor in considering potential public health impacts.

The location of elevated terrain (terrain above the power plant stack height) is an important factor to be considered in assessing potential exposure. An emission plume may impact high elevations before impacting lower elevations. The SFERP stack would be 85 feet high (SFPUC 2005a Section 8.1). Terrain above stack height ranges up to 700 feet in elevation in the project vicinity, and exists in all directions except for east, where the San Francisco Bay is located (SFERP 2004d USGS Quad Maps). The site topography itself is relatively flat and is about 13.5 feet above sea level.

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.

Mild summers with minimal precipitation and mildly windy and rainy winters characterize the climate of San Francisco (SFPUC 2005a Section 8.1.1.2). The climate at the project site is dominated by the influence of the Pacific Ocean and the Pacific high-pressure system, a semi-permanent, subtropical high-pressure system located off the west coast of the United States. 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 77 percent of the region's annual rainfall occurs between December 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 the Bay Area Air Quality Management District (BAAQMD). By examining average toxic concentration levels from representative air monitoring sites in the project vicinity with cancer risk factors specific to each contaminant, lifetime cancer risk can be calculated to provide a background risk level for inhalation of ambient air. For comparison purposes, it should be noted that the

overall lifetime cancer risk for the average individual in the United States is about 1 in 4, or 250,000 in one million.

The BAAQMD has a monitoring station in San Francisco at 10 Arkansas Street, 1.5 miles northwest of the project site (SFPUC 2005a section 8.1.3). In 2003, the background inhalation cancer risk calculated by the California Air Resources Board (CARB) for the Arkansas site was 134 in one million (CARB 2004). The pollutants 1,3-butadiene and benzene, emitted primarily from mobile sources, were the two highest contributors to risk and together accounted for over half of the total. The risk from 1,3-butadiene was about 32 in one million, while the risk from benzene was about 36 in one million. Formaldehyde accounts for about 10 percent of the 2003 average, with a risk of about 13 in one million. Formaldehyde is emitted directly from vehicles and other combustion sources, such as the proposed SFERP.

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, in the Bay Area, cancer risk was 342 in one million based on 1992 data, 315 in one million based on 1994 data, and 303 in one million based on 1995 data. In 2002, the most recent year for which data is available, the average inhalation cancer risk decreased to 162 in one million (BAAQMD 2004b, p. 12).

EXISTING PUBLIC HEALTH CONCERNS

Staff has conducted a detailed study and analysis of existing public health issues in the project vicinity. This analysis was prepared in order to identify the current status of respiratory diseases (including asthma), cancer, and childhood mortality rates in the population located near the proposed project. Assessing existing health concerns in the project area will provide staff with a basis on which to evaluate the significance of any additional health impacts from the proposed SFERP project and evaluate any proposed mitigation.

Asthma

Staff determined that residents of neighborhoods in the southeastern area of San Francisco have some of the highest rates of asthma hospitalizations in the city. This is true for adults and for children. This is also true for children of other neighborhoods of San Francisco, including the Western Addition and Pacific Heights, the Richmond and Sea Cliff, the Sunset and St. Francis Wood areas, as well as Twin Peaks and Diamond Heights. Overall, the rate of adult and child asthma hospitalizations in San Francisco County is about the same as rates in Alameda County, greater than the rates in Contra Costa and Solano counties, and higher than the asthma target rates recommended by the Healthy People 2000 and Healthy People 2010 National Health Promotion & Disease Prevention Objectives. Please refer to **Public Health Appendix B** for staff's complete analysis.

Cancer

Staff determined that the observed cancer incidence rates for all cancers, breast cancer and childhood cancer for the Bayview-Hunters Point neighborhood are not greater than the rates expected for that population based on the rates reported for the greater San Francisco Bay Area, the state, and the nation. Please refer to **Public Health Appendix C** for the complete report.

Childhood Mortality

Staff determined that in 1998, the overall infant mortality rate in San Francisco was lower than the Healthy People 2000 objective for infant mortality (5.3 deaths in San Francisco per 1,000 live births versus the objective of 7 deaths per 1,000 live births). Infant and childhood mortality rates specific to the Bayview Hunters Point neighborhood of San Francisco were not identified in the literature. Within the African American population of San Francisco, however, the infant mortality rate was more than 3 times greater than the rate reported in white residents and 5 times greater than the rate in Hispanic residents. This trend is consistent with the Forum study (2004) that reports that child death rates in the U.S. by race/ethnicity are highest in non-Hispanic African American children. Since nearly half of the Bayview Hunters Point residents are African American, it seems likely that an increased rate of infant/childhood mortality would be observed in this population, as it is observed in the entire City of San Francisco and nation-wide. Please refer to **Public Health Appendix D** for the complete report.

A five-part series published by the San Francisco Chronicle on infant mortality rates in California (McCormick and Holding 2004) identified the Bayview-Hunters Point area as having significantly higher rates of infant mortality compared to the rest of San Francisco. Neighborhood-specific infant mortality rates were calculated using vital statistics data from each zip code for the years 1992 through 2001. All live births and infant deaths in a certain zip code were counted, and an infant mortality rate (deaths per 1000 births) was derived for the entire 10-year period (only zip codes that had at least 1000 births during this period were included).

The Chronicle staff that calculated infant mortality rates per zip code notes that this data is only intended as a general guideline and may not be statistically significant. They acknowledge that many of the zip code infant mortality rates “are not different enough from each other for the rankings to be considered indicative of statistically significant ongoing trends,” and that looking at a different set of years would undoubtedly yield different results (McCormick and Holding 2004). In addition, several zip codes were created, eliminated, or had their boundaries change over the course of the 10-year period examined, which is not accounted for by the rates calculated.

Part 1 of this series focused on the Bayview-Hunters Point neighborhood (zip code 94124), which was determined to have almost 2.5 times higher infant mortality rates than the rest of the City (11.8 deaths per 1000 births). Other Bay Area hot spots with elevated rates of infant mortality are present in pockets of Richmond (11.3) and Oakland (10.9). The article examined various factors that may account for the elevated rates, including poverty, inadequate housing, crime, violence, pollution, and race. The article suggested that the combination of all these factors produces elevated levels of stress hormones in pregnant women, which may account for the high number of premature births in neighborhoods such as Bayview-Hunters Point.

Overall, the article found that all aspects of inner-city life, including environmental pollution and stress, might contribute to high rates of infant mortality. In the case of the Bayview-Hunter Point neighborhood, the large African American population is likely to be a factor (65 percent of infant deaths in the period studied were from African American families), and a concentration of polluting industries may be another (the City’s main power plants, sewage treatment plants, and the Hunters Point Naval Shipyard which is a former Superfund site are located in this neighborhood). The article indicates that “new research is finding links between infant death and pesticides, air

particles, smog and other types of pollution," but offers no specific references or evidence that pollution in the Bayview-Hunters Point area is higher than in other parts of the City. Similarly, the article notes that "studies show that residents of [Bayview-Hunters Point] face elevated rates of asthma, diabetes, and cervical and breast cancer," but no references are provided (McCormick and Holding 2004).

Staff reviewed the Chronicle series and the accompanying database of mortality rates per zip code, and determined that infant mortality rates calculated for San Francisco are generally consistent with what staff has found (as described in **Public Health Appendix D**). However, the scientific literature reviewed by staff did not identify infant mortality rates per zip code, but rather by race, which is a well-documented and far more statistically significant trend.

Staff concludes that the concerns raised in the Chronicle series are worthy of note and consideration by the City when evaluating their Air Quality Mitigation and Community Benefits Plan for the Bayview, Hunters Point, Dogpatch, and Potrero neighborhoods (See the Noteworthy Public Benefits section of this document). Staff also concludes that its analysis of potential health impacts from the proposed SFERP uses a highly conservative methodology that accounts for impacts to the most sensitive individuals in a given population, including newborns and infants. According to the results of staff's health risk assessment, emissions from the SFERP would not contribute significantly to morbidity or mortality in any age or ethnic group residing in the project area (See **Public Health Appendix E**).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

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

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

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

- Identify the types and amounts of hazardous substances that the SFERP could emit to the environment;
- Estimate worst-case concentrations of project emissions in the environment using dispersion modeling;
- Estimate amounts of pollutants to which people could be exposed through inhalation, ingestion, and dermal contact; and

- 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 will be much lower than the risks as estimated by the screening level assessment. The risks for screening purposes are based on examining conditions that would lead to the highest, or worst-case risks, and then using those conditions in the study. Such conditions include:

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

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

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

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

The analysis for noncancer health effects compares the maximum project contaminant levels to safe levels called "reference exposure levels" or RELs. These are amounts of toxic substances to which even sensitive people can be exposed and suffer no adverse health effects (OEHHA 2003, p. 6-2). These exposure levels are designed to protect the most sensitive individuals in the population, such as infants, the aged, and people suffering from illness or disease which makes them more sensitive to the effects of toxic substance exposure. The 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 the California Air Pollution Control Officers Association (CAPCOA) guidelines, the health risk assessment assumes that the effects of each substance are additive for a given organ system (OEHHA 2003, pp. 1-5, 8-12). Other possible mechanisms due to multiple exposure include those cases where the actions may be synergistic or antagonistic (where the effects are greater or less than the sum, respectively). For these types of substances, the health risk assessment could underestimate or overestimate the risks.

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

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

The screening analysis is performed to assess worst-case risks to public health associated with the proposed project. If the screening analysis predicts no significant risks, then no further analysis is required. However, if risks are above the significance level, then further analysis, using more realistic site-specific assumptions would be performed to obtain a more accurate assessment of potential public health risks. This more detailed analysis will also include a specific analysis to determine if a significant disproportional impact to a minority or low income population exists.

Significance Criteria

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. The significance of project health impacts is determined separately for each of the three categories.

Acute and Chronic Noncancer Health Effects

Staff assesses the significance of 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 which 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. Under these conditions, health protection from the project is likely to be achieved, even for sensitive members of the population. In such a case, staff presumes that there would be no significant 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, section 12703(b) states that "the risk level which represents no significant risk shall be one which is calculated to result in one excess case of cancer in an exposed population of 100,000, assuming lifetime exposure." This level of risk is equivalent to a cancer risk of 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 Bay Area Air Quality Management District (BAAQMD) Board of Directors 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, BAAQMD's Toxic Air Contaminant Regulation (Regulation 2, Rule 5, adopted June 15, 2005) states that a project with an incremental cancer risk of between one and ten in one million is acceptable if best available control technology has been applied to reduce risk (BAAQMD 2005). In general, BAAQMD would not approve a project with a cancer risk exceeding ten in one million (regulations 2-5-301 and 2-5-302).

As noted earlier, the initial risk analysis for a project is typically performed at a screening level, which is designed to overstate actual risks, so that health protection can be ensured. Staff's analysis also addresses potential impacts on all members of the population including the young, the elderly, people with existing medical conditions that may make them more sensitive to the adverse effects of toxic air contaminants, and any minority or low income populations that are likely to be disproportionately affected

by impacts. In order to accomplish this goal, staff utilizes the most current acceptable public health exposure levels (both acute and chronic) set to protect the public from the effects of airborne toxics. When a screening analysis shows cancer risks to be above the significance level, refined assumptions would likely result in a lower, more realistic risk estimate. If facility risk, based on refined assumptions, exceeds the significance level of ten in one million, staff would require appropriate measures to reduce the risk to less than significant. If, after all risk reduction measures had been considered, a refined analysis identifies a cancer risk greater than ten in one million, staff would deem such risk to be significant, and would not recommend project approval.

DIRECT/INDIRECT IMPACTS AND MITIGATION

CONSTRUCTION IMPACTS AND MITIGATION

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

Site disturbances occur during facility construction from excavation, grading, and earth moving. Such activities have the potential to adversely affect public health through various mechanisms, such as the creation of airborne dust, material being carried off-site through soil erosion, and uncovering buried hazardous substances.

A site characterization study was conducted on the proposed project site by Dames & Moore in 1987. The only findings were drums and containers that were subsequently disposed off-site. A site investigation of soil and groundwater in the area proposed to be occupied by the San Francisco Municipal Railway (MUNI) facility was conducted by AGS Inc. in 1999. The investigation concluded that both soil and groundwater in portions of the MUNI site are contaminated with petroleum hydrocarbons (from diesel), motor oil, Bunker C-oil, arsenic, and lead (SFPUC 2005a Section 8.13.3). Since the proposed SFERP site is adjacent to the proposed MUNI site and had been historically used for the same purpose, it is likely that the same levels of contamination exist in soil and groundwater at the SFERP site. For a more detailed discussion of the findings please refer to the **Waste Management** Section of this document.

Staff believes that adherence to current ordinances requiring identification and removal of asbestos containing materials (ACM), removal of regulated building materials, site soils and groundwater characterization and remediation, inclusion of the site under the neighboring MUNI site's Risk Management Plan, Site Management Plan, and deed restrictions with San Francisco Bay Regional Water Quality Control Board oversight, and staff's proposed Conditions of Certification as described in the **Waste Management** Section of this document will be more than adequate to address any soil or groundwater contamination that exists on this site.

The operation of construction equipment will 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. Environmental Protection Agency (U.S. EPA) as hazardous air pollutants and by CARB as toxic air contaminants.

Exposure to diesel exhaust may cause 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 (SRP) on Toxic Air Contaminants 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, established pursuant to California Health and Safety Code section 39670, evaluates the risk assessments of substances proposed for identification as Toxic Air Contaminants by CARB and the Department of Pesticide Regulation (DPR). The SRP reviews the exposure and health assessment reports and the underlying scientific data upon which the reports are based.] 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, CARB listed particulate emissions from diesel-fueled engines as a toxic air contaminant and approved SRP's recommendations regarding health effect levels.

Construction of SFERP is anticipated to take place over a period of 12 months, including site preparation. As noted earlier, assessment of chronic (long-term) health effects assumes continuous exposure to toxic substances over a significantly longer time period, typically from eight to seventy years.

AFC Appendix 8.1D presents diesel exhaust emissions from engines and fugitive dust from construction activities. The applicant estimated worst-case hourly dust emissions of 22.8 lb/day of particulate matter less than 10 microns (PM10) and 10.9 lb/day of particulate matter less than 2.5 microns (PM2.5). Diesel emissions are generated from sources such as trucks, graders, cranes, welding machines, electric generators, air compressors, and water pumps. Modeling of construction activities including impacts of fugitive dust over a 12 month period resulted in a predicted annual average concentration of 1.1 $\mu g/m^3$ of PM10 and 0.6 $\mu g/m^3$ PM2.5 at any location. (SFPUC 2005a, Table 8.1D-4). Mitigation measures are proposed by both the applicant and Air Quality staff to reduce the maximum calculated PM10 as well as PM2.5 concentrations. These include the use of extensive fugitive dust control measures. 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, Air Quality staff recommends the use of ultra low sulfur diesel fuel **and** Tier 2 or Tier 1 California Emission Standards for Off-Road Compression-Ignition Engines or the installation of an oxidation catalyst **and** soot filters on diesel equipment. The catalyzed diesel particulate filters are passive, self-regenerating filters that reduce particulate matter, carbon monoxide, and hydrocarbon

emissions through catalytic oxidation and filtration. The degree of particulate matter reduction is comparable for both mitigation measures in the range of approximately 85-92 percent. Such filters will reduce diesel emissions during construction and reduce any potential for significant health impacts. (See Condition of Certification AQ-SC5 for staff's proposal to control particulate matter.)

OPERATION IMPACTS AND MITIGATION

Emissions Sources

The emissions sources at the proposed SFERP include three gas turbines and a two-cell cooling tower.

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 8.1A-5 of the Application for Certification (AFC) lists non-criteria pollutants that may be emitted from SFERP turbines as combustion byproducts, along with their anticipated amounts (emission factors). Table 8.1A-6 lists emission rates from cooling tower emissions. Emission factors are from the California Air Toxics Emission Factors (CATEF II) database (CARB 2001). 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 RELs, which are used to calculate short-term and long-term noncancer health effects, and cancer unit risks, which are used to calculate the lifetime risk of developing cancer, as published in the OEHHA Guidelines (OEHHA 2003). **Public Health Table 2** lists 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. **Public Health Table 3** lists estimated emissions from the cooling towers.

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

Substance	Oral Cancer	Oral Noncancer	Inhalation Cancer	Noncancer (Chronic)	Noncancer (Acute)
Acetaldehyde			✔	✔	
Acrolein				✔	✔
Ammonia				✔	✔
Arsenic	✔	✔	✔	✔	✔
Benzene			✔	✔	✔
1,3-Butadiene			✔	✔	
Cadmium		✔	✔	✔	
Chromium VI		✔	✔	✔	
Copper				✔	✔
Diesel Exhaust			✔	✔	
Ethylbenzene				✔	
Formaldehyde			✔	✔	✔
Hexane				✔	
Lead	✔		✔		
Mercury		✔		✔	✔
Napthalene		✔	✔	✔	
Nickel		✔	✔	✔	✔
Polynuclear Aromatic Hydrocarbons (PAHs)	✔	✔	✔	✔	
Propylene				✔	
Propylene oxide			✔	✔	✔
Toluene				✔	✔
Xylene				✔	✔
Zinc				✔	

*Source:OEHHA 2003 Appendix L

PUBLIC HEALTH Table 3
Cooling Tower Emissions *

Constituent	Concentration in Cooling Tower Return Water (µg/l**)	Emissions (lb/hr)	Emissions (lb/day)	Emissions (lb/year)
Ammonia	1	3.91 E-08	9.39 E-07	3.43 E-04
Arsenic	10	3.91 E-07	9.39 E-06	3.43 E-03
Cadmium	1.5	5.87 E-08	1.41 E-06	5.14 E-04
Chromium III (2)	6.5	2.54 E-07	6.10 E-06	2.23 E-03
Copper	73	2.85 E-06	6.85 E-05	2.50 E-02
Lead	12.5	4.89 E-07	1.17 E-05	4.28 E-03
Mercury	0.1	3.91 E-09	9.39 E-08	3.43 E-05
Nickel	19.5	7.63 E-07	1.83 E-05	6.68 E-03
PAHs	0.8	3.13 E-08	7.51 E-07	2.74 E-04
PCBs	0.5	1.96 E-08	4.69 E-07	1.71 E-04
Zinc	309	1.21 E-05	2.90 E-04	1.06 E-01

E-08 is the same as 10^{-8}
* calculated from maximum drift rate of 19.55 lb/hr
** micrograms per liter or parts per billion
Source: AFC Table 8.1A-6 (SFPUC 2005a).

In order to evaluate the potential health impacts from cooling tower emissions, staff reviewed information on the water quality to be used for cooling at SFERP. The applicant states that the cooling water will be tertiary treated to Title 22 quality water for use in industrial processes. Since the SFERP recycled water quality data won't be available until after the water treatment facility begins to operate and the effluent is sampled, staff used water quality data from two other Bay Area wastewater treatment facilities that recycle to tertiary standards to estimate the water quality used for cooling at SFERP.

PUBLIC HEALTH Table 4
Estimated Quality of Recycled Water for Cooling

Water Quality Parameter	Palo Alto WPCP*	San Jose RWQCP**
Anions	**µg/l*** **	**µg/l**
Sulfate	n/a	104,000
Chloride	n/a	182,000
Bicarbonate	n/a	200,000
Metals		
Arsenic	0.9	1.2
Boron	n/a	513
Cadmium	0.2	<0.5
Calcium	n/a	54,600
Chromium	0.8	<0.9
Copper	7.1	3.4
Iron	n/a	92
Lead	0.4	<1.0
Magnesium	n/a	33,200
Mercury	0.005	0.0026
Nickel	3.3	6.7
Potassium	n/a	15,400
Selenium	0.7	n/a
Silver	0.2	<0.2
Sodium	n/a	157,000
Zinc	45.9	66
Other		
Turbidity (NTU)	0.7 NTU	1.0 NTU
pH (SU)	n/a	7.0 SU
Phosphate	10,700	1,950
Silicon	n/a	11,800
TDS	n/a	720,000
TSS	1,300	2,400
BOD	1,300	3,500
NH_3	400	300
NO_3 as N	18,500	8,000
NO_2 as N	13	<100
Cyanide	3.5	n/a

* Source: Palo Alto Regional Water Quality Control Plant web-site.
** Source: San Jose/Santa Clara Water Pollution Control Plant, average water quality for the year 2004.
*** micrograms per liter

Emissions Levels

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

The next step in the health risk assessment process is to estimate the ambient concentrations of toxic substances. This is accomplished by using a screening air dispersion model and assuming conditions that result in maximum impacts. The applicant's screening analysis was performed using the CARB/OEHHA Hotspots Analysis and Reporting Program (HARP) modeling program with a modification described in Amended AFC Appendix 8.1-C, Section 1.2. 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 OEHHA's Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA 2003) referred to earlier, and results in the following health risk estimates.

Impacts

The applicant's screening health risk assessment for the project, including combustion and non-combustion emissions, resulted in a maximum acute hazard index of 0.03 and a maximum chronic hazard index of 0.002. The locations of the maximum acute and chronic hazards are shown in Figure 8.1C-1 of the amended AFC. As **Public Health Table 5** 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 5
Operation Hazard/Risk at Point of Maximum Impact

Type of Hazard/Risk	Hazard Index/Risk	Significance Level	Significant?
ACUTE NONCANCER	0.03	1.0	No
CHRONIC NONCANCER	0.002	1.0	No
INDIVIDUAL CANCER	0.046×10^{-6}	10.0×10^{-6}	No

Source: SFPUC 2005a Section 8.6.4.2.1 and Tables 8.1C-2, 8.1C-3 and 81C-4.

As shown in **Public Health Table 5**, total worst-case individual cancer risk was calculated by the applicant to be 0.046 in one million at the location of maximum impact, which in this case is located in San Francisco Bay northeast of the proposed power plant (see SFPUC 2005a Figure 8.1C-1). The applicant also calculated a maximum cancer risk at the closest residence of 0.0008 in one million.

Staff reviewed the applicant's modeling and also conducted an independent risk assessment for the SFERP project using the CARB Hot Spots Analysis and Reporting Program (HARP). Staff's results are summarized below and the complete report including tables and figures can be found in **Public Health Appendix E**. Dispersion modeling and risk assessment were conducted by staff for source emissions under the following scenarios:

- all sources at SFERP (3 combustion turbines and 2 cooling tower cells)

- SFERP combustion turbines only
- SFERP cooling tower only

The analysis for cancer risk and noncancer hazard due to emissions from all 5 on-site sources (3 combustion turbines and 2 cooling tower cells) at the proposed SFERP facility estimated (using fine grid dispersion modeling) a cancer risk of 0.073 in one million at the point of maximum impact (PMI), which is located to the east of the facility boundary at the proposed construction laydown area. At the facility fenceline (conservatively assumed to be the location of the nearest workplace), cancer risk under the worker exposure scenario is 0.021 in one million. At the nearest residence located approximately 1,600 feet west of the facility, cancer risk is estimated to be 0.0014 in one million and at the nearest sensitive receptor located at Warm Water Cove Public Access (approximately 550 feet north of the facility), cancer risk is estimated to be 0.0027 in one million. Cancer risk at the maximally exposed sensitive receptor is 0.015 in one million at the Gloria B. Davis Middle School. All cancer risks due to emissions from SFERP are less than 1.0 in one million. All chronic and acute noncancer hazard indices are less than 1.0 indicating a lack of noncancer hazard from facility emissions at all receptors evaluated. Staff's results are summarized in **Public Health Table 6**.

PUBLIC HEALTH Table 6
Operation Hazard/Risk (Staff's Calculations)

Type of Hazard/Risk	Hazard Index/Risk	Significance Level	Significant?
ACUTE NONCANCER	0.038	1.0	No
CHRONIC NONCANCER	0.0027	1.0	No
INDIVIDUAL CANCER	0.073×10^{-6}	10.0×10^{-6}	No

Source: SFERP Final Staff Assessment Appendix E Table 3.

Further analysis of SFERP emissions was conducted in which cancer risk and noncancer hazard were determined separately for the combustion turbines and the cooling towers. Results indicated that the majority of cancer risk estimated for the facility (0.073 in one million at the PMI located just outside the eastern facility boundary) is due to cooling tower emissions.

In conclusion, staff's analysis shows that, while slightly different from the applicant's, SFERP emissions would not present significant cancer risk or noncancer hazards to any member of the public, including low income and minority populations.

Cooling Tower

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

industrial cooling towers and building heating, ventilating, and air conditioning systems, have been correlated with outbreaks of legionellosis.

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

As noted in the LORS section above, the State of California regulates recycled water for use in cooling towers in Title 22, Section 60303, California Code of Regulations. This section requires that, in order to protect workers and the public who may come into contact with cooling tower mists, chlorine or another biocide must be used to treat the cooling system water to minimize the growth of Legionella and other micro-organisms. This regulation applies to the SFERP project since it intends to provide onsite treatment of recycled water to tertiary standards for cooling purposes. Legionella is not regulated by the BAAQMD but BAAQMD suggests that facilities follow guidelines and recommendations made by the Cooling Technology Institute (CTI) in their February 2000 report titled "Legionellosis, Guideline: Best Practices for Control of Legionella" (CTI 2000).

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

In 2000 as noted above, 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. More recently, staff has received a 2005 report of testing in cooling towers in Australia that found the rate of Legionella presence in cooling tower waters to be extremely low, approximately three to six percent. The cooling towers all had implemented aggressive water treatment and biocide application programs similar to that required by proposed condition of certification **Public Health-1**.

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

Good preventive maintenance is very important in the efficient operation of cooling towers and other evaporative equipment (ASHRAE 1998). Preventive maintenance

includes having effective drift eliminators, periodically cleaning the system if appropriate, maintaining mechanical components in working order, and maintaining an effective water treatment program with appropriate biocide concentrations. Staff notes that most water treatment programs are designed to minimize scale, corrosion, and biofouling and not to control Legionella.

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

In order to ensure that Legionella growth is kept to a minimum, thereby protecting both nearby workers as well as members of the public, staff has proposed Condition of Certification **Public Health-1**. The condition would require the project owner to prepare and implement a biocide and anti-biofilm agent monitoring program to ensure that proper levels of biocide and other agents are maintained within the cooling tower water at all times, that periodic measurements of Legionella levels are conducted, and that periodic cleaning is conducted to remove bio-film buildup. Staff believes that with the use of an aggressive antibacterial program coupled with routine monitoring and biofilm removal, the chances of Legionella growing and dispersing would be reduced to an insignificant level.

Impacts on Background Asthma, Cancer, and Childhood Mortality

Staff has described the existing public health status in the area of the power plant in an earlier part of this section. Staff determined that residents of neighborhoods in the southeastern area of San Francisco, as well as several other neighborhoods in San Francisco, have some of the highest rates of asthma hospitalizations in the city. Yet, overall, the rate of adult and child asthma hospitalizations in San Francisco County is about the same as rates in Alameda County, greater than the rates in Contra Costa and Solano counties, and higher than the asthma target rates recommended by the Healthy People 2000 and Healthy People 2010 National Health Promotion & Disease Prevention Objectives. Asthma can be exacerbated and may even be caused by some of the same pollutants emitted from natural gas fired-power plants, especially small particulate matter (PM10 and PM2.5). However, as discussed in greater detail in the Air Quality section of this staff assessment, all PM emitted by the proposed project would be mitigated such that there would be no net gain of PM in the air. Furthermore, the closing of the Hunters Point power plant may also result in decreased airborne levels of particulate matter in these neighborhoods. Therefore, staff concludes that the project would have an insignificant impact on existing asthma rates in this part of San Francisco, including minority and low income populations.

Staff also reviewed the existing cancer rates and childhood mortality incidences in the vicinity of the proposed power plant. Staff determined that the observed cancer incidence rates for all cancers, breast cancer and childhood cancer for the Bayview-Hunters Point neighborhood are not greater than the rates expected for that population based on the rates reported for the greater San Francisco Bay Area, the state, and the nation. Staff did find that childhood mortality in the vicinity was greater than that found in the city but there are many causes of childhood mortality that are unrelated to power plant emissions. However, because the airborne concentrations of project emissions would be well below the RELs and the theoretical maximum cancer risk would be below the level of significance,

staff concludes that the proposed power plant emissions would not contribute significantly to either childhood mortality or to cancer rates for any population in the area regardless of ethnicity or economic status. This conclusion is based on RELs and cancer potency factors that are health-protective of all populations.

Prions

Because the proposed project would use treated wastewater for cooling, staff investigated the potential for exposure to prions that may be dispersed from the cooling tower. Prions have been defined as "small proteinaceous infectious particles which resist inactivation by procedures that modify nucleic acids" (Microbiology & Immunology 2004). Perhaps the best current working definition of a prion is "a proteinaceous infectious particle that lacks nucleic acid" (Prusiner 1997). The active component in prions is an abnormal protein called prion protein (abbreviated PrP), which has about 250 amino acids (Bolton 2000).

The smallest infectious prion particles are estimated to be somewhat smaller than viruses. Therefore, prions may not be retained by most of the filters that efficiently eliminate bacteria and viruses. Additionally, prions aggregate into particles of non-uniform size and cannot be solubilized by detergents, except under denaturing conditions where infectivity is lost (Bellinger-Kawahara 1988, Gabizon 1990, Safar 1990).

Humans might be infected by prions in two ways:

1. Acquired where an infectious agent is implicated.

   A person can be exposed via diet by consuming nerve tissue of infected animals, and following certain medical procedures such as surgery, growth hormone injections, and corneal transplants. Acquired infection may occur by the ingested prions being absorbed across the gut wall and once in the body, they are believed to convert normal proteins in the nervous system into the abnormal prion shape.

2. Apparent hereditary

   A person may actually inherit a gene that causes prions to form much like a dominant trait.

There is no evidence of prion transmission via skin contact or aerosol transmission from one human to another (PHSICC 1997, CDC 1997) or through environmental exposures.

Prions appear to be very stable outside of a host. There is evidence that some prion diseases can be spread through soil. Groundwater may also be a potential disease reservoir. University of Wisconsin-Madison researchers showed that prions literally stick to some soil types (UWM 2003).

Despite this stability and resistance to routine disinfection methods, prions can be destroyed by the application of protein denaturing organic solvents such as phenol and alkali such as sodium hydroxide (NaOH). They are inactivated by one Normal (1N) NaOH, sodium hypochlorite (two percent free chlorine concentration; household bleach is approximately five percent free chlorine), and steam autoclaving at 132°C for 4.5 hours (Prusiner S.B. et al 1981, 1984, 1993; Taylor 1995, Taylor 1997).

Staff concludes, based on the evidence available to date, that it is doubtful that prions would be present in treated wastewater from the proposed SFERP wastewater treatment plant used for cooling at the facility and that if any prions are present, they would not pose a significant health risk to the public.

CUMULATIVE IMPACTS AND MITIGATION

The maximum cancer risk for emissions from SFERP (calculated by staff) is 0.073 in one million at a location east of the facility boundary. The maximum impact location occurs where pollutant concentrations from SFERP 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 incidence rate due to all causes (environmental as well as life-style and genetic). 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 thus overstate the true magnitude of the risk expected. Therefore, staff does not consider the incremental impact of the additional risk posed by the SFERP to be either individually or cumulatively significant.

The worst-case long-term noncancer health impact from SFERP (0.0027 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 the result of emissions from the proposed power plant. As with cancer risk, long-term hazard would be lower at all other locations.

The BAAQMD has in the past examined the issue of cumulative impacts from facilities affecting the same neighborhood. The Air District concluded that elevated concentrations of toxic air contaminants from stationary sources tend to be quite localized and that cumulative risks are likely to occur only when multiple facilities with substantially low-level emissions are immediately adjacent to, or very close to, one another (BAAQMD 1993). The proposed SFERP is located about 0.3 miles away from the existing Potrero Power Plant and within 1.5 miles of Hunters Point Power Plant, and thus cumulative impacts may occur as a result of all three power plants operating. In order to address the issue in regards to public health, staff has used information collected from the BAAQMD for the existing Potrero Power Plant's Health Risk Assessment in order to compare the points of maximum impact from the Potrero Power Plant and the SFERP and their potential cumulative impacts. The BAAQMD provided two points of maximum cancer impact for the Potrero Power Plant: 0.7 in one million, which occurs in the San Francisco Bay, and the second highest maximum impact 0.6 in one million, which occurs south of the Potrero Power Plant site near the intersection of Quesada and Lane Streets. The BAAQMD stated that the chronic hazard index of 0.2 was conservatively calculated, though the maximum impacts from each source at the power plant occurred at the same location as the maximum cancer impact, and that they do not have any information on the acute hazard index for the existing Potrero Power Plant (BBAQMD 2004a).

To further assess potential cumulative impacts, a detailed public health cumulative risk assessment was conducted for emissions of toxic air contaminants from facilities located in the vicinity of the proposed SFERP facility. Twenty (20) facilities were

included in the analysis: all three power plants mentioned above, one water treatment control plant, three dry cleaners, ten gasoline dispensing service stations, a steel drum facility, a printing facility and SF Petroleum. A total of 50 sources were evaluated using CARB's Hot Spots Analysis and Reporting Program (HARP). The results are presented below and the complete report including the approach, assumptions, and all tables and figures can be found in **Public Health Appendix E** of this document.

Using fine grid modeling, the PMI for this analysis was identified in the neighborhood near One-Hour Martinizing, with a cancer risk of 19 in one million. Thus, estimates of cancer risk due to emissions from the proposed SFERP project, 0.073 in one million, are much less than the cancer risk calculated due to the cumulative emissions of facilities in the southeastern section of San Francisco. In the cumulative analysis, all off-site chronic noncancer hazard indices are less than 1.0, indicating a lack of chronic noncancer hazard from cumulative facility emissions at all receptors evaluated. Acute noncancer hazard indices are less than 1.0 in all areas evaluated with the exception of the area just to the northeast of the Southeast Water Pollution Control Plant (SE WPCP).

Based on the results of this cumulative analysis (presented in Tables 3 and 6 of **Public Health Appendix E**), risk due to SFERP emissions contributes only 0.4 percent to the total risk estimated for the residence located nearest SFERP (0.0014 in one million for SFERP emissions compared to 0.37 in one million calculated for emissions from 20 facilities including SFERP). For the sensitive receptor located nearest SFERP, at Warm Water Cove Public Access Park, the contribution of risk due to SFERP emissions represents 1.2 percent to the total risk.

As described above, the contribution of SFERP to both cancer risk and chronic and acute noncancer disease are comparatively very small. Even in a cumulative context including other regional sources, the estimates for cancer risk from the SFERP project are less than significant. In addition, SFERP's contribution to chronic and acute noncancer disease is less than significant in a cumulative context.

Staff has also reviewed and evaluated the concerns expressed by the public about the proposed Muni bus yard at Islais creek. The Islais Creek Maintenance Facility is designed to replace the existing Kirkland Motor Coach Division at North Point and Stockton Streets, and provide maintenance services to MUNI's future vehicles that use "lighter than air" fuels as well as the 106 hybrid electric vehicles MUNI plans to purchase by the end of 2006. The facility will also provide parking for 135 of MUNI's diesel motor coaches and will include structures for operations, maintenance (including fuel and wash), and administration. The site will include approximately 8.3 acres at 1301 Cesar Chavez Street, between Cesar Chavez St., Indiana St., I-280, and Islais Creek.

In February 2005, MUNI has requested $16 million of Proposition K funds, of which $6 million was granted in March 2005. These funds were requested to pay for phase I construction of the Islais Creek facility. The structure is designed using green building features, such as windows that cut glare while reducing heating and cooling requirements, clear windows in the bus maintenance area to take advantage of daylight, recycled and/or sustainably-harvested building materials, and electrically efficient lighting. Despite repeated phone calls to the Muni, staff has not been able to determine the time table for construction and completion of this facility nor to determine how long

diesel busses will be present, what kind of emissions the hybrid busses will have, and what exactly will be the "lighter than air" fuel, although staff assumes it will be compressed natural gas (CNG). However, since CNG vehicles and hybrid vehicles do not burn diesel, these vehicles will not have diesel emissions, including diesel particulates. Additionally, the cumulative modeling conducted by staff as described above, showed that small-source emissions such as diesel emissions from diesel buses going to and from the facility would not have a significant cumulative impact because the impacts would be local and not overlap with emissions from the proposed SFERP. Thus, staff believes that the presence of this facility would not result in a significant cumulative impact.

COMPLIANCE WITH LORS

Staff concludes that construction and operation of the SFERP will be in compliance with all applicable LORS regarding long-term and short-term project impacts in the area of Public Health.

NOTEWORTHY PUBLIC BENEFITS

The City of San Francisco is in the process of developing an Air Quality-related particulate matter (PM10) mitigation and community benefits program, which would ensure reduction of emissions in the project vicinity, and minimize social, economic, and cultural impacts of the project. The City has arranged a number of public meetings and workshops to obtain public input and recommendations on air quality mitigation. The City has submitted a draft plan identifying infrastructure and capital improvements to reduce air pollution in the southeast part of San Francisco.

In addition, the City operates air monitoring stations (in this time period prior to SFERP operation) that collect information on air quality and provide a basis to address community concerns related to the possible need for further mitigation measures. One of these monitoring stations was jointly operated by the BAAQMD, the CARB, and the San Francisco Dept. of the Environment. It was located in Whitney Young Circle at Hudson and Progress streets and has collected data on criteria and toxic air pollutants in the Hunters Point community from mid-June 2004 through the end of June 2005.

Five other monitoring stations are located in the Potrero Hills and Bayview/Hunters Point neighborhoods. Data collected from two stations in Bayview/Hunters Point and two located in Potrero local stations are being compared with data collected from the BAAQMD Arkansas Street monitoring station to determine if there are any significant local variations in air quality. Air quality data from the Whitney Young Circle and Arkansas Street stations have so far showed comparable concentrations of air pollutants (SFPUC 2005a Section 4.5). Depending on the data obtained from these stations, the City may continue to monitor the air quality in the southeast part of the City after SFERP start-up.

In addition to the above, it is noteworthy that one of the project objectives of SFERP is to enable the shutdown of Hunters Point Units 1 and 4. The City has been in discussions with the Independent System Operator (Cal ISO) regarding the

prerequisites to such a shutdown and for the termination of the Reserve Must Run (RMR) contracts with the Mirant Potrero generation facility. This process is still evolving but it appears increasingly likely that the Hunters Point Units will shut down as a result of these efforts in the approximate time frame that SFERP comes on-line. (See the **Transmission System Evaluation** section of this staff assessment.) The Hunters Point units are old, have higher emissions, and have been a community health concern for many years. The final closure of these units will constitute a benefit to the surrounding community and the air basin by removing this concern.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Members of the community have provided verbal comments at workshops as well as pre-workshop meetings expressing concerns on a variety of public health issues. These issues include the existing health status of South East San Francisco neighborhoods, emissions from multiple existing and planned sources, and concerns over the placement of new and expanded MUNI bus yards. Staff has provided a discussion of the existing health issues in the Southeast portion of San Francisco in the **SETTING** section and cumulative impacts from multiple sources are addressed in the **CUMULATIVE IMPACTS** section. Concerns about the proposed MUNI bus yard are addressed in the Cumulative Impacts section above.

There have been no agency or public comments on the staff PSA.

CONCLUSIONS

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

PROPOSED CONDITION OF CERTIFICATION

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

Verification: 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.

REFERENCES

American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) 1998. Legionellosis: Position Paper. June 25.

Bay Area Air Quality Management District (BAAQMD) 1993. Cumulative Air Toxics Modeling Study. Staff Report. July.

Bay Area Air Quality Management District (BAAQMD) 2000a. "Cooling Towers" written by Barry Young and Ellia Ciammaichella, July 17, 2000.

Bay Area Air Quality Management District (BAAQMD) 2000b. Final Determination of Compliance, Metcalf Energy Center, Application no. 27215. August 24.

Bay Area Air Quality Management District (BAAQMD) 2004a. E-mail received from Jane Lundquist in response to questions, dated May 24, 2004.

Bay Area Air Quality Management District (BAAQMD) 2004b. Toxic Air Contaminant Control Program Annual Report 2002. Volume I. June.

Bay Area Air Quality Management District (BAAQMD) 2005. Bay Area AQMD Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants. June 15.

Bellinger-Kawahara C.G., Kempner E., Groth D.F., Gabizon R., Prusiner S.B. 1988. Scrapie prion liposomes and rods exhibit target sizes of 55,000 Da. Virology **164**:537-541.

Bolton, David C. 2000. "Do Prions Exist?" Nova Online. <http://www.pbs.org/wgbh/noca/nadcow/prions.html>

California Air Resource Board. 2002. California Air Quality Data, http://www.arb.ca.gov/aqd/aqd.htm

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

CDC. 1997. Creutzfeldt-Jakob disease associated with cadaveric dura mater grafts - Japan, January 1979-May 1996. MMWR **46**:1066-1069.

Cooling Technology Institute (CTI). 2000. Guidelines: Best Practices for Control of Legionella.

County of San Diego Department of Environmental Health (CSDEH), 2001. Recycled Water Plan Check and Inspection Manual, Attachment 53: Recycled Water Use in Cooling Towers.

Environmental Protection Agency (EPA) November 1999. (EPA-822-R-99-001) "Legionella: Human Health Criteria Document."

Gabizon R., Prusiner S.B. 1990. Prion liposomes. Biochem J **266**:1-14.

McCormick, Erin, and Raynolds Holding, 2004. "Too Young To Die." The San Francisco Chronicle, October 3 through 7. <http://www.sfgate.com/n/s/p/2004/infantmortality/>

Microbiology and Immunology 2004. "Prion Diseases" <http://www-micro.mbs.le.ac.uk/3035/prions.html>

OEHHA 2003. Office of Environmental Health Hazard Assessment. Air Toxics Hot Spots Program Risk Assessment Guidelines. The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. August.

Prusiner S.B., Groth D., Serban A., Stahl N., Gabizon R. 1993. Attempts to restore scrapie prion infectivity after exposure to protein denaturants. Proc Natl Acad Sci USA **90**:2793-2797.

Prusiner S.B., Groth D.F., McKinley M.P., Cochran S.P., Bowman K.A., Kasper K.C. 1981. Thiocyanate and hydroxyl ions inactivate the scrapie agent. Proc Natl Acad Sci USA **78**:4606-4610.

Prusiner S.B., McKinley M.P., Bolton D.C., Bowman K.A., Groth D.F., Cochran S.P., Hennessey E.M., Braunfeld M.B., Baringer J.R., Chatigny M.A., 1984. "Prions: methods for assay, purification and characterization." In: Methods in Virology. Maramorosch K., Koprowski H., Eds. Academic Press, New York, pp. 293-345.

Prusiner, Stanley B. 1997. *Science* 278, 245-251.

Prusiner, Stanley B. 1998. Nobel Lecture "Prions", Proc. Natl. Acad. Sci., Vol 95, 13363, November.

Public Health Service Interagency Coordinating Committee (PHSICC). 1997. Report on Human Growth Hormone and Creutzfeldt-Jakob Disease. **14**:1-11.

Safar J., Ceroni M., Piccardo P., Liberski P.P., Miyazaki M., Gajdusek D.C., Gibbs C.J., Jr. 1990. Subcellular distribution and physicochemical properties of scrapie associated precursor protein and relationship with scrapie agent. Neurology **40**:503-508.

SFERP 2004a - City and County of San Francisco/Blout (tn:31130). Application for Certification San Francisco Electric Reliability Project - 145-megawatt natural gas-fired peaking power plant located in San Francisco. Submitted to the California Energy Commission 3/18/04.

SFERP 2004c - CH2MHill/Carrier (tn:31127). Electronic copies (CD-ROM) of SFERP Ambient Air Quality Modeling Files, March 04. Submitted to the California Energy Commission 3/18/2004.

SFERP 2004d - CH2MHill/Carrier (tn:31128). Sets of 7.5 Minute U.S. Geological Survey (USGS) Quad Maps Submitted to the California Energy Commission 3/18/04.

SFERP 2004h - CH2MHill/Carrier (tn:31274). Attachment to the Data Adequacy Supplement: Attachment WM-DA-1, the Phase I Environmental Site Assessment. Submitted to the California Energy Commission 4/16/04.

SFERP 2004o – CH2MHill/Carrier (tn:31856). Data Response Set 1A. Attachment S&W-48, Analytical Results for February 2004 Sampling Event. Submitted to the California Energy Commission 7/6/04.

SFERP 2004q – CH2MHill/Carrier (tn:31854). Data Responses Set 1A. Response to Staff's Data Requests dated 6/4/04. Submitted to the California Energy Commission 7/6/04.

SFPUC 2005a – San Francisco Public Utilities Commission/Hale (tn: 34403). Amendment A of the Application for Certification. Submitted to the California Energy Commission 3/25/05.

SRP. 1998. Scientific Review Panel on Toxic Air Contaminants. Findings of the Scientific Review Panel on The Report On Diesel Exhaust as adopted at the Panel's April 22, 1998 Meeting.

Taylor D.M., Woodgate S.L., Atkinson M.J. 1995. Inactivation of the bovine spongiform encephalopathy agent by rendering procedures. Vet Rec **137**:605-610.

Taylor D.M., Woodgate S.L., Fleetwood A.J., Cawthorne R.J.G. 1997. Effect of rendering procedures on the scrapie agent. Vet Rec **141**:643-649.

Title 22, California Code of Regulations, March 20, 2001.

University of Wisconsin-Madison (UWM) 2003. "Study shows prions stick around in certain soils." September. <http://www.eurekalert.org/pub_releases/2003-09>

Public Health Appendix A

CRITERIA POLLUTANT HEALTH EFFECTS

CRITERIA POLLUTANT HEALTH EFFECTS

OZONE (O_3)

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

The U.S. EPA revised the federal ozone standard on July 18, 1997 (62 Fed. Reg. 38856), based on new health studies which became available since the standard was last revised in 1979. These new studies showed that adverse health effects occur at lower ambient concentrations over longer exposure times than those reflected in the previous standard, which was based on acute health effects associated with heavy exercise and short-term exposures. The U.S. EPA's proposed ozone rule lists health effects which have been attributed to result from short-term (one to three hours) and prolonged (six to eight hours) exposure to ozone (61 Fed. Reg. 65719). However, a 1999 federal court ruling blocked implementation of the ozone 8-hour standard. EPA has asked the U.S. Supreme Court to reconsider that decision.

Acute health effects induced by short-term exposures include transient reductions in pulmonary function, and transient respiratory symptoms including cough, throat irritation, chest pain, nausea, and shortness of breath with associated effects on exercise performance. Other health effects associated with short-term or prolonged O_3 exposures include increased airway responsiveness (a predisposition to bronchoconstriction caused by external stimuli such as pollen and dust), susceptibility to respiratory infection by impairing lung defense mechanisms, increased hospital admissions and emergency room visits, and transient pulmonary inflammation.

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

CARBON MONOXIDE (CO)

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

CO reduces the oxygen carrying capacity of the blood, thereby disrupting the delivery of oxygen to the body's organs and tissues. Persons sensitive to the effects of carbon monoxide include those whose oxygen supply or delivery is already compromised. Thus, groups potentially at risk to carbon monoxide exposure include persons with coronary artery disease, congestive heart failure, obstructive lung disease, vascular disease, anemia, the elderly, newborn infants, and fetuses (CARB 1989, p. 9). In particular, people with coronary artery disease were found to be especially at risk from carbon monoxide exposure (CARB 1989, p. 9). Tests conducted on patients with confirmed coronary artery disease indicated that exposure to low levels of carbon monoxide during exercise produced significant cardiac effects. These included earlier onset of chest pain (angina) and electrocardiographic changes indicative of effects on the heart muscle (CARB 1989, p. 6). Such changes can limit the ability of patients with coronary artery disease to exert themselves even moderately. Therefore, the statewide carbon monoxide one hour and eight hour standards were adopted in part to prevent aggravation of chest pain. Additionally, however, the standards are intended to prevent decreased exercise tolerance in persons with peripheral vascular disease and lung disease, impairment of central nervous system functions, and increased risk to fetuses (Title 17, Cal. Code Regs., secϋ70200).

PARTICULATE MATTER (PM)

Particulate matter is a generic term for particles of various substances, which occur as either liquid droplets or small solids of a wide range of sizes. Particles with the most potential to adversely affect human health are those less than 10 micrometers (millionths of a meter) in diameter (or PM10), which may be inhaled and deposited within the deep portions of the lung (PM10). PM may originate from anthropogenic or natural sources such as stationary or mobile combustion sources or windblown dust. Particles may be emitted directly to the atmosphere or result from the physical and chemical transformation of gaseous emissions such as sulfur oxides, nitrogen oxides, and volatile organic compounds. PM10 may be made up of elements such as carbon, lead, and nickel; compounds such as nitrates, organics, and sulfates; and complex mixtures such as diesel exhaust and soil fragments. The size, chemical composition, and concentration of ambient PM10 can vary considerably from area to area and from season to season within the same area.

PM10 can be grouped into two general sizes of particles, fine and coarse, which differ in formation mechanisms, chemical composition, sources, and potential health effects. Fine-mode particles are those with a diameter of 2.5 micrometers or less (PM2.5), while the coarse-mode fraction of PM consists of particles ranging from 10 micrometers down to 2.5 micrometers in diameter.

Coarse-mode PM10 is formed by crushing, grinding, and abrasion of surfaces, and in the course of reducing large pieces of materials to smaller pieces. Coarse particles consist mainly of soil dust containing oxides of silicon, aluminum, calcium, and iron; as well as fly ash, particles from tires, pollen, spores, and plant and insect fragments.

Coarse particles normally have shorter lifetimes (minutes to hours) and only travel over short distances (of less than tens of kilometers). They tend to be unevenly distributed across urban areas and have more localized effects than the finer particles.

PM2.5 is derived both from combustion by-products, which have volatilized and condensed to form primary PM2.5, and from precursor gases reacting in the atmosphere to form secondary PM2.5. Components include nitrates, organic compounds, sulfates, ammonium compounds, and trace elements (including metals) as well as elemental carbon such as soot. Major sources of PM2.5 are fossil fuel combustion by electric utilities, industry and motor vehicles, vegetation burning, and the smelting or other processing of metals. Dry deposition of fine mode particles is slow allowing such particles to often exist for long periods of time (of from days to weeks) in the atmosphere and travel hundreds to thousands of kilometers. They tend to be uniformly distributed over urban areas and larger regions and are removed from the atmosphere primarily by forming cloud droplets and falling out within raindrops.

The health effects of PM10 from any given source usually depend on the toxicity of its constituent pollutants. The size of the inhaled material usually determines where it is deposited in the respiratory system. Coarse particles are deposited most readily in the nose and throat area while the finer particles are more likely to be deposited within the bronchial tubes and air sacs, with the greatest percentage deposited in the air sacs. Until recently, PM10 particles had been considered to be the major fraction of airborne particulates responsible for various adverse health effects. The PM10 fraction is known to be capable of penetrating the thoracic and alveolar regions of the human and animal lungs. The PM2.5 fraction, however, was found to pose a significantly higher risk for health. This is due to their size and associated deposition and retention characteristics in the respiratory tract, enabling it to penetrate and deposit within the deeper alveolar regions of the lung. The following aspects of PM2.5 deposition all contribute to the more serious health effects attributed to smaller particles:

- The deposition of PM2.5 favors the periphery of the lungs, which is especially vulnerable to injury for anatomical reasons.
- Clearance of the PM2.5 from within the deeper reaches of the lungs is a much slower process than from the upper regions. Consequently, the residence time is longer, implying longer exposure, and hence greater risk.
- The human anatomy further allows the penetration of the superficial tissues by PM2.5 and entry into the bodily circulation without much effort in the periphery of the lungs.

Many epidemiological studies have shown exposure to particulate matter capable of inducing a variety of health effects, including premature death, aggravation of respiratory and cardiovascular disease, changes in lung function and increases in existing respiratory symptoms, effects on lung tissue structure, and impacts on the body's respiratory defense mechanisms. The underlying biological mechanisms are still poorly understood. Based on their review of a number of these epidemiological studies (as published after 1987 when the federal standards were revised), together with suggestion of PM2.5 concentrations as a more reliable surrogate for the health impacts of the finer fraction of PM than PM10, the U.S. EPA concluded that the then-current standards were not sufficiently stringent to protect against significant effects in exposed humans. Therefore, federal PM standards were revised on July 18, 1997 (62 Fed. Reg.

38652) to add new annual and 24-hour PM2.5 standards to the existing annual and 24-hour PM10 standards. Taken together, these new standards were meant to provide additional protection against a wide range of PM-related health effects, including premature death, increased hospital admissions and emergency room visits, primarily among sensitive individuals such as the elderly, children and individuals with cardiopulmonary diseases such as asthma. Other impacts include decreased lung function (particularly in children and asthmatics), and alterations in lung tissue and structure.

California has also had 24-hour and annual standards for PM10 (CARB 1982, pp. 81,84). These studies were aimed at establishing the PM10 levels capable of inducing asthma, premature death and bronchitis-related symptoms. They were set to protect against such impacts in the general population as well as sensitive individuals such as patients with respiratory disease, declines in pulmonary function, especially as related to children (Tit. 17, Cal. Code Regs., sec. 70200). These standards were set to be more stringent than the federal standard, which the ARB regarded as inadequate for the protection desired (CARB 1991, p. 26).

On June 20, 2002, the ARB approved the adoption of a lower annual state standard for PM10, as well as a new annual standard for PM2.5 (CARB 2002). The 24-hour PM10 standard was not changed. The standards were established to prevent excess death, illnesses such as respiratory symptoms, bronchitis, asthma exacerbation, and cardiac disease, and restrictions in activity from short- and long-term exposures (Title 17, Cal. Code Regs., sec. 70200).

NITROGEN DIOXIDE (NO_2)

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

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

Health effects of particular concern in relation to low-level nitrogen dioxide exposure include: (1) effects of acute exposure on some asthmatics and possibly on some persons with chronic bronchitis, (2) effects on respiratory tract defenses against infection, (3) effects on the immune system, (4) initiation or facilitation of the development of chronic lung disease, and (5) interaction with other pollutants (CARB 1992, Appendix A, p. 5).

Several groups which may be especially susceptible to nitrogen dioxide related health effects have been identified (CARB 1992, Appendix A, p. 3). These include asthmatics, persons with chronic bronchitis, infants and young children, cystic fibrosis and cancer patients, people with immune deficiencies, and the elderly.

Studies using controlled brief exposures on sensitive groups have shown an increase in bronchial reactivity or airway responsiveness of some asthmatics, and decreased lung function in some patients with chronic obstructive lung disease (CARB 1992, Appendix A, p. 2). In general, bronchial hyperreactivity (an exaggerated tendency of the airways to constrict) is markedly greater in asthmatics than in nonasthmatics upon exposure to respiratory irritants (CARB 1992a, p. 107). At exposure concentrations relevant to the current one hour ambient standard, there appears to be little, if any, effect on respiratory symptoms of asthmatics (CARB 1992a, p. 108).

SULFUR DIOXIDE (SO_2)

Sulfur dioxide is formed when any sulfur-containing fuel is burned. SO_2 is highly soluble and consequently absorbed in the moist passages of the upper respiratory system. Exposure to sulfur dioxide can cause changes in lung cell structure and function that adversely affect a major lung defense mechanism known as muco-ciliary transport. This mechanism functions by trapping particles in mucus in the lung and sweeping them out via the cilia (fine hair-like structures) also in the lung. Slowed mucociliary transport is frequently associated with chronic bronchitis.

Exposure to sulfur dioxide can produce both short- and long-term health effects. Therefore, California has established sulfur dioxide standards to reflect both short- and long-term exposure concerns. Based on controlled exposure studies of human volunteers, investigators have found that asthmatics comprise the group most susceptible to adverse health effects from exposure to sulfur dioxide (CARB 1994, p. V-1).

The primary short-term effect is bronchoconstriction, a narrowing of the airways which results in labored breathing, wheezing, and coughing. The short-term (one hour) standard is based on bronchoconstriction and associated symptoms (such as wheezing and shortness of breath) in asthmatics and is designed to protect against adverse effects from five to ten minute exposures. In the opinion of the California Office of Environmental Health Hazard Assessment, the short-term ambient standard is likely to afford adequate protection to asthmatics engaged in short periods of vigorous activity (CARB 1994, Appendix A, p. 16).

Longer-term exposure is associated with an increased incidence of respiratory symptoms (e.g., coughing and wheezing) or respiratory disease, decreases in pulmonary function, and an increased risk of mortality (CARB 1991a, p. 12). The long-term (24 hour) standard is based upon increased incidence of respiratory disease and excess mortality. The standard includes a margin of safety based on epidemiological studies which have shown adverse respiratory effects at levels slightly above the standard. Some of the studies indicate a sulfur dioxide threshold for effects, whereby "no adverse effects" are expected from exposures to concentrations at the state standard (Ibid.).

REFERENCES

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

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

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

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

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

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

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

CARB. 2004. California Air Resources Board. Annual Toxics Summary Data for the San Francisco-Arkansas Street Monitoring Station. http://www.arb.ca.gov/adam/toxics/toxics.html

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

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

Public Health Appendix B

Respiratory Disease Incidence in the Southeast Section of San Francisco

October 2005

RESPIRATORY DISEASE INCIDENCE IN THE SOUTHEAST

SECTION OF SAN FRANCISCO

INTRODUCTION

The Application for Certification (04-AFC-1), submitted by the City and County of San Francisco to the CEC in 2004, has initiated an extensive review of the environmental and public health impacts of the proposed simple-cycle peaking power plant, the San Francisco Electric Reliability Project (SFERP).

The purpose of this assessment is to identify the current status of respiratory disease - using asthma as the metric - in the population located near the proposed power plant (the Bayview Hunter's Point and Potrero Hill neighborhoods in the southeast section of San Francisco) to enable a comparison of the prevalence of respiratory disease in this area with such disease in populations located in other parts of San Francisco, the state, and the nation.

ASTHMA

The Asthma Epidemic and Causes

Asthma has emerged as a major public health problem in this country over the last 20 years (Kreutzer 1998; U.S. EPA 2003). Over that time period, asthma incidence in the U.S. has increased while asthma mortality and hospitalization rates have decreased (American Lung Association 2005a). Asthma rates among children have reached epidemic proportions in this state and throughout the entire United States (Kreutzer 1998; Thompson 2002; Bell 2002).

Based on a 2003 national estimate of asthma prevalence, 30.0 million Americans (10,410 per 100,000 population) had been diagnosed with asthma within their lifetime. The national rate for children aged 5-17 years old was reported to be 14,270 per 100,000 (ALA 2005a). In 2003, 19.8 million Americans, including 6.2 million children, experienced asthma symptoms, for rates of 6,940 per 100,000 for all Americans and 8,510 per 100,000 for children (ALA 2005a). Over 600 people die from asthma each year in California (DHS 2000a).

It has been estimated that in 2001, 3.9 million California adults and children, (11.9% of the state's population) had been diagnosed with asthma in their lifetime, a rate referred to as "lifetime asthma prevalence" (DHS 2003, Meng et al. 2003).

There are many theories about the causes of asthma (Redd 2002) but a consensus exists that lifestyle factors, genetics, environmental exposures and air pollution (Weisel 2002) are the major causes. Racial differences exist in terms of the incidence of asthma, which is 2 to 3 times higher among African-Americans than among Caucasian Americans (Redd 2002). Non-environmental factors which have been associated with asthma in the literature include obesity (Redd 2002; Rodriguez 2002), low income (Von Behren 2002; Castro 2001), low education level (Arif 2003), smoking (Von Behren 2002;

Arif 2003), and African-American ethnicity (Rodriguez 2002; Von Behren 2002; Castro 2001).

The American Lung Association lists the following factors as possible causes of poor air quality at schools (ALA 2000): molds, diesel bus fumes, old ventilation systems, solvents, marker fumes, chalk dust and pesticides. These agents can trigger asthma attacks in students. In the home, asthma can be triggered by conditions commonly found in substandard housing such as old carpet, molds, cockroach wastes and dust mites.

Coarse and fine fractions of Particulate Matter (PM10 and PM2.5, respectively) are also associated with an increased disease severity as manifested by increased admissions to hospital for asthma (Peden 2002). The California Air Resources Board (CARB), in an exhaustive compilation of the available scientific studies to date, summarized over eighteen studies assessing the ability of PM – fine and coarse - to exacerbate asthma (CARB 2002). CARB found that "evidence for a fairly consistent (but not universal) effect of PM10/2.5 has emerged over the last several years." But PM causation of asthma has not been proved.

Rates of Asthma Reported in San Francisco

Asthma rates in San Francisco have been reported based on three different sources of information: asthma mortality rates, asthma hospitalization data and a community and school-based survey regarding asthma.

Asthma Mortality in San Francisco

The California Department of Health Services reported asthma mortality statistics for 1990 to 1997 in the "California Asthma Mortality Chart Book" (DHS 2000a). Age-adjusted asthma mortality rates for 1990 to 1997, for all ages in San Francisco County, are shown below (age-adjusted to the 1970 U.S. population). The mortality rate observed in African-Americans is 2.6 times greater than the rate observed in non-Hispanic whites in San Francisco.

	Age-adjusted asthma mortality rate in San Francisco County 1990-1997 (in deaths per 100,000)
Total (all races/ethnicities)	2.46
Non-Hispanic White	1.69
African-American	4.35
Hispanic	-
Asian/Pacific Islander	3.43

Asthma Hospitalizations in San Francisco

Asthma hospitalization data provide information on patients with asthma so severe that they are admitted to the hospital for treatment. These data do not provide information on asthma incidence in the population or on how many people visit private doctors, emergency rooms or outpatient clinics for asthma, or on the mortality rate of asthma.

National and regional asthma hospitalization data were presented and evaluated by Jennifer Mann of the San Francisco Department of Public Health in a publication entitled

"Asthma in San Francisco" (Mann 2000). This study also cites the California Department of Health Services County Chart Book (1991-1994) which reports that age-adjusted asthma hospitalization rates are 2-3 times higher for African-American children compared to white, non-Hispanic children.

Similar trends in age-adjusted asthma hospitalization rates are reported by DHS in San Francisco county in the updated County Chart Books for asthma hospitalization rates in California counties for 1995-1997 (DHS 2000b) and for 1998 to 2000 (DHS 2003). A side-by-side comparison of the asthma hospitalization rate data presented in the three County Chart Books for three different time periods indicates a decrease of approximately 50% of asthma hospitalizations in San Francisco between 1991-2000. Age-adjusted asthma hospitalization rates by race/ethnicity for all ages and for children (ages 0-14) are presented below (annual rates per 100,000, age-adjusted to 1990 census data for the 1991-1994 and 1995-1997 data and to the 2000 U.S. population for the 1998-2000 data):

Age-adjusted asthma hospitalization rates in San Francisco County (annual rate per 100,000)

	1991-1994	1995-1997	1998-2000
Children 0-14:			
Non-Hispanic White	345	221	147
African American	805	664	365
Hispanic	556	351	194
Asian/Other**	n/a	213	116
All ages:			
Non-Hispanic White	151	128	94
African American	515	463	342
Hispanic	208	134	105
Asian/Other**	177	113	84

n/a = not available
**Asian/Other in 1991-1994 report; Asian/PI in 1995-1997 and 1998-2000 reports

In 1999, Nancy Warren of the Bay Area Regional Asthma Management and Prevention Initiative (RAMP) reported and compared asthma hospitalization rates in San Francisco, Alameda, Contra Costa and Solano counties for 1994-1996 (Warren 1999). In the Warren study, hospital discharge data were obtained from the Office of Statewide Planning and Development (OSHPD) Hospital Discharge Database 1994-1996. Warren concluded that children less than 15 years old, African-Americans and people living in urban areas have high rates of asthma hospitalizations. Information from the Warren study is also presented in the Mann study. The following sections contain information presented in both studies (unless otherwise noted).

Asthma Hospitalization Data for All Ages in San Francisco

The Warren (1999) study reports that, in San Francisco, the Bayview Hunter's Point area (zip code 94124) had the highest age-adjusted annual asthma hospitalization rate for all ages: 491 per 100,000. This rate is greater than the target rate of 160 per 100,000 recommended by the Healthy People 2000 National Health Promotion & Disease

Prevention Objectives for asthma hospitalization rates (DHHS 1999). Nine zip codes in San Francisco (of 21 zip codes evaluated) had hospitalization rates above the target value.

More recent data was provided by the Community Action to Fight Asthma (CAFA 2004a) for three-year averaged hospitalization rates for four Bay Area counties for the years 1998-2001. Data was obtained from OSHPD at the zip code tabulation area level (ZCTA). The Bayview Hunter's Point neighborhood again had the highest age-adjusted annual asthma hospitalization rate for all ages: 352 per 100,000 for 1998-2001. Of the 26 zip codes in San Francisco reported in the CAFA 2004 data, twelve zip codes had hospitalization rates above the Healthy People 2010 value of 93 per 100,000.

Data from these two studies are presented below for neighborhoods located in San Francisco (see Figure 1):

Asthma hospitalization rate, all ages (cases per 100,000):

Zip Code	Neighborhood	Warren (1999) 1994-1996		CAFA (2004a) 1998-2001	
		Rate	95% CI	Rate	95% CI
94102	Tenderloin	269	(232-309)	274	(235-319)
94103	South of Market	310	(260-364)	169	(136-211)
94104	Financial District	n/a		783*	(261-2770)
94105	Financial District	n/a		200*	(86-1270)
94107	Potrero Hill	306	(248-369)	192	(147-248)
94110	Mission/Bernal Heights	238	(218-259)	191	(171-213)
94111	Embarcadero	n/a		212*	(56-592)
94112	City College	206	(186-228)	137	(121-154)
94115	Western Addition	318	(277-361)	190	(159-226)
94117	Haight	191	(163-221)	135	(107-171)
94124	Bayview Hunter's Point	491	(444-541)	352	(316-393)
94134	Visitacion Valley	294	(262-328)	197	(172-224)

* Rates based on small populations; wide confidence intervals indicate high uncertainty in rates.
n/a = not available

Overall, San Francisco County had an age-adjusted rate of 190 per 100,000 (all ages). Asthma hospitalization rates reported in three other Bay Area counties (age-adjusted, all ages, rate per 100,000) are: Alameda County - 187, Contra Costa County - 127, and Solano County - 127.

By ethnicity (all ages), African-Americans in San Francisco exhibited the highest asthma hospitalization rate (478 per 100,000). In the Hispanic population the rate was 203 per 100,000, in the Asian population the rate was 142 per 100,000 and in the white population the rate was 107 per 100,000.

Adult and pediatric asthma hospitalization rates were reported for 1999-2001 for San Francisco, Bayview Hunters Point (zip code 94124) and Potrero Hill (zip code 94107, and including 94105, 94111 and 94130 which comprise parts of the Financial District,

the Embarcadero and Treasure Island; Hospital Council 2004). The rates are age-adjusted to the 2000 U.S. standard population and expressed per 100,000:

San Francisco	336.7
Bayview Hunters Point	851.2
Potrero Hill	455.3

Bayview Hunters Point had the highest rate of adult and pediatric asthma hospitalizations in San Francisco in 1999-2001 followed by the Tenderloin (zip code 94102) and Potrero Hill.

The California Department of Health Services (DHS 2005a) provided a summary of asthma hospitalization data for San Francisco County from the Patient Discharge Database, 2001-2003, Office of Statewide Health Planning and Development. The age-adjusted asthma hospitalization rates for San Francisco County are 97 per 100,000 hospitalizations for all ages and 157 per 100,000 for children ages 0-14 years. Rates for the State of California are 111 per 100,000 for all ages and 177 per 100,000 for children. Results by race/ethnicity are summarized below:

Age-adjusted Asthma Hospitalization Rates, per 100,000 hospitalizations and age-adjusted to the 2000 U.S. standard population:

Race/ethnicity	All ages	Children 0-14 years old
Non-Hispanic White	70	112
African American	385	490
Hispanic	85	192
Asian/PI	85	192

Asthma hospitalization rates for children and adults in San Francisco County and California were also compared to Healthy People 2010 target rates (DHS 2005a).
Age-adjusted Asthma Hospitalization Rates, per 100,000 hospitalizations and age-adjusted to the 2000 U.S. standard population:

Age	San Francisco County	State of California	Healthy People 2010 Goal
Less than 5 yrs	330	340	250
5-64 yrs	70	80	77
Older than 65	220	180	110

Asthma Hospitalization Data for Children in San Francisco

Children younger than 15 in San Francisco County had an asthma hospitalization rate (441 per 100,000) almost twice the Healthy People 2000 target of 225 per 100,000 for this age group and 2.5 times greater than the Healthy People 2010 target of 173 per 100,000 for ages younger than 18 years. By ethnicity (children under 15 years old), African-American children in San Francisco had the highest asthma hospitalization rate of 785 per 100,000. In the Hispanic population the rate was 544 per 100,000, in the Asian population the rate was 303 per 100,000 and in the white population the rate was 232 per 100,000.

Fifteen zip codes in San Francisco (of 18 zip codes evaluated) had hospitalization rates above the Healthy People 2000 target value for children under the age of 15 in 1994-1996. The highest rate was reported for Bayview Hunter's Point (approximately 850 per 100,000; Warren 1999).

More recent data on three-year averaged hospitalization rates for children in San Francisco were obtained for the years 1998-2001 (CAFA 2004a). The Bayview Hunter's Point neighborhood again had the highest age-adjusted annual asthma hospitalization rate for children under 15 years old: 503 per 100,000 for 1998-2001. Of the 26 zip codes in San Francisco reported in the CAFA 2004a data, thirteen zip codes had hospitalization rates above the Healthy People 2010 value of 173 per 100,000. Neighborhoods located in San Francisco had the following rates:

Asthma hospitalization rate, children 0-14 years old (cases per 100,000; confidence intervals not presented in Warren study):

Zip Code	Neighborhood	Warren (1999) 1994-1996	CAFA (2004a) 1998-2001	
		Rate	Rate	95% CI
94102	Tenderloin	477	403	(277-568)
94103	South of Market	542	216	(119-362)
94107	Potrero Hill	730	483	(314-716)
94110	Mission/Bernal Heights	575	314	(257-380)
94112	City College	470	313	(260-375)
94114	Castro/Noe Valley	330	219	(116-381)
94115	Western Addition	825	303	(203-436)
94116	Parkside/Forest Hill	220	228	(163-310)
94117	Haight	380	154	(79-277)
94118	Inner Richmond/Presidio	225	182	(118-270)
94121	Richmond/Sea Cliff	380	224	(155-314)
94122	Sunset	300	145	(97-208)
94124	Bayview Hunter's Point	850	503	(416-603)
94127	St. Francis Wood/West Portal	310	234	(145-359)
94131	Twin Peaks/Diamond Heights	340	132	(69-232)
94132	Lake Merced	406	141	(77-236)
94134	Visitacion Valley	680	295	(230-373)

Asthma Prevalence in San Francisco

The California Department of Health Services (DHS 2005a) provided a summary of asthma data from various sources for San Francisco County. Lifetime asthma prevalence rates were obtained from the California Health Interview Survey, 2003. Results (unadjusted for age) indicated that lifetime asthma prevalence in San Francisco County was 10.6% for all ages, compared to a prevalence rate of 13.0% for the State of California. San Francisco County children ages 0-14 years old had the same lifetime prevalence as children of the entire state, 13.8%.

Data on lifetime asthma prevalence in California counties were collected in the 2001 California Health Interview Survey (CHIS; Meng et al. 2003). CHIS conducted phone

interviews of over 55,000 households from throughout California between November 2000 and September 2001. The overall response rate was 37%. Asthma symptom prevalence refers to people who have been previously diagnosed with asthma and experienced asthma symptoms in 2001. Pertinent data collected on asthma symptom prevalence in 2001 are summarized below.

	Children (ages 1-17)	Adults (ages >18)	All Ages
Greater Bay Area	10.2%	9.0%	9.3%
Alameda County	9.9%	10.2%	10.1%
San Francisco County	10.5%	8.3%	8.6%

Asthma prevalence rates were reported by California Legislative District in Mendez-Luck et al. (2004). Rates were based on data from the 2001 California Health Interview Survey and the 2000 census. The overall asthma symptom prevalence rate for the state of California was 10% for children ages 0-17 years, 9% for adults ages 18-64 and 8% for adults older than 64 years. Asthma symptom prevalence rates for children ages 0-17 are higher than the California rate for that age group in Assembly District 13 (13%) and Senate District 03 (12%). Both districts include Potrero Hill and Bayview Hunters Point. Rates for the other age groups are either the same as the California rate, or lower.

Community and School Asthma Surveys

In 1998 the principal at G.W. Carver Elementary School in the Bayview Hunter's Point community of San Francisco observed that many children at the school had asthma. Studies and evaluations were set into motion by this observation and reports were published by the United States Environmental Protection Agency (EPA 2000), the American Lung Association (ALA 2000), the San Francisco Department of Public Health (Mann 2000) and the Bayview Hunter's Point Healthy Start Collaborative (Epps-Miller and Legion 1999).

The EPA conducted an indoor air evaluation at Carver Elementary School and Charles Drew Elementary School (also located within zip code 94124). EPA's Indoor Air Quality (IAQ) Tools for Schools program was instituted at the schools and a joint IAQ team was created which included the school nurse, facilities manager, maintenance supervisors, custodial supervisors, planners, architects and representatives from the school district's health program. The IAQ team was trained to implement the school district's new IAQ policy, using the EPA Tools for Schools program. Additionally, indoor air sampling and analysis was conducted at both schools and walkthroughs were organized with the IAQ team to evaluate building performance and ventilation. IAQ problems (not specified in the EPA document) were identified during the walkthrough and recommendations were made. During the walkthrough at one school it was noted that the ventilation system had been inadvertently shut off. This was remedied. Other recommendations (not specified in the EPA document) by the EPA were implemented at the schools and indoor air quality and airflow throughout the schools improved. The EPA reported that office visits by students to use their asthma inhalers were reduced by half and that, even though the number of students with asthma did not change, asthma episodes became less frequent (EPA 2000).

The Bayview Hunter's Point Health and Environmental Assessment Task Force (HEATF), in collaboration with researchers at the University of California at San Francisco and the

San Francisco Department of Public Health, conducted a community asthma survey (Mann 2000). Adult residents were asked how many people in their home had asthma. Results of the survey indicate that, overall, 10% of people living in Bayview Hunter's Point have asthma and 15.5% of children were reported as having asthma. Mann (2000) reports that in 1995 the national prevalence of self-reported active asthma was 5.6% for all ages and 7.4% in children aged 5-14.

Another survey, of elementary and middle school aged children, was conducted by the Asthma Task Force of the Bayview Hunter's Point Healthy Start Collaborative. Results were released May 19, 1999 in a report entitled "Condition Critical - The Bayview/Hunter's Point School/Community Asthma Survey". Six Bayview Hunter's Point elementary and middle schools were included in the survey and 665 parents or caregivers of 2,150 students responded (30% overall response rate). Results of the survey indicate that 17% of caregivers had a child diagnosed with asthma and 19% had children with asthma-like symptoms.

Demographics of San Francisco, Bayview Hunter's Point & Potrero Hill

The population characteristics of the Bayview Hunter's Point neighborhood with regards to racial/ethnic makeup, based on the results of the 2000 census, have been described by the San Francisco Planning Department in their report "Profiles of Community Planning Areas: San Francisco's Eastern Neighborhoods" (SFPD 2002).

While residents of the Bayview Hunter's Point neighborhood of San Francisco represent 4.4% of the total population of San Francisco, 27% of the City's African American population resides in the Bayview Hunter's Point neighborhood.

Likewise, while 7.6% of the population of San Francisco is African American, 46% of the population of Bayview Hunter's Point is African American. These data are summarized below (SFPD 2002):

	Bayview Hunter's Point		San Francisco	
	Population	Percent	Population	Percent
White	1,986	5.9	338,909	43.6
African American	15,715	46.4	58,791	7.6
American Indian	84	0.2	2,020	0.3
Asian	8,239	24.3	238,173	30.7
Native Hawaiian	1,127	3.3	3,602	0.5
Other	58	0.2	2,580	0.3
Two or more races	929	2.7	23,154	3.0
Hispanic	5,708	16.9	109,507	14.1
Total	33,846	100.0	776,736	100.0

The African American population of San Francisco neighborhoods is also reported by the San Francisco Department of Public Health in "Atlas of HIV/AIDS in San Francisco, 1981-2000" (DPH 2000). In this report, the Bayview neighborhoods (Bayview, Bayshore, Candlestick Park, Hunter's Point and Silver Terrace) are reported to be comprised of 58.8% African Americans. The Western Addition neighborhoods (Western Addition, Fillmore, Hayes Valley and Lower Haight) have the second highest population of African Americans, representing 41.5% of the population of this region. Other San Francisco neighborhoods

have African American populations representing 3-11% of the total population (from 2.5% in the Downtown neighborhoods to 10.6% in the Twin Peaks neighborhoods).

The Hospital Council (2004) reported the following demographic information for San Francisco, Bayview Hunters Point and Potrero Hill (based on the U.S. census report, 2000):

	San Francisco	Bayview Hunters Point	Potrero Hill
Population	776,733	33,170	24,214
Male	50.8%	47.8%	55.3%
Female	49.2%	52.2%	44.7%
Ethnicity			
White	43.6%	5.4%	59.3%
African American	7.6%	47.2%	10.8%
Hispanic	14.1%	16.7v	8.4%
Asian/PI	30.7%	27.6%	17.6%
Native American	0.3%	0.3%	0.4%
Other or multiple	3.3%	2.9%	3.6%

Rates of Asthma Reported in California

Asthma Mortality in California

The California Department of Health Services reported asthma mortality statistics for 1990 to 1997 in the "California Asthma Mortality Chart Book" (DHS 2000a). For this reporting period, 4,978 deaths occurred in California due to asthma, representing an age-adjusted mortality rate of 1.88 deaths per 100,000 population. By gender the data were 2.40 deaths per 100,000 for females and 1.89 deaths per 100,000 for males.

For children ages 0-14, the age-adjusted mortality rates in California (in deaths per 100,000) are 0.05 for non-Hispanic whites, 0.34 for African-Americans, and 0.04 for Hispanics.

Mortality rates for children and all ages for the State of California, Alameda County and San Francisco County were 2-3 times greater for the African-American population compared to the non-Hispanic white population. Age-adjusted asthma mortality rates for 1990 to 1997, all ages, are shown below (in deaths per 100,000; DHS 2003):

	California	Alameda	San Francisco
Total (all races/ethnicities)	1.88	2.34	2.46
Non-Hispanic White	1.72	1.55	1.69
African-American	4.30	5.66	4.35
Hispanic	1.10	-	-
Asian/Pacific Islander	2.55	2.92	3.43

In 2001 the age-adjusted asthma mortality rate in California was 1.7 per 100,000 representing 543 deaths due to asthma that year (Stockman 2004). The mortality rate for African American men was three times higher than the rate in non-Hispanic white men and

the rate for African American women was two times higher than the rate for non-Hispanic white women.

Asthma Hospitalizations in California

The Mann (2000) study cites the California Department of Health Services County Chart Book (1991-1994) which reports that age-adjusted asthma hospitalization rates are 2-3 times higher for African-American children compared to white, non-Hispanic children.

An update to the County Chart Book was published in 2003, with data on asthma hospitalization rates in California counties for 1998 to 2000 (DHS 2003). In California about 40,000 people are hospitalized annually due to asthma and asthma hospitalization rates are highest in the African-American population, at rates over three times higher than other races, regardless of neighborhood income level (DHS 2003). The age-adjusted annual asthma hospitalization rate for all ages in California for African-Americans is 330.1 per 100,000 compared to 94.8 per 100,000 in non-Hispanic whites and 102.5 per 100,000 in the Hispanic population.

Data on hospitalizations due to asthma in California was obtained from the 1993 California Hospital Discharge file prepared by the California Office of Statewide Health Planning and Development (reported in Fox et. al. 1998). In California in 1993 there were 35,800 hospitalizations for asthma (ages 0-64 years), representing an annual rate of 134 per 100,000 compared to a reported rate of 170 per 100,000 in the U.S. population.

Age-adjusted asthma hospitalization rates in California for 1993 were (per 100,000): 425 for African-Americans, 103 for whites and 130 for Hispanics. The hospitalization rate for African-Americans was elevated above the rate for non-African-Americans regardless of reported residence in urban or rural areas (Fox et. al. 1998). Risk of asthma hospitalization was also reported to decrease as median household income increased. The authors concluded that the differential asthma risk observed can be based on two predictors: median household income and race/ethnicity (Fox et. al. 1998).

DHS (2003) also evaluated data on asthma hospitalization rates as they correlate to median household income for 1998-2000. Annual age-adjusted rates were three times higher in African-American males and females compared to non-African-Americans for all income levels. Specifically, in the lowest income level (<$31,233) California African-American males were hospitalized for asthma at a rate of 354.8 per 100,000 compared to non-African-American males for which the rate was 103.7 per 100,000 (ratio = 3.4). In females the rates were 437.6 and 140.5, respectively (ratio = 3.1). At the highest income level (>$56,930), the rates were 185.7 for African-American males compared to 60.9 for non-African-American males (ratio = 3.0) and 233 for African-American females compared to 71.8 for non-African-American females (ratio = 3.2).

Community Action to Fight Asthma (CAFA 2004b) presents data on hospitalization rates by poverty status in California. Results comparable to the DHS 2003 study are reported, with age-adjusted asthma hospitalization rates increasing with increasing percentage of population below the poverty level in a zip code tabulation area (ZCTA):

% of ZCTA Population below poverty line	Age-adjusted rate per 100,000	
	Children	All Ages

< 20	163.6	96.1
20 - 40	262.7	163.2
> 40	292.7	207.1

Approximately 40,000 people are hospitalized with asthma annually in California. Asthma hospitalization rates in 2000 for California children and adults are presented by Stockman et al. (2004). Rates are per 100,000 population, age-adjusted to the 2000 U.S. standard population.

Age/gender	non-Hispanic White	African American	Overall
0-17 years old			
Male	171	635	204
Female	102	417	123
Adults > 18 years			
Male	40.6	148	49.6
Female	106	324	118

The California Department of Health Services reported asthma hospitalization rates for 2003 compared to the Healthy People 2010 objectives, by age, gender and race/ethnicity (DHS 2005b). Rates are per 100,000 population:

Race/gender	< 5 yrs old	5-64 yrs old	> 65 yrs old
Healthy People 2010 Goal	250	80	100
California Total	326	78	203
White	301	74	156
African American	787	259	340
Hispanic	297	61	300
Asian/PI	267	33	278
Am Indian/Alaska native	196	19	-
Male	420	58	143
Female	228	98	248

Asthma Prevalence in California

Data on lifetime asthma prevalence in California residents were collected in the 2001 California Health Interview Survey (CHIS; Meng et al. 2003). CHIS conducted phone interviews of over 55,000 households from throughout California between November 2000 and September 2001. The overall response rate was 37%. Pertinent data collected on lifetime asthma prevalence are summarized below:

Lifetime Asthma Prevalence by Age:

Children (< 6 yrs)	8.8%
Children (ages 6-11)	13.7%
Adolescents (ages 12-17)	16.3%
Young adults (ages 18-24)	14.4%

Adults (> 25 yrs)	11.1%
All Ages	11.9%

Lifetime Asthma Prevalence by Age and Gender:

Boys (< 18 yrs)	14.7%
Girls (< 18 yrs)	11.0%
Men (>18 yrs)	10.0%
Women (>18 yrs)	13.0%

Lifetime Asthma Prevalence by Race/Ethnicity:

	Children (ages 1-17)	Adults (ages >18)
White	14.3%	13.1%
Hispanic	9.7%	7.0%
Asian	11.7%	9.2%
African-American	21.1%	16.2%

The Behavioral Risk Factor Surveillance System (BRFSS) conducted a telephone survey of the U.S. population (noninstitutionalized residents over age 18) in 2000-2003 (ALA2005a). Results were reported for lifetime asthma (people diagnosed with asthma in their lifetime) and current asthma (people diagnosed with asthma and who had experienced asthma symptoms within the past 12 months). Results indicated that 13.4% of California adults had lifetime asthma in 2003 while 8.4% had current asthma in 2003 (ALA 2005a). Data collected through BRFSS for the California Metropolitan Statistical Area (including San Francisco, Oakland and Fremont) resulted in lifetime prevalence of asthma in that area of 11.6% and current prevalence of 5.5% (ALA 2005a).

ALA 2005a also reports the results of the National Center for Health Statistics state and local area integrated telephone survey in 2003 regarding asthma prevalence in children. In the U.S., lifetime prevalence in children in 2003 is reported at 12.4% while it is 12.3% in California. Current prevalence is listed as 8.8% for U.S. children and 7.4% for children in California.

Results of the California Healthy Kids Survey (CHKS) were reported by the California Department of Health Services in 2004 (DHS 2004). The survey was completed by approximately 480,000 5th, 7th, 9th and 11th grade students in California between 2001 and 2003. Fifth grade students were not included in the asthma portion of the survey; 404,342 students provided a response to the question “Has a doctor ever told you or a parent/guardian that you have asthma?” Lifetime prevalence rates for this group of children were estimated based on the results obtained; the overall prevalence rate in the study group for California was 18.4% and for San Francisco County it was 16.5%:

Lifetime Asthma Prevalence by Gender (CHKS results):

Boys	18.9%
Girls	17.8%

Lifetime Asthma Prevalence by Race/Ethnicity (CHKS results):

White	20.2%
African-American	25.8%
Hispanic	14.1%
Asian	16.5%

Rates of Asthma Reported in the United States

Asthma Mortality in the United States

In 2002 asthma was the cause of death for 4,261 Americans, which represents an age-adjusted asthma mortality rate of 1.5 per 100,000 for all races. A higher mortality rate was seen for females than males: for white females the mortality rate was 1.4 per 100,000 compared to 0.9 per 100,000 for white males; for African-American females the rate was 3.4 per 100,000 compared to 3.3 per 100,000 for African-American males. For African-Americans the asthma mortality rate was three times greater than for whites (3.4 per 100,000 for African-Americans of both sexes compared to 1.2 per 100,000 for whites of both sexes) (ALA 2005a).

Asthma Hospitalizations in the United States

National and regional asthma hospitalization data were presented and evaluated in "Asthma in San Francisco" (Mann 2000). National sources cited in this study indicate that African-American children have higher rates of emergency room visits for asthma than do Caucasian American children (1,960 per 100,000 vs. 450 per 100,000, according to the National Ambulatory Medical Care Survey). Additionally, the National Hospital Discharge Survey indicates that, since 1979, asthma hospitalization rates have increased for young children (0-4 years) and for African-Americans. Specifically, the survey indicates that the average hospitalization rate for children (0-4 years) was 343 per 100,000 in 1979-1980. In 1993-1994 that rate had increased to 497 per 100,000. Likewise, the average hospitalization rate for African-Americans in 1979-1980 was 260 per 100,000 and in 1993-1994 the rate had increased to 355 per 100,000.

The American Lung Association (2004) reports that hospital discharge rates for asthma in the United States decreased from 1995 to 2001 for all age groups. In 2001 the hospital discharge rate for African-Americans with asthma was 317 per 100,000, more than 3 times greater than the rate for whites (101 per 100,000).

Asthma Prevalence in the United States

Data from the Third National Health and Nutrition Examination Survey, 1988-1994 (NHANES III) has been evaluated and reported in the literature. Researchers have used the information collected by the NHANES III program to estimate asthma prevalence in the United States. Arif (2003) reports that of 18,393 subjects included in the asthma analysis conducted of the NHANES III data, the prevalence of current asthma was 4.5%. The overall prevalence of current asthma in 12,388 children (2 months to 16 years) included in the NHANES III study was 6.7% (Rodriguez 2002).

Results of the Behavioral Risk Factor Surveillance System (BRFSS) conducted in 2000-2003 indicated that 11.9% of US adults had lifetime asthma in 2003 while 7.7% had current asthma in 2003 (ALA 2005a).

The National Center for Health Statistics conducted the National Health Interview Survey (NHIS) in 1982-1996 and 1997-2003 (ALA 2005a). Based on data from 2003 on the national estimate of asthma prevalence, 30.0 million Americans (10,410 per 100,000 population) had been diagnosed with asthma within their lifetime. The national rate for children aged 5-17 years old was reported to be 14,270 per 100,000 (ALA 2005a). In 2003

19.8 million Americans, including 6.2 million children, experienced asthma symptoms, for rates of 6,940 per 100,000 for all Americans and 8,510 per 100,000 for children (ALA 2005a). Results of the NHIS data are summarized below for current asthma prevalence by age, gender, race/ethnicity (per 100,000):

Females	=	7,940 (≈ 35% higher in females)
Males	=	5,880
Boys 0-17	=	9,550 (≈30% higher in boys)
Girls 0-17	=	7,510
White all ages	=	6,670
African-American all ages	=	9,270 (39% higher than whites)

Smith (2005) evaluated data on asthma incidence in children younger than 18 years old from the 1997 National Health Interview Survey, Data were evaluated with regards to race/ethnicity and poverty. Results indicated that asthma was more prevalent among African American children (13.6%) than white children (11.2%) and Hispanic children (10.1%). When analyzed with regards to income, the data revealed that higher asthma risk occurred in African American children from very poor families (income less than half of the federal poverty level) compared to very poor non-Hispanic white children. Increased risk based on race/ethnicity was not seen in children at higher income levels.

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

COPD Mortality

Chronic Obstructive Pulmonary Disease or COPD is a group of lung diseases that includes emphysema and chronic bronchitis. COPDs are characterized by air flow obstruction in the lungs that interferes with normal breathing. 82% of deaths due to COPD are caused by cigarette smoking (DHS 1998). According to the American Lung Association, COPD is the fourth leading cause of death in the United States with an age-adjusted death rate of 42.0 deaths per 100,000 population in 2002. COPD is the only lung disease with a higher age-adjusted death rate in Whites than in African-Americans (ALA 2005b):

Age-adjusted death rates due to COPD in the US in 2002 (deaths per 100,000 population):

Females	=	35.7	
Males	=	52.3	(1.5 times greater in males)
White	=	44.2	(1.6 times greater in whites)
African-American	=	27.8	

In San Francisco in 1990-1995, COPD was the sixth leading cause of death for males and females accounting for 2.7% of deaths in males and 3.1% of deaths in females. The age-adjusted mortality rates for COPD in males and females for 1990-1995 by race/ethnicity in San Francisco are shown below (DPH 1998).

Age-adjusted death rates due to COPD in San Francisco in 1990-1995 (deaths per 100,000 population):

	Males	Females
White	22.7	14.6
African-American	25.2	12.3
Hispanic	5.8	2.5
Asian	18.0	4.7

COPD does not appear among the ten leading causes of death for male and female residents of the Bayview Hunter's Point neighborhood (DPH 1998). Data on the incidence or prevalence of COPDs in San Francisco and Bayview Hunter's Point were not identified in the literature.

COPD Hospitalizations

The California Department of Health Services reported COPD hospitalization rates for people 45 years and older for 2000-2003 compared to the Healthy People 2010 objectives, by gender and race/ethnicity (DHS 2005b). Rates are per 100,000 population, age-adjusted to 2000 U.S. standard population:

Race/gender	2000	2001	2002	2003
Healthy People 2010 Goal	60.0	60.0	60.0	60.0
California Total	124.3	123.2	116.0	119.1
White	153.4	152.6	144.8	149.4
African American	103.3	106.6	106.3	101.8
Hispanic	46.2	50.1	44.0	48.2
Asian	54.2	52.7	48.5	50.8
Am Indian/Alaska native	105.5	85.2	97.2	75.9
Male	139.0	132.6	124.5	128.0
Female	113.6	116.2	109.5	112.2

Adult COPD hospitalization rates were reported for 1999-2001 for San Francisco, Bayview Hunters Point (zip code 94124) and Potrero Hill (zip code 94107, and including 94105, 94111 and 94130 which comprise parts of the Financial District, the Embarcadero and Treasure Island; Hospital Council 2004). The rates are age-adjusted to the 2000 U.S. standard population and expressed per 100,000:

San Francisco	412.9
Bayview Hunters Point	899.5
Potrero Hill	474.9

Bayview Hunters Point had the third highest rate of adult COPD hospitalizations in San Francisco in 1999-2001 following the Tenderloin (zip code 94102; rate = 957.2/100,000) and South of Market (zip code 94103; rate = 947.0/100,000). Potrero Hill ranked 5th for adult COPD hospitalizations.

DISCUSSION

Asthma rates for adults and children in San Francisco are higher than the asthma target rates recommended by the Healthy People 2000 and Healthy People 2010 National Health Promotion & Disease Prevention Objectives (DHHS 1999, DHHS 2000). Within San Francisco there appear to be ethnic populations and neighborhoods with higher asthma hospitalization rates as compared to other populations and neighborhoods in the City. African-American adults and children in San Francisco have higher asthma hospitalization rates than Hispanics, Asians and whites. The neighborhood with the highest asthma hospitalization rate in adults and children is the Bayview Hunter's Point neighborhood. Results of the community asthma survey indicate that the prevalence rate of asthma in children in Bayview Hunter's Point (15.5%) is about twice the1995 national prevalence rate in children (7.4%).

The San Francisco Asthma Task Force Act was signed into law in May 2001 and was charged with the responsibility to address the asthma epidemic in San Francisco[1]. Community activists, many from Bayview Hunter's Point, and the San Francisco Board of Supervisors worked together to create the Asthma Task Force and give it the responsibility to develop a strategic plan for the City of San Francisco to manage and prevent asthma (Asthma Task Force 2003). In June 2003, the Asthma Task Force published the strategic plan, with recommendations made in four sectors (environmental, schools & child care, clinical care and community). The purpose of the strategic plan is to manage and prevent asthma in San Francisco through implementation of the recommendations made by the Asthma Task Force.

Dr. Mitchell Katz, Director of San Francisco Department of Public Health, addressed a meeting of the Southeast Community Facility Commission on May 25, 2005. Dr. Katz reported that rates of asthma in the Bayview Hunters Point community “continue to be high; however, the rates are down from a high of over 49% in the 1994-1996 study.” He also stated that the rates in this community are “highest in California, which stem from institutionalized racism and economic disparity.”

There are only a few studies available in the scientific literature that have attempted to link a specific stationary source of air pollution (such as a power plant) to either the onset or exacerbation of asthma. It is interesting to note that at a gross level, air pollution levels in the United States are lower than they were in the past, yet asthma prevalence has risen substantially over the past 20 years. Despite the fact that the United States and California are experiencing an increase in asthma incidence rates of epidemic proportions, a comparative examination of existing background asthma incident rates at a location prior to the construction of a power plant compared to asthma rates afterward would be fraught with scientific uncertainty. Certain air pollutants cause asthma and others exacerbate asthma, but how many cases are caused or exacerbated by air pollution and at what levels of pollution is not precisely known. Data specific to asthma rates for specific neighborhoods is non-existent and that for cities and counties limited. According to the President’s Task Force on Environmental Health Risks to Children, there is “no national system to collect data from states specifically on asthma” (President’s Task Force 1999).

---

[1] Membership in the asthma task force represents the following: environmental epidemiology, tenants' rights, housing management, environmental health, building inspection, public health, schools, child care, parent associations, health education, clinical care (including medicine, respiratory therapy, nursing and pharmacy), community activism, research and health policy.

Databases often measure different end-points such as hospital admission rates which measure severe reactions or self-reported asthma prevalence in a household. Thus, different databases lead to results portraying different locations as having the “highest” rates of asthma. In fact, DHS (2003) reports that, based on the results of the California Health Interview Survey, the counties with the highest asthma hospitalization rates were not the counties with the highest estimated asthma prevalence rates.

The Agency for Toxic Substances and Disease Registry of the Centers for Disease Control is supporting research on the relationship between environmental exposures and asthma, but it is unknown to what extent, if any, this research will address the source of pollution. California Senator Escutia sponsored legislation which became law (SB-702) in 2001 that intended to create a tracking system to learn where and when diseases occur, what environmental hazards were involved, and what the actual exposure is to these hazards. No results are available to date. The San Francisco Asthma Task Force effort will ultimately provide local data on asthma.

CONCLUSIONS

It is clear that residents of neighborhoods in the southeastern area of San Francisco have increased rates of asthma hospitalizations. This is true for adults and for children. This is also true for children of other neighborhoods of San Francisco, including Potrero Hill, the Western Addition and the Tenderloin. Overall, the rate of adult and child asthma hospitalizations in San Francisco County is about the same as rates in Alameda County and greater than the rates in Contra Costa and Solano counties. Additionally, asthma hospitalization rates in San Francisco have declined over the past decade.

REFERENCES

American Lung Association (ALA). 2005a. "Trends in Asthma Morbidity and Mortality." Epidemiology and Statistics Unit, Research and Scientific Affairs. May. http://www.lungusa.org/atf/cf/%7B7A8D42C2-FCCA-4604-8ADE-7F5D5E762256%7D/ASTHMA1.PDF

American Lung Association (ALA). 2005b. "Trends in Chronic Bronchitis and Emphysema: Morbidity and Mortality." Epidemiology and Statistics Unit, Research and Scientific Affairs. May. http://www.lungusa.org/atf/cf/%7B7A8D42C2-FCCA-4604-8ADE-7F5D5E762256%7D/COPD1.pdf

American Lung Association (ALA). 2000. "Making a difference: program offers tools for improving indoor air quality at schools." *Breathe Easy Magazine.* Spring/Summer. http://www.californialung.org/support/toolsforschools.html

Arif, A. et al. 2003. "Prevalence and risk factors of asthma and wheezing among US adults: an analysis of the NHANES III data." *Eur Respir J.* 21(5): 827-33. May. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=12765429&dopt=Abstract (link to abstract only)

Asthma Task Force. 2003. "Strategic plan on asthma for the City and County of San Francisco." Prepared by the Asthma Task Force, a legislated task force under the San Francisco Board of Supervisors. http://www.dph.sf.ca.us/cehp/Asthma/Index_asthma_taskforce.htm

Bell, Judith, et al. 2002. “Reducing health disparities through a focus on communities." PolicyLink, Oakland, Ca., November. http://www.policylink.org/pdfs/HealthDisparities.pdf

California Air Resources Board (CARB). 2002. “Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates”, Prepared by the staff of the California Air Resources Board and the Office of Environmental Health Hazard Assessment. May 3. http://www.arb.ca.gov/research/aaqs/std-rs/pm-final/pm-final.htm

California Department of Health Services (DHS), Environmental Health Investigations Branch, 2005a. “County Asthma Profiles: San Francisco County.” October. http://www.californiabreathing.org/files/san_francisco.pdf

California Department of Health Services (DHS), Center for Health Statistics, Office of Health and Information Research, 2005b. “Healthy California 2010: Progress in Achieving the Healthy People 2010 Objectives, 2000-2003.” April. http://www.dhs.ca.gov/hisp/chs/OHIR/hp2010/hc2010progress.htm

California Department of Health Services (DHS), 2004. “California Asthma Facts.” Asthma in Schools: Results from the California Health Kids Survey, 2001-2003.” Vol. 2, Issue 3. October. http://www.californiabreathing.org/files/21908_fnl.pdf

California Department of Health Services (DHS), Environmental Health Investigations Branch, 2003. "California County Asthma Hospitalization Chart Book. Data from 1998 to 2000." September. http://www.ehib.org/cma/papers/Hosp_Cht_Book_2003.pdf

California Department of Health Services (DHS), Environmental Health Investigations Branch, 2000a. "California County Asthma Mortality Chart Book. Data for 1990-1997." April. http://www.dhs.ca.gov/ps/deodc/ehib/EHIB2/PDF/Mortality%20Chart%20Book.pdf

California Department of Health Services (DHS), Environmental Health Investigations Branch, 2000b. "California County Asthma Hospitalization Chart Book." August. http://www.dhs.ca.gov/ps/deodc/ehib/EHIB2/PDF/Hosp%20Chart%20Book%202000.pdf

California Department of Health Services (DHS). 1998. "Chronic Obstructive Pulmonary Disease Deaths, California 1980-1996." Center for Health Statistics, Data Summary. Report Registry No. D298-11001. October. http://www.dhs.ca.gov/hisp/chs/OHIR/Publication/LeadingCauseReport/COPD8096.pdf

Castro, M. et al. 2001. "Risk factors for asthma morbidity and mortality in a large metropolitan city." *J. Asthma.* 38(8) 625-35. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=retrieve&db=pubmed&list_uids=11758891&dopt=Abstract (link to abstract only)

Centers for Disease Control and Prevention (CDC). 2004. "Asthma Prevalence and Control Characteristics by Race/Ethnicity -- United States, 2002." Morbidity and Mortality Weekly Report. 53(07):145. February 27. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5307a1.htm

Community Action to Fight Asthma (CAFA). 2004a. "Asthma Hospitalization Rates by Zip Code Tabulation Area in 15 California Counties: Bay Area, Oakland, CA". June. (not yet available on the web; data provided by Jamila Stockman, MPH, Epidemiologist with California Department of Health Services, Environmental Health Investigations Branch)

Community Action to Fight Asthma (CAFA). 2004b. "Hospitalization Rates of Asthmatic Children: California, 1998-2000, by Legislative Districts." May. http://www.calasthma.org/resources/show_resource/242/

Department of Health and Human Services (DHHS). 1999. "Healthy People 2000 Review, 1998-99." Washington DC: U.S. Government Printing Office, http://www.cdc.gov/nchs/data/hp2000/hp2k99.pdf

Department of Health and Human Services (DHHS). 2000. "Healthy People 2010. 2nd ed. With Understanding and Improving Health and Objectives for Improving Health." Washington, DC: U.S. Government Printing Office, November. http://www.healthypeople.gov/document/pdf/Volume2/24Respiratory.pdf

Epps-Miller, D. and V. Legion. 1999. "Condition critical: asthma in the Bay View Hunter's Point." Reported by the San Francisco Medical Society. http://www.sfms.org/sfm/sfm1199a.htm

Fox, N, Ray, MS, Thamer, M, Fadillioglu, B and PJ Gergen. 1998. "Race, Income, Urbanicity and Asthma Hospitalization in California. A Small Area Analysis." Chest. 113(5):1277. May. http://www.chestjournal.org/cgi/reprint/113/5/1277.pdf

Hospital Council of Northern and Central California. 2004. "2004 Community Health Assessment: Building a Healthier San Francisco." December. http://www.hcncc.org/doc/SF%20Needs%20Assessment%202004.pdf

Katz M. 2005. Minutes of the May 25, 2005 meeting of the Southeast Community Facility Commission. http://www.ci.sf.ca.us/site/sefacility_page.asp?id=33991

Kreutzer, R. et al. 1998. "Asthma in California: Laying the Foundations for a Statewide Strategy." California Policy Seminars Brief Series. August. http://www.ucop.edu/cprc/asthma.html

Mann, Jennifer. 2000. "Asthma in San Francisco." Community Health Epidemiology & Disease Control, San Francisco Department of Public Health. November. http://www.dph.sf.ca.us/Reports/asthma00.pdf

Mendez-Luck CA, Yu H, Meng YY, Chia J, Jhawar M, Sripipatana A, and Wallace SP. 2004. "Asthma Among California's Children, Adults and the Elderly: A Geographic Look by Legislative Districts." Los Angeles: UCLA Center for Health Policy Research. September. http://www.healthpolicy.ucla.edu/pubs/files/AsthmaLegDistricts_PB_092204.pdf

Meng, YY, Babey, SH, Malcolm, E, Brown, ER and N Chawla. 2003. "Asthma in California: Findings from the 2001 California Health Interview Survey." Los Angeles: UCLA Center for Health Policy Research. http://www.healthpolicy.ucla.edu/pubs/files/Asthma_Rpt_FINAL_R.pdf

Peden, David, 2002. "Pollutants and Asthma: Role of Air Toxics." *Environmental Health Perspectives.* Volume 110, supplement 4, August. http://ehp.niehs.nih.gov/members/2002/suppl-4/565-568peden/ehp110s4p565.pdf

Presidents Task Force on Environmental Risks and Safety Risks to Children 1999. "Asthma and the Environment: A Strategy to Protect Children." January. http://yosemite.epa.gov/ochp/ochpweb.nsf/content/pdf12.htm/$File/asthmastrategy.pdf

Redd, S.C. 2002. "Asthma in the United States: burden and current theories." *Env Health Perspect*. 110 Suppl 4:557-60. August. http://ehp.niehs.nih.gov/members/2002/suppl-4/557-560redd/ehp110s4557.pdf

Rodriguez, M.A. et al. 2002. "Identification of population subgroups of children and adolescents with high asthma prevalence: findings from the Third National Health and Nutrition Examination Survey." *Arch Pediatr Adolesc Med.* 156(3): 269-275.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=11876672 (link to abstract only)

San Francisco Department of Public Health (DPH). 2000. “Atlas of HIV/AIDS in San Francisco, 1981-2000.” http://www.dph.sf.ca.us/PHP/RptsHIVAIDS/SFAtlasHIVAIDS19912000/

San Francisco Department of Public Health (DPH). 1998. “San Francisco Burden of Disease and Injury: Mortality Analysis, 1990-1995.” By Aragon T, Reiter R and Katcher B. December. http://www.dph.sf.ca.us/Reports/DiseaseInjury/bdi9095b1.pdf

San Francisco Planning Department (SFPD). 2002. “Profiles of Community Planning Areas: San Francisco’s Eastern Neighborhoods.” January. http://sfgov.org/site/planning_index.asp?id=25368

Smith LA, Hatcher-Ross JL, Wertheimer R, Kahn RS. 2005. “Rethinking race/ethnicity, income, and childhood asthma: racial/ethnic disparities concentrated among the very poor.” Public Health Rep. March-April. 120(2): 109-16. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=15842111&query_hl=3 (link to abstract only)

Stockman JK, Garcia K, Von Behren J, Bembom O, Shaikh N, Kreutzer R. 2005. “Asthma Disparities Among African Americans.” California Asthma Facts, Volume 2, Issue 1.” Environmental Health Investigations Branch, California Department of Health Services. March. http://www.ehib.org/cma/paper.jsp?paper_key=Asthma_Disparities

Thompson, M., Phillips, R. and Bell, J. 2002. “Fighting childhood asthma: how communities can win.” PolicyLink, Oakland, CA. Fall. http://www.calendow.org/reference/publications/pdf/disparities/Childhood_Asthma_Policy_Link.pdf

United States Environmental Protection Agency (EPA). 2000. "Case Study: G.W. Carver and Charles Drew Elementary Schools. San Francisco Unified School District, California." Indoor Environmental Division, Office of Radiation and Indoor Air. August. http://www.epa.gov/iaq/schools/casestudies/califor.doc

United States Environmental Protection Agency (EPA). 2003. “America’s Children and the Environment: Measures of Contaminants, Body Burdens, and Illnesses.” 2nd edition. EPA 240-R-03-001. Office of Children’s Health Protection, February. http://www.epa.gov/envirohealth/children/ace_2003.pdf

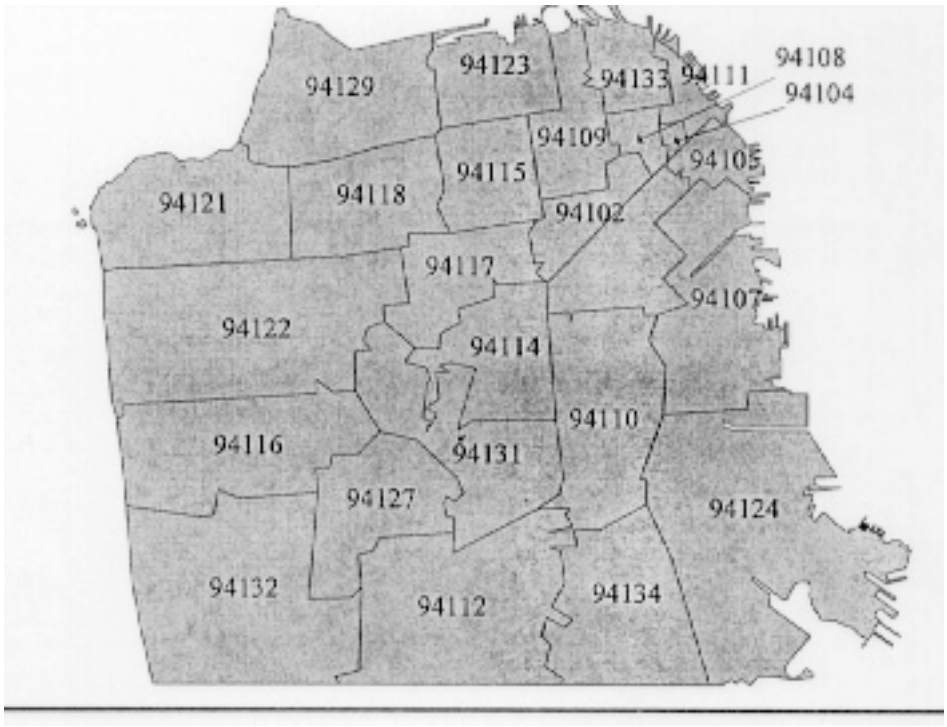
Von Behren, J. et al. 2002. "Self-reported asthma prevalence in adults in California." *J Asthma*. 39(5): 429-40. August. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=12214897&dopt=Abstract (link to abstract only)

Warren, Nancy. 1999. "Age-adjusted asthma hospitalization data: 1994-1996. Alameda, Contra Costa, San Francisco and Solano Counties." Bay Area Regional Asthma

Management and Prevention Initiative (RAMP). April. http://www.rampasthma.org/section1.pdf

Weisel, C. 2002. "Assessing Exposure to Air Toxics to Asthma." *Env Health Perspect.* 110 Suppl 4, August. http://ehp.niehs.nih.gov/members/2002/suppl-4/527-537weisel/ehp110S4p527.pdf

Figure B-1: San Francisco Zip Code Boundaries



Source:
http://www.tf.org/tf/injuries/map.html

Zip Code	Neighborhood
94102	North Market/Hayes Valley/Tenderloin
94103	South of Market
94104	Financial District
94105	Financial District
94107	Potrero Hill
94108	Chinatown
94109	Nob Hill/Russian Hill/Tenderloin
94110	Mission/Bernal Heights
94111	Embarcadero
94112	Excelsior/Ocean View/Ingleside
94114	Castro/Noe Valley/Corona Heights
94115	Western Addition/Pacific Heights
94116	Parkside/Forest Hill
94117	Haight-Asbury/Hayes Valley
94118	Inner Richmond/Presidio
94121	Richmond/Sea Cliff
94122	Sunset
94123	Marina/Cow Hollow
94124	Bayview/Hunter's Point
94127	St. Francis Wood/West Portal/Miraloma Park
94129	Presidio
94131	Twin Peaks/Diamond Heights/Glen Park
94132	Lake Merced/Merced Manor/Lake Shore
94133	North Beach/Telegraph Hill
94134	Visitacion Valley/Portola

Public Health Appendix C

Cancer in the Southeast Section of San Francisco

October 2005

CANCER IN THE SOUTHEAST SECTION OF SAN FRANCISCO

INTRODUCTION

CEC staff has initiated an extensive review of the environmental and public health impacts of the proposed simple-cycle peaking power plant, the San Francisco Electric Reliability Project (SFERP) proposed by the City and County of San Francisco.

The purpose of this assessment is to determine if increased cancer has occurred in the population located near the proposed power plant, specifically the Bayview Hunters Point neighborhood in the southeast section of San Francisco. This will be accomplished by reviewing the incidence rates of cancers observed in this area with cancers in adults and children observed in populations located in the San Francisco Bay Area, the state, and the nation. Particular emphasis is placed on rates of all cancers, breast cancer and childhood cancers.

ALL CANCERS

United States

Cancer is the second leading cause of death in the United States (following death due to heart disease), and is the cause of 1 of every 4 deaths in the nation (ACS 2005a). It has been estimated that in January 2000 there were 9.6 million Americans alive who were either cancer survivors or current cancer patients. The American Cancer Society estimates that one-third of the 570,280 cancer deaths expected to occur in the United States in 2005 will be due to lifestyle factors related to nutrition, physical inactivity, and obesity and thus could be prevented. Also preventable are cancers caused by cigarette smoking and heavy alcohol consumption (ACS 2005a).

The top three leading sites of new cancer cases and deaths for males are prostate, lung/bronchus and colon/rectum. For women the top three leading sites are lung, breast and colon/rectum (ACS 2005a).

Incidence rates in the U.S. for all cancers in 1997-2001 were highest among African-American males (689 cases per 100,000 population, age-adjusted to 2000 U.S. standard population, compared to 557 per 100,000 for white males) and white females (430 cases per 100,000 population compared to 400 per 100,000 for African-American females; ACS 2005a). Incidence rates for cancers of the colon/rectum and lung were highest for African-Americans (males and females) and for prostate cancer in African-American males. White females had the highest breast cancer incidence rate (142 cases per 100,000 compared to 120 per 100,000 for African-American females; ACS 2005a).

Jemal (2004), in the "Annual Report to the Nation on the Status of Cancer, 1975-2001" reported incidence rates in the United States for all cancers and prostate cancer in

males/breast cancer in females by sex and race/ethnicity for 1992-2001, per 100,000 and age-adjusted to the 2000 U.S. standard population:

	Males		Females	
	All Cancers	Prostate Cancer	All Cancers	Breast Cancer
All Races	572	180	412	133
White	574	176	425	138
African-American	719	285	402	120
Asian/PI	396	105	300	92
AI/AN	286	63	229	60
Hispanic	431	143	309	88

PI = Pacific Islander
AI/AN = American Indian/Alaska Native

The data presented above show that African-American males had the highest cancer incidence rates for all cancers and prostate cancer of all ethnic groups and white females had the highest rates for all cancers and breast cancer.

The American Cancer Society reported cancer mortality rates in the U.S. for 1997-2001. African-American males and females had the highest cancer mortality rates for cancers of all sites (347 per 100,000 for African-American males compared to 246 per 100,000 for white males and 197 per 100,000 for African-American females compared to 166 for white females). Mortality rates were highest for African-American males and females for cancers of the colon/rectum, for lung and prostate cancer in males, and breast cancer in females (ACS 2005a). In 2001 the death rate due to cancer in African-Americans was 244 deaths per 100,000 which can be compared to the rate in whites of 193 per 100,000 (ACS 2005b).

Cancer mortality rates were also reported in the "Annual Report to the Nation on the Status of Cancer, 1975-2001" (Jemal 2004). U.S. death rates for all cancers and lung cancer in males/lung and breast cancer in females by sex and race/ethnicity for 1992-2001, per 100,000 and age-adjusted to the 2000 U.S. standard population, were:

	Males		Females		
	All Cancers	Lung Cancer	All Cancers	Lung Cancer	Breast Cancer
All Races	261	82	170	40	29
White	254	80	169	41	28
African-American	365	111	200	39	36
Asian/PI	158	42	103	19	13
AI/AN	168	51	115	26	15
Hispanic	177	41	112	15	18

PI = Pacific Islander
AI/AN = American Indian/Alaska Native

Similar to cancer mortality trends reported by the American Cancer Society (2005a), African-American males had the highest cancer mortality rates for all cancers and lung cancer. African-American women also had the highest mortality rates for all cancers and breast cancer while white women and the highest mortality rate for lung cancer (Jemal 2004). Trends in cancer mortality over time have shown decreases in rates for all cancers combined and for many of the leading 15 cancers, an effect which is paralleled by improvement in 5-year relative survival rates for all cancers combined. These trends are not seen, however, in most minority populations (Jemal 2004).

California

Cancer is the second leading cause of death in California and the cause of 23% of all deaths in California in 2002 (ACS 2005c). In 1999, 52,877 people died of cancer in the state, which represents an age-adjusted mortality rate of 179.9 cancer deaths per 100,000 persons (Kwong 2001). Statistically significant decreases were seen in the incidence rates of 15 of the most common cancers over the period of 1988 to 1999. From 1988 to 2001, cancer incidence rates in California declined by 8% and cancer mortality rates declined by 16% (ACS 2005c). It has been predicted that cancer will occur in two of five Californians and that one in five Californians will die of cancer (ACS 2005c).

Le and coworkers (2005) report the five leading cancer sites in males in California in terms of incidence and mortality for the period 1998-2002:

	Cancer Incidence in Males	Cancer Mortality in Males
1st	Prostate *(all races)*	Lung *(all races)*
2nd	Lung *(white, African-American, Asian)* Colorectal *(Hispanic)*	Prostate *(white, African-Am, Hispanic)* Liver *(Asian)*
3rd	Colorectal *(white, African-American, Asian)* Lung *(Hispanic)*	Colorectal *(all races)*
4th	Bladder *(white)* non-Hodgkin Lymphoma *(African-American, Hispanic)* Liver *(Asian)*	Pancreas *(white, African-American)* Stomach *(Hispanic, Asian)*

5th	Melanoma *(white)*	non-Hodgkin Lymphoma *(white)*
	Oropharyngeal *(African-American)*	Stomach *(African-American)*
	Leukemia *(Hispanic)*	Liver *(Hispanic)*
	Stomach *(Asian)*	Prostate *(Asian)*

The five leading cancers for females in terms of incidence and mortality in California for the period 1998-2002 are (Le 2005):

	Cancer Incidence in Females	Cancer Mortality in Females
1st	Breast *(all races)*	Lung *(white, African-American, Asian)*
		Breast *(Hispanic)*
2nd	Lung *(white, African-American)*	Breast *(white, African-American, Asian)*
	Colorectal *(Hispanic, Asian)*	Lung *(Hispanic)*
3rd	Colorectal *(white, African-American)*	Colorectal *(all races)*
	Lung *(Hispanic, Asian)*	
4th	Corpus uteri *(white, African-American, Asian)*	Ovarian *(white)*
	Cervix uteri *(Hispanic)*	Pancreas *(African-Am, Hispanic)*
		Stomach *(Asian)*
5th	Melanoma *(white)*	Pancreas *(white, Asian)*
	Pancreas *(African-American)*	Ovarian *(African-American, Hispanic)*
	Corpus uteri *(Hispanic)*	
	Thyroid *(Asian)*	

The age-adjusted cancer incidence rate for 1999 in California was 427.4 cases per 100,000 (Kwong 2001). The American Cancer Society (2005a) reports the following cancer incidence and death rates in California for 1997-2001, age-adjusted to the 2000 U.S. standard population:

Cancer incidence rates in California (per 100,000):

	Male	Female
All sites	525	395
Breast	-	133
Colon & rectum	59	43
Lung & bronchus	74	50
Non-Hodgkin Lymphoma	22	15
Prostate	158	-

Cancer death rates in California (per 100,000):

	Male	Female
All sites	221	159
Breast	-	26
Colon & rectum	22	16
Lung & bronchus	62	39
Non-Hodgkin Lymphoma	10	6
Prostate	28	-

In California in 1995-1999 African-American males had the highest rates of cancer incidence and mortality of the four racial/ethnic groups while the lowest rates were seen in Hispanic and Asian/Pacific Islander males and females. In 1999, the cancer incidence rate for African-American males in California was 623.0 per 100,000, which can be compared to the cancer incidence rate for white males in California (442.3 per 100,000). The cancer mortality rate in African-American males was also higher than in white males (325.3 per 100,000 and 230.8 per 100,000, respectively; Kwong 2001). Cancer incidence and mortality rates by race/ethnicity and sex for California are shown below.

Average annual age-adjusted (2000 US population) incidence and mortality rates per 100,000 population for all cancers by race/ethnicity and sex, California, 1995-1999 (Kwong 2001):

All sites	Incidence		Mortality	
	Male	Female	Male	Female
All Races	518.0	400.7	224.2	158.2
Non-Hispanic white	545.4	435.7	238.1	169.7
African-American	655.9	393.8	328.4	201.4
Hispanic	367.8	289.9	161.4	115.0
Asian/PI	362.6	294.0	163.9	110.2

Cockburn and Deapen (2004) report variability in cancer incidence rates in California by race/ethnicity. African-American males had the highest cancer incidence rate for all cancers combined, followed by white, Japanese, Filipino, Korean, Latino, Chinese and South Asian men. White women had the highest cancer incidence rate for all cancers, followed by African-Americans, Japanese, Vietnamese, Filipino, Chinese, Latina, Korean and South Asian women. Among males, prostate cancer was the most common cancer for all racial/ethnic groups except Korean and Vietnamese males for whom stomach and lung cancer had the highest rates, respectively. Among females, breast cancer was the most common cancer for all racial/ethnic groups except Korean females for whom lung cancer was the most common cancer.

The following distribution of cancer cases in males in California for 1988-2001 are reported by Cockburn and Deapen, 2004 (W = non-Hispanic White, AA = African-American, H = Hispanic, C = Chinese, F = Filipino, J = Japanese, K = Korean, SA = South Asian, V = Vietnamese):

	Cancer Incidence in Males	Cancer Mortality in Males
1st	Prostate *(W, AA, H, C, F, J, SA)* Stomach *(Korean)* Lung *(Vietnamese)*	Lung *(all races)*
2nd	Lung *(W, AA, H, C, F, K)* Colorectal *(Japanese, South Asian)* Prostate *(Vietnamese)*	Prostate *(W, AA, H, F, SA)* Colorectal *(Chinese, Japanese)* Stomach *(Korean, Vietnamese)*
3rd	Colorectal *(W, AA, H, C, F, K, V)*	Colorectal *(W, AA, H, F, K, V)*

	Lung *(Japanese, South Asian)*	Stomach *(Chinese, Japanese)* Leukemia *(South Asian)*
4th	Melanoma *(white)* non-Hodgkin Lymphoma *(AA, H, F, SA)* Oral cavity *(Chinese)* Stomach *(Japanese, Vietnamese)* Prostate *(Korean)*	Pancreas *(W, AA, C, K, V)* Stomach *(Hispanic)* non-Hodgkin Lymphoma *(Filipino)* Prostate *(Japanese)* Colorectal *(South Asian)*
5th	Urinary bladder/NHL *(white)* Oral cavity *(African-American, Vietnamese)* non-Hodgkin Lymphoma *(Japanese, Korean)* Leukemia *(Hispanic, Filipino, South Asian)* Stomach *(Chinese)*	NHL/Leukemia *(white)* Stomach *(African-American)* Leukemia *(H, F. K, V)* Prostate *(Chinese)* Pancreas *(Japanese, South Asian)*

The following distribution of cancer cases in females in California for 1988-2001 are reported by Cockburn and Deapen, 2004 (W = non-Hispanic White, AA = African-American, H = Hispanic, C = Chinese, F = Filipino, J = Japanese, K = Korean, SA = South Asian, V = Vietnamese):

	Cancer Incidence in Females	Cancer Mortality in Females
1st	Breast *(all races)*	Lung *(W, AA, C, J, K, V)* Breast *(Hispanic, Filipino, South Asian)*
2nd	Lung *(white)* Colorectal *(AA, H, C, F, J, K, SA)* Cervix uteri *(Vietnamese)*	Breast *(W, AA, C, V)* Lung *(Hispanic, Filipino)* Colorectal *(Japanese)* Stomach *(Korean)* Ovary *(South Asian)*
3rd	Colorectal *(white, Vietnamese)* Lung *(AA, C, F, J)* Cervix uteri *(Hispanic)* Stomach *(Korean)* Ovary *(South Asian)*	Colorectal *(W, AA, H, C, F, K, V)* Breast *(Japanese)* Lung *(South Asian)*
4th	Corpus uteri *(W, AA, C, F, SA)* Lung *(Hispanic, Korean, Vietnamese)* Stomach *(Japanese)*	Ovary *(white, Filipino)* Pancreas *(African American, Hispanic)* Stomach *(Chinese, Japanese, Vietnamese)* Breast *(Korean)* Leukemia *(South Asian)*
5th	Ovary *(white)* Pancreas/Cervix uteri *(African-American)* Corpus uteri *(Hispanic, Japanese)* Cervix uteri *(Filipino, Korean)* Stomach *(Chinese, Vietnamese)* non-Hodgkin Lymphoma *(South Asian)*	Pancreas *(W, C. F, J, K)* Ovary *(African-American, Hispanic)* Colorectal *(South Asian)* Cervix uteri *(Vietnamese)*

The California Department of Health Services reported cancer mortality rates for Californians for 2000-2003 compared to the Healthy People 2010 objectives, by gender and race/ethnicity (DHS 2005b). Rates are per 100,000 population, age-adjusted to 2000 U.S. standard population:

Race/gender	2000	2001	2002	2003
Healthy People 2010 Goal	159.9	159.9	159.9	159.9
California Total	179.6	175.5	169.4	165.0
White	196.0	191.9	187.0	181.2
African American	241.2	241.5	228.9	224.8
Hispanic	128.5	127.4	123.4	119.9
Asian	128.4	124.0	118.4	118.1
Am Indian/Alaska native	142.3	111.9	101.2	89.8
Male	214.0	207.7	200.2	193.0
Female	157.2	153.7	148.0	145.5

San Francisco Bay Area

Cancer incidence and mortality rates in the San Francisco Bay Area are collected by the Greater Bay Area Cancer Registry (GBACR), a state- and federally-funded cancer registry that is operated by the Northern California Cancer Center (NCCC). NCCC publishes annual reports of cancer incidence and mortality in the Greater San Francisco Bay Area.

In 2005, Le and coworkers published data for cancer incidence and mortality for 1988 to 2002, reported by anatomic site and age (Le 2005). In this report, cancer incidence and mortality data are presented for residents of the counties of the greater Bay Area: Alameda, Contra Costa, Marin, Monterey, San Francisco, San Benito, San Mateo, Santa Clara, and Santa Cruz.

Le (2005) reports the five leading cancer sites in terms of incidence and mortality in males in the Greater San Francisco Bay Area for the period 1998-2002:

	Cancer Incidence in Males	Cancer Mortality in Males
1st	Prostate *(all races)*	Lung *(all races)*
2nd	Lung *(white, African-American, Asian)* Colorectal *(Hispanic)*	Prostate *(white, African-American)* Colorectal *(Hispanic)* Liver *(Asian)*
3rd	Colorectal *(white, African-American, Asian)* Lung *(Hispanic)*	Colorectal *(white, African-American, Asian)* Prostate *(Hispanic)*
4th	Bladder *(white)* non-Hodgkin Lymphoma *(African-American, Hispanic)* Liver *(Asian)*	Pancreas *(white, African-American)* Liver *(Hispanic)* Stomach *(Asian)*

5th	Melanoma *(white)* Stomach *(African-American, Asian)* Bladder *(Hispanic)*	non-Hodgkin Lymphoma *(white)* Stomach *(African-American, Hispanic)* Prostate *(Asian)*

The five leading cancers for females in terms of incidence and mortality in the Greater San Francisco Bay Area for the period 1998-2002 are (Le 2005):

	Cancer Incidence in Females	Cancer Mortality in Females
1st	Breast *(all races)*	Lung *(all races)*
2nd	Lung *(white, African-American)* Colorectal *(Hispanic, Asian)*	Breast *(all races)*
3rd	Colorectal *(white, African-American)* Lung *(Hispanic, Asian)*	Colorectal *(all races)*
4th	Corpus uteri *(all races)*	Pancreas *(white, African-American, Hispanic)* Stomach *(Asian)*
5th	non-Hodgkin Lymphoma *(white, Hispanic)* Pancreas *(African-American)* Thyroid *(Asian)*	Ovarian *(white, Hispanic)* Multiple Myeloma *(African-American)* Pancreas *(Asian)*

Lung cancer was the leading cause of death due to cancer in males and females in the Greater San Francisco Bay Area during 1998-2002, representing 26% of all cancer deaths in the region (Le 2005).

The Northern California Cancer Center published a report on colorectal cancer rates in the San Francisco Bay Area between 1988-1999 (NCCC 2002a). Both colon and rectal cancers occurred at higher rates in males than in females during that time period. Colon cancer was also seen at a higher incidence in African-Americans and whites than in Hispanics and Asians/Pacific Islanders (NCCC 2002a).

The San Francisco Department of Public Health published the following cancer mortality rates by race/ethnicity for the City of San Francisco for 1990-1995 (Aragon 1998):

Age-adjusted cancer mortality rates, 1990-1995 in San Francisco, per 100,000 and age-adjusted to the 1940 U.S. standard population:

	Males		Females	
	Lung	Colorectal	Lung	Colorectal
Non-Hispanic white	50.1	16.4	30.5	10.5
African-American	82.2	20.1	36.0	15.9
Hispanic	15.8	9.3	6.9	5.3
Asian	34.8	11.1	13.1	8.9

In 2004, the following cancer incidence and mortality rates were reported for San Francisco for 1996-2000 (Hospital Council 2004):

Age-adjusted cancer incidence rates in San Francisco, 1996-2000, per 100,000 and age-adjusted to the 2000 U.S. standard population:

Males:

	All Sites	Prostate	Lung	Colorectal
Non-Hispanic white	645.4	175.8	76.1	65.9
African-American	768.2	275.3	131.3	77.4
Latino	362.5	106.1	36.5	34.5
Asian	380.8	89.0	70.4	55.4

Females:

	All Sites	Breast	Colorectal	Lung
Non-Hispanic white	464.6	155.4	48.8	51.6
African-American	364.8	104.7	44.3	53.7
Latino	266.2	71.8	28.4	23.4
Asian	290.8	82.7	42.2	31.0

Age-adjusted cancer mortality rates in San Francisco, 1996-2000, per 100,000 and age-adjusted to the 2000 U.S. standard population:

Males:

	All Sites	Lung	Colorectal	Prostate
Non-Hispanic white	233.1	56.9	25.3	25.9
African-American	348.4	98.4	36.6	58.0
Latino	157.2	33.7	13.8	14.3
Asian	172.3	50.3	18.5	9.4

Females:

	All Sites	Lung	Breast	Colorectal
Non-Hispanic white	161.8	36.2	28.2	16.8
African-American	193.1	45.3	34.9	19.9
Latino	92.0	14.2	11.7	7.0
Asian	101.5	21.3	11.1	13.7

Bayview Hunters Point

The leading cause of death for Bayview Hunters Point males is homicide, followed by HIV/AIDS, heart disease, lung cancer and stroke (Aragon 1998). The 2004 Community Health Assessment for San Francisco, prepared by the Hospital Council of Northern and Central California, lists violence as the leading cause of death in Bayview Hunters Point and ischemic heart disease as the leading cause of death in the Potrero Hill neighborhood of San Francisco.

In 1998 the San Francisco Department of Public Health published a report entitled "Cancer incidence among residents of the Bayview-Hunters Point Neighborhood, San Francisco, California 1993-1995" (Glaser 1998). This study compared the observed number of cancers in the neighborhood in 1993-1995 to the number that would have been expected to occur assuming that Bayview Hunters Point residents had the same cancer rates as seen in the Greater Bay Area. Cancer incidence data was obtained

from NCCC's Greater Bay Area Cancer Registry and the study controlled for gender, race/ethnicity and age.

The results of the Glaser et al. study indicated that, during 1993-1995, there were no meaningful differences between observed numbers of cancer cases in the neighborhood and expected numbers. The study concluded that: "All the differences between the observed and expected numbers are well within the range of what can be expected to occur through normal fluctuations." Specifically, cancers of the following sites were not shown to be increased in Bayview Hunters Point by this study: breast, cervical, bladder, colon, lung, prostate, rectum, leukemia, non-Hodgkin's lymphoma, cancers among children and adolescents and all cancers combined.

At the request of CEC staff, Le et al. (2004) of the Northern California Cancer Center, using an approach similar to the Glaser study, reviewed four specific cancers diagnosed in residents of the Bayview Hunters Point neighborhood from 1996-2000. The cancers reviewed were breast cancer, cervical cancer, childhood leukemia (children aged 0-19 years old), and brain and other nervous system cancers. In the study, the number of cases observed in the Bayview Hunters Point population was compared to the number of cases expected in that population based on the rate of cancer occurrence reported for the five-county San Francisco Bay Area for that same time period. The five counties of the Bay Area include: Alameda, Contra Costa, Marin, San Francisco and San Mateo counties. The study was designed to control for age, sex and race.

The following results were obtained:

Incidence of selected invasive cancers in Bayview-Hunters Point[1]

	# Observed	# Expected	SIR[2]	99% CI[3]
Breast cancer	72	74.34	0.97	(0.71, 1.31)
Cervical cancer	10	6.39	1.57	(0.69, 3.54)
Childhood leukemia[4]	<5	1.57	-	-
Brain & other nervous system	8	5.50	1.45	(0.58, 3.62)

[1]Bayview-Hunter's Point includes Census Tracts 230.01, 230.02, 230.03, 231.0, 232, 233, 234, 606 and 610 based on Census 2000 census tract boundary definitions.
[2]SIR = Standardized Incidence Ratio = observed number of cases/expected number of cases
[3]If the 99% confidence interval (CI) for the SIR contains 1, then any difference between the observed and expected number is not significant and could have been due to chance.
[4]Cases in children and adolescents aged 0-19.

The study's authors concluded that "Our assessment indicates that during the period 1996-2000, the incidence of childhood leukemia and breast, cervical, and brain cancer in the Bayview-Hunter's Point neighborhood did not differ substantially from that of the entire five-county San Francisco Bay Area." The full study is attached to this report as Attachment 1.

BREAST CANCER

Breast cancer incidence rates have been reported in the literature to increase with increasing socioeconomic status (SES), which probably acts as a proxy for other known breast cancer risk factors such as diet, activity, age at birth of first child, parity and breast feeding.

UNITED STATES

The American Cancer Society (ACS 2005a) has estimated that 211,240 new cases of invasive breast cancer will be diagnosed in women in the United States in 2005, and that 40,870 deaths will occur due to breast cancer.

The breast cancer incidence and mortality rates for African-American and white females in the U.S. for 1997-2001 was reported by the American Cancer Society (2005b). The incidence rate for white females was higher than for African-American females (143.2 per 100,000 for white females compared to 118.6 for African -American females). Mortality due to breast cancer was higher in African-American females: 35.4 deaths per 100,000 compared to 26.4 deaths per 100,000 in white females (all age-adjusted to the 2000 U.S. standard population; ACS 2005b).

Similar results are reported by the American Cancer Society in another publication, “Breast Cancer Facts and Figures 2005-2006” (ACS 2005d). The incidence rate for white females in the U.S., 1998-2002, was higher than for African-American females (141.1 per 100,000 for white females compared to 119.4 for African-American females). Mortality due to breast cancer was higher in African-American females: 34.7 deaths per 100,000 compared to 25.9 deaths per 100,000 in white females (all age-adjusted to the 2000 U.S. standard population).

California

Breast cancer was the most frequently diagnosed cancer in California in 1999 with 21,390 cases of invasive breast cancer and 4,150 cases of in situ breast cancer diagnosed; 4,039 women died of breast cancer in 1999 (Kwong 2001).

Since 1989 the incidence rate of invasive female breast cancer in California has been between 127-131 new cases per 100,000 women per year while breast cancer mortality has decreased by 2.5% per year, from 32.4 deaths per 100,000 in 1988 to 24.5 per 100,000 in 1999 (Kwong 2001).

In California, from 1988-1992, age-adjusted invasive breast cancer incidence rates were significantly higher in white women than in African-American, Asian and Hispanic women (Yost 2001). The effect of socioeconomic status (SES) on breast cancer incidence in the four racial/ethnic groups was studied by Yost and coworkers using 1990 census data and cancer registry data for California. As SES information is not reported to the California Cancer Registry, SES levels were based on SES information at the census block level rather than for individual cases. As evidenced by the results below, SES correlated with breast cancer incidence such that, in general, the higher the SES level, the higher the age-adjusted incidence rate:

Age-adjusted breast cancer incidence rates in California in 1988-1992 (per 100,000 and age-adjusted to the 1970 U.S. population:):

	White	African-American	Hispanic	Asian/other
SES High	218	178	154	117
SES 4	192	168	136	106
SES 3	183	172	123	92
SES 2	176	146	105	86
SES Low	171	146	84	71
Unadjusted by SES	193	155	109	96

Similar race-specific results are reported by Kwong (2001) in California women (the same results are also reported in Morris and Kwong 2004). These results are presented below:

Average annual age-adjusted (2000 US population) incidence and mortality rates per 100,000 population for breast cancer by race/ethnicity, California females, 1995-1999:

	Breast Cancer Incidence	Breast Cancer Mortality
All Races	129.4	26.4
Non-Hispanic white	145.5	28.9
African-American	118.1	35.8
Hispanic	83.6	18.0
Asian/PI	88.5	14.4

The California Department of Health Services reported female breast cancer mortality rates for Californians for 2000-2003 compared to the Healthy People 2010 objectives, by race/ethnicity (DHS 2005b). Rates are per 100,000 population, age-adjusted to 2000 U.S. standard population:

	2000	2001	2002	2003
Healthy People 2010 Goal	22.3	22.3	22.3	22.3
California Total	25.5	24.4	23.2	22.9
White	29.2	27.5	26.6	25.7
African American	36.8	34.6	33.2	32.4
Hispanic	14.9	16.2	14.1	15.8
Asian	13.4	14.6	14.2	13.5

Heavy alcohol consumption (2 or more drinks per day) and use of hormone replacement therapy (HRT) have been associated with elevated breast cancer risk, although a woman's age at the time her first child is born is reported to be the most consistent indicator of breast cancer risk (Morris and Kwong 2004). Certain risk factors that have been associated with increased risk of breast cancer are not modifiable such as age, family history, age at time her first child is born, early menarche and late menopause. Other risk factors, however, are modifiable: postmenopausal obesity, HRT use, alcohol intake and physical inactivity (ACS 2005d).

The relationship between recent alcohol consumption and breast cancer has been studied in the California Teachers Study Cohort and reported by Horn-Ross (2004). In the California Teachers Study Cohort, Horn-Ross and coworkers report that elevated breast cancer risk was correlated with recent drinking of two or more drinks per day. The greatest effect was observed among heavy drinkers with a history of hormone replacement therapy (HRT) or benign breast disease. Heavy drinkers who used HRT were approximately twice as likely to develop invasive breast cancer as nondrinkers who never used HRT.

San Francisco Bay Area

The Northern California Cancer Center (NCCC 2002b) has reported that in the San Francisco Bay Area, from 1988-1999, the age-adjusted incidence rate for invasive breast cancer was 137 cases per 100,000 women and the in situ breast cancer incidence rate was 29 cases per 100,000. These rates are reportedly similar to rates observed in the Santa Clara region, located to the south of San Francisco (NCCC 2002b). Le (2005) reported that the age-adjusted incidence rate for invasive breast cancer in the Greater Bay Area for the period of 1988-2002 was 133 cases per 100,000 women (based on 2000 U.S. population standard) and the in situ breast cancer incidence rate for that time period was 30 cases per 100,000. Breast cancer incidence rates (invasive and in situ) were highest in non-Hispanic white females compared to other racial/ethnic groups.

Aragon (1998) reported the following mortality rates for female breast cancer by ethnicity in the City of San Francisco for 1990-1995, in cases per 100,000 and age-adjusted to the 1940 U.S. standard population:

Race/Ethnicity	Mortality Rate
All races	18.8
Non-Hispanic White	22.4
African-American	32.0
Hispanic	10.4
Asian	12.2

Le (2005) reported the following mortality rates for female invasive breast cancer by ethnicity in the Greater Bay Area for 1988-2002, in cases per 100,000 and age-adjusted to the 2000 U.S. standard population::

Race/Ethnicity	Mortality Rate
All races	24
Non-Hispanic White	27
African-American	39
Hispanic	18
Asian	13

Le (2005) also reports incidence and mortality rates for invasive breast cancer in females in three counties of the Greater San Francisco Bay Area for the period 1998-2002. Rates for Alameda, Marin and San Francisco counties and the Greater Bay Area are shown below.

Age-adjusted incidence rates for female invasive breast cancer per 100,000 females, 1998-2002; age-adjusted to the 2000 U.S. standard population:

	Alameda	Marin	San Francisco	Bay Area
All races	137	168	130	141
Non-Hispanic White	163	174	174	166
African-American	123	n/a	138	122
Hispanic	114	165	97	108
Asian/Pacific Islander	86	n/a	91	91

n/a = not available; data not shown for rates based on fewer than 5 cases or for counties with sex- and race-specific population totals less than 50,000

Age-adjusted mortality rates for female invasive breast cancer per 100,000 females, 1998-2002; age-adjusted to the 2000 U.S. standard population:

	Alameda	Marin	San Francisco	Bay Area
All races	27	28	23	25
Non-Hispanic White	30	29	30	29
African-American	39	n/a	41	36
Hispanic	23	14	15	20
Asian/Pacific Islander	14	n/a	12	13

n/a = not available; data not shown for rates based on fewer than 5 cases or for counties with sex- and race-specific population totals less than 50,000

These data indicate that breast cancer incidence is greatest in white females, with the highest rate occurring in Marin and San Francisco County women. Mortality from breast cancer, however, is highest in African-American women.

The Northern California Cancer Center recently published a report updating breast cancer incidence data in the San Francisco Bay Area (Clarke 2004). This report incorporated the most recent data from the California Cancer Registry, the California Office of Vital Statistics and the California Department of Finance, utilizing revised population estimates based on results of the 2000 census. This report indicates that the revised breast cancer incidence rates for San Francisco County (from 1990 to 2001) are somewhat higher than the rates previously reported for that time period which were based on 1990 census statistics.

Clarke et al. (2004) also showed that the rate of invasive breast cancer in the San Francisco Bay Area is 9% higher than the rate for the rest of California (1997-2001). Average breast cancer rates in San Francisco County in 1988-1989 were virtually the same as rates reported in 2000-2001. For both San Francisco and Marin County, the highest concentration of breast cancer cases was shown to be in women aged 40-69.

As shown below, breast cancer incidence rates are highest among non-Hispanic white women compare to other races (Clarke 2004). Rates in white women in Marin and San

Francisco counties are comparable in this report while rates for Hispanic women in Marin County are higher than rates in other areas.

Age-adjusted breast cancer incidence rates for female breast cancer per 100,000 females, 1997-2001; age-adjusted to the 2000 U.S. standard population:

	Marin	San Francisco	Other Bay Area*	Other California**
Non-Hispanic White	176.6	178.9	165.7	154.2
African-American	97.1	129.4	123.1	128.1
Hispanic	139.1	93.3	107.7	92.2
Asian/Pacific Islander	108.5	88.2	91.8	89.2

*Other Bay Area includes Alameda, Contra Costa, San Mateo and Santa Clara counties
**Other California includes other counties in California excluding the Bay Area

The Clarke (2004) study also showed that the breast cancer mortality rates in the regions evaluated are comparable:

Age-adjusted mortality rates for female breast cancer per 100,000 females, 1997-2001; age-adjusted to the 2000 U.S. standard population:

	Marin	San Francisco	Other Bay Area*	Other California**
Non-Hispanic White	29.8	31.9	28.5	28.4
African-American	37.6	42.9	34.4	36.1
Hispanic	15.7	16.0	20.8	18.5
Asian/Pacific Islander	16.4	12.2	13.9	14.7

*Other Bay Area includes Alameda, Contra Costa, San Mateo and Santa Clara counties
**Other California includes other counties in California excluding the Bay Area

John and coworkers (2003) conducted a case-control study of patients diagnosed with invasive breast cancer between 1995 and 1998 in five Bay Area counties (San Francisco, San Mateo, Santa Clara, Alameda and Contra Costa Counties). Lifetime histories of moderate and vigorous physical activity were collected from cases and controls (types of activities included recreational activity, walking, bicycling, household and outdoor chores and occupation). Results of the study indicate that physical activity reduces the risk of breast cancer with similar reductions for moderate and vigorous activities.

Marin County

Elevated breast cancer rates have been reported in Marin County, California since the early 1990s. Marin County is unique in that its population is relatively homogenous, predominantly non-Hispanic white and affluent. Invasive breast cancer rates in Marin County have increased since 1990 at an average reported rate six times greater than in comparison areas (Clarke 2002).

For women aged 45-64 years the breast cancer incidence rate increased by an annual average of 6.7% between 1990-1999 (Clarke 2002). Similar results were reported by Prehn (2002) for women aged 45-64 years in Marin County from 1991-1997 who exhibited an estimated annual percentage change (EAPC) of 8% (rates for the rest of the Bay Area were relatively constant over the same time period).

Between 1995 and 1999, the average annual age-adjusted breast cancer incidence rates for Marin County women were at least 20% higher than rates observed in other counties of the San Francisco Bay Area. Marin County rates were also 38% higher than rates for other urban counties combined. Average incidence rates were 58% higher for Marin women 45-64 years old than the women of the same age in other San Francisco Bay Area counties, and 72% higher than other urban California counties (Clarke 2002).

Wrensch (2003) reported the following age-adjusted invasive breast cancer rates in white, non-Hispanic women, averaged over 1995-1999: Marin County - 199 per 100,000, the rest of the San Francisco Bay Area - 155 per 100,000 and the United States - 144 per 100,000.

Breast cancer mortality rates were 25% higher in Marin County women than in women of other Bay Area and urban California counties (averaged over 1995-1999; Clarke 2002). In Marin women aged 45-64 the increase in breast cancer mortality rate was reported to be 1.9% per year from 1995-1999. In contrast, mortality rates in women of other Bay Area and urban California counties decreased from 3 to 4.5% over the same time period for the same age group (Clarke 2002).

In 2004, Clarke et al. published a report with updated breast cancer incidence rates for Marin County, based on 2000 census data (Clarke 2004). In the 2004 Clarke report, the revised breast cancer incidence rates for Marin County (from 1990 to 2001) are somewhat lower than the rates previously reported for that time period which were based on 1990 census statistics.

Clarke et al. (2004) also showed that, in 1997-2001, the rate of invasive breast cancer in Marin County was 6% higher than the rest of the Bay Area and 15% higher than the rest of the state. Average breast cancer rates in Marin County in 2000-2001 were 12.4% higher than rates reported in 1988-1989. In other parts of the Bay Area the 2000-2001 rates were 5.9% higher and in other parts of California the 2000-2001 rates were 6.5% higher, compared to rates in 1988-1989.

Breast cancer incidence and mortality rates for Marin County reported by Clarke (2004) are shown in the previous section of this report on breast cancer in San Francisco. Note that, contrary to other reports previous to Clarke 2004, breast cancer mortality in Marin County is similar to that reported for other regions.

In 2005, Phipps, Clarke and co-workers published a report entitled “Impact of intercensal population projections and error of closure on breast cancer surveillance: examples from 10 California counties” (Phipps 2005). In this report, breast cancer incidence rates in Marin and San Francisco counties were calculated based on projected population estimates for the year 2000 based on 1990 census data, as determined by the California Department of Finance (DOF), and on actual data from the

2000 census. DOF population projections are based on data from the previous census (1990 in this case) as well as vital statistics and immigration records. These projections are subsequently adjusted upon release of new data from the subsequent census. The difference between these two data sets (projected population versus actual census data) is known as "error of closure."

Phipps (2005) reports that the DOF population projection for 45-64 year old non-Hispanic white women living in Marin County in 2000 was 32% lower than the value obtained during the 2000 census. In other words, there were 32% more women living in Marin County in the year 2000 than the DOF had predicted. Recalculation of breast cancer incidence rates based on the number of cases reported in Marin County and the new census data showed a 22% lower incidence rate than the DOF-based rate. A similar analysis was done for breast cancer incidence rates in San Francisco County using actual 2000 census data with results indicating a higher incidence rate than the DOF-based rate.

Age-adjusted breast cancer incidence rates, per 100,000 non-Hispanic white women, 1999-2001 (Phipps 2005):

	Average cases per year	DOF-based incidence rate	Census-based incidence rate
Marin County	245	214	176
San Francisco County	298	140	160

In 1998, Prehn and West compared Marin cancer rates with rates of similarly wealthy census blocks using cancer registry data and 1990 census block data (a census block is smaller than a census tract and contains approximately 1,000 individuals). Marin County rates and risk factors were compared to rates and risk factors in census blocks located in 24 other California counties. In 1988-1992 Marin County had an age-adjusted breast cancer incidence rate of 119 cases per 100,000 women per year, compared to 109 per 100,000 for all other counties combined. Prehn and West (1998) reported that census blocks that had characteristics most similar to Marin County had breast cancer incidence rates like rates seen in Marin. Likewise, census blocks with high levels of known breast cancer risk factors had higher breast cancer rates; this effect was seen in Marin County and in other parts of California. These results indicate that the high rates of breast cancer seen in Marin County are probably associated with characteristics of the unique population of the county rather than with characteristics of the county itself. The specific population characteristics evaluated included: race, urban status, parity, income, education, occupation and poverty level.

In a 1997-1999 case-control study of breast cancer risk factors in Marin County, the following factors were more likely to occur in cases than controls (Wrensch 2003):

- Premenopausal
- Never to have used birth control pills
- Lower highest lifetime body mass index
- Four or more mammograms in 1990-1994
- Beginning drinking after age 21

- On average drinking 2 or more drinks/day
- Highest quartile of pack years of cigarette smoking
- Raised in organized religion

In this same study, the following factors did not differ significantly between cases and controls:

- Having a first degree relative with breast cancer
- History of benign breast biopsy
- Previous radiation treatment
- Age at menarche
- Parity
- Use of hormone replacement therapy
- Age of first living in Marin
- Total years lived in Marin

Thus, this study did not identify an association between breast cancer incidence and how many years women live in Marin County, an association that would be expected if there was something specific to Marin County that caused breast cancer (other than the socioeconomic status of the population).

Current research indicates an association between the elevated breast cancer rates in Marin County and a high concentration of women with known breast cancer risk factors including low parity, later age at birth of first child, education and affluence.

Ongoing research in Marin County includes a case control study of exposures during adolescence; projects to identify environmental exposures unique to the county; studies to elucidate the relationship between socioeconomic status and breast cancer; and research on the contributions of alcohol consumption and HRT to elevated breast cancer rates, among other studies, including a proposal by the Marin County Department of Health to use biomonitoring of environmental toxins in breast cancer research.

Bayview Hunters Point

In the 1998 study of cancer incidence in Bayview Hunters Point, the San Francisco Department of Public Health also evaluated observed versus expected cases of breast cancer in women in 1993-1995 (Glaser 1998). The results showed that 52.5 breast cancers cases were expected based on the population of the Bayview Hunters Point neighborhood and Bay Area breast cancer incidence rates. However, only 45 breast cancers were observed. Likewise, 5.3 cases of cervical cancer were expected and 6 were observed.

In the 2004 study of breast and cervical cancer incidence in the Bayview Hunters Point, the Northern California Cancer Center reported the observed versus expected cases of these two cancers for 1996-2000 (Le 2004). The results showed that 74.34 breast

cancer cases were expected based on the population of the Bayview Hunters Point neighborhood and Bay Area breast cancer incidence rate for that time period. However, only 72 cases were observed in the Bayview Hunter's Point.

For cervical cancer, 6.39 cases were expected but 10 cases were observed. The standardized incidence ratio is 1.57 with a 99% confidence interval of (0.69, 3.54). Since the 99% CI contains 1, the difference between the observed and expected number is not significant and could be due to chance.

These two studies contradict a previous study conducted by the same department, which showed elevated breast and cervical cancer incidence rates in women of the Bayview Hunters Point neighborhood during 1988-1992. The authors ascribed some of the increase in cancer incidence found in the late 1980s to increased breast cancer screening during that period rather than due mostly to an actual increase in cancer incidence.

CHILDHOOD CANCER

Childhood cancer does not encompass one single disease but rather represents a wide group of different malignancies that vary by histology, origin site, race, sex and age.

UNITED STATES

Cancer is the leading cause of death by disease in children in the U.S. For children and adolescents in the U.S., cancer is the fourth ranked cause of death after unintentional injuries, homicide and suicide (Ries 1999).

Nationwide it is reported that leukemia, central nervous system tumors and lymphoma comprise 57% of childhood cancers (Ries 1999). On average, the nationwide childhood cancer incidence rate is 10 to 20 cases/100,000 children (NCI 2002).

The American Cancer Society (ACS 2005a) estimates that 9,510 new cases of childhood cancer will occur in the United States among children ages 0-14 in 2005. 1,585 deaths are estimated, approximately one-third of which will be from leukemia in children. In 2001, 8,600 children (defined as <15 years of age) in the United States were diagnosed with cancer. About 1,500 children died from the disease that year (NCI 2002). In 2001 the death rate of African-American children aged 1-14 was 2.2 per 100,000 which is close to the death rate reported in white children, 1.5 per 100,000 (ACS 2005b).

Survival rates for children with cancer have improved dramatically in recent years. Boys in 1995-2000 have shown an absolute survival increase of 20% over boys in 1975-1979 while the increase observed in girls is 13% (Jemal 2004).

The causes of cancer in children are unknown. Consistent findings have not been reported that link environmental exposures or parental occupations to childhood cancer. Only a few known conditions or agents have been determined to explain a small percentage of specific cancers in children (Down syndrome, ionizing radiation from accidents or radiation therapy, certain chemotherapeutic agents, AIDS, specific genetic syndromes; NCI 2002).

The National Cancer Institute's SEER program (Surveillance, Epidemiology and End Results) has published detailed information on the incidence of childhood cancer in the United States (Ries 1999). Population-based data were compiled and presented by histologic type and primary site. The following age-specific cancer incidence rates, per 100,000 population, for all races for 1986-1995 were presented:

	All Sites	Acute Lymphoblastic Leukemia (ALL)	Acute Myeloid Leukemia (AML)	CNS Tumors (total)
Male & Female:				
<5 yrs old	20.0	5.8	1.0	3.6
5-9 yrs old	11.0	3.0	0.5	3.2
10-14 yrs old	11.7	1.8	0.6	2.5
15-19 yrs old	20.2	1.3	0.9	2.0
Male:				
0-14 yrs old	15.0	3.7	0.7	3.3
15-19 yrs old	20.4	1.8	0.8	2.3
Female:				
0-14 yrs old	12.9	3.1	0.7	2.8
15-19 yrs old	20.0	0.8	0.9	1.7

California

Accidents are the leading cause of death in California's children. The second leading cause of death in children is cancer, with leukemia, central nervous system tumors and lymphomas being the most common types of cancer diagnosed in children and teenagers in California. Together these three types of cancer comprise approximately 64% of all cancers diagnosed in children in the state (Campleman 2004a). During the period of 1994-1999 the average annual age-adjusted rate of invasive primary cancer cases in children in California was 13.6 cases/100,000 children under age 15 and 20.4 cases/100,000 children ages 15-19 (Campleman 2004a and 2004b). According to the American Cancer Society (2005c), 1100 children less than 15 years of age and ~400 young adults (15 to 19 years of age) are diagnosed with cancer each year in California.

Campleman (2004a and 2004b) reports the following average annual, age-specific and age-adjusted incidence rates for all cancer sites and for leukemia, all races combined in children in California, for 1994-1999. Rates are reported per 100,000 population; age-adjusted to the 2000 U.S. standard population.

All Cancer Sites (rate per 100,000):

	Male		Female	
	Count	Rate	Count	Rate
0-4 yrs old	1748	20.17	1416	17.11
5-9 yrs old	959	11.57	762	9.64
10-14 yrs old	840	11.73	800	11.71
15-19 yrs old	1450	21.86	1183	18.92

Leukemia (rate per 100,000):

	Male		Female	
	Count	Rate	Count	Rate
0-4 yrs old	713	8.23	563	6.80
5-9 yrs old	360	4.34	268	3.39
10-14 yrs old	231	3.23	198	2.90
15-19 yrs old	248	3.74	140	2.24

For all cancers, incidence rates are slightly higher in male children in California than in female children. In California in 1994-1999, the annual age-adjusted overall cancer incidence rate for boys ages 0-14 was 14.40 per 100,000 while the rate for girls was 12.75 per 100,000 (Campleman 2004a). In children ages 15-19 the age-specific cancer incidence rate for males is 21.9 per 100,000 and for females it is 18.9 per 100,000 (Campleman 2004b).

Incidence rates of childhood cancer also vary in California by race/ethnicity, especially for younger children and older adolescents. Campleman (2004a & 2004 b) report the following average annual, age-specific cancer incidence rates for all cancer sites combined, male and female children, for 1994-1999 (per 100,000, adjusted to 2000 U.S. standard population):

	0-4 yrs old	5-9 yrs old	10-14 yrs old	15-19 yrs old
All Races	18.7	10.6	11.7	20.4
Non-Hispanic white	20.2	10.6	11.5	21.3
African-American	14.2	8.0	11.3	16.5
Hispanic	18.4	11.5	12.4	20.7
Asian/PI	16.0	8.4	9.4	16.0

The American Cancer Society (ACS 2005c) has also published cancer incidence rates for California children ages 0-14, for 2001 (per 100,000, age-adjusted to the 2000 U.S. standard population):

	Cases	Rate per 100,000
Non-Hispanic white	432	16.7
African-American	59	10.7
Hispanic	516	14.3
Asian/PI	107	14.3

San Francisco Bay Area

Le (2005) reports the following average annual, age-specific incidence rates in the greater San Francisco Bay Area for all cancer sites and for leukemia in children. Rates are reported per 100,000 population by sex, for all races combined, for 1998-2002; age-adjusted to the 2000 U.S. standard population:

All Cancer Sites (rate per 100,000):

	Male		Female	
	Count	Rate	Count	Rate
0-4 yrs old	261	23.5	213	20.1
5-9 yrs old	139	12.2	122	11.3
10-14 yrs old	134	12.3	129	12.5
15-19 yrs old	216	20.4	168	17.2

Leukemia (rate per 100,000):

	Male		Female	
	Count	Rate	Count	Rate
0-4 yrs old	102	9.2	86	8.1
5-9 yrs old	53	4.7	44	4.1
10-14 yrs old	25	2.3	26	2.5
15-19 yrs old	37	3.5	27	2.8

The Northern California Cancer Center reported in 2000 (NCCC 2000), that each year in the Bay Area about 250 children are diagnosed with cancer. NCCC (2000) evaluated patterns of childhood cancer incidence in children younger than 20 years old in the Greater Bay Area (Alameda, Contra Costa, Marin, Monterey, San Benito, San Francisco, San Mateo, Santa Clara and Santa Cruz counties). The results of the analysis indicated that the incidence rates of childhood cancer were greater in boys than girls and greater in whites and Hispanics than African-Americans and Asians/Pacific Islanders. Rates reported for the Bay Area were similar to rates reported for children in the state.

Bayview-Hunters Point

Childhood cancer incidence in the Bayview-Hunters Point (BVHP) neighborhood was evaluated by Glaser et.al. in 1998. The report was prepared by: Eva Glaser, M.D. of the Cancer Surveillance Section, California Department of Health Services, Martha Davis and Rita Leung of the Northern California Cancer Center, and Tomas Aragon, M.D. of the San Francisco Department of Public Health.

In this study, cancer incidence was reviewed in BVHP for 1993-1995 using information obtained from NCCC's Greater Bay Area Cancer Registry. Cancer rates and population estimates were specific for gender, race/ethnicity and age. The data were evaluated by comparing the number of cancers observed in the population during 1993-1995 with the average number of cancers that would have been expected to have occurred if BVHP residents had the same cancer rate as residents of the Bay Area as a whole. For childhood and adolescent cancers, fewer than 5 cases were observed in BVHP and fewer than 5 cases were expected based on Bay Area rates. Incidence of fewer than 5 cases is not statistically significant and therefore should not be included in an analysis of cancer incidence; in fact, most studies would not even include information on less than 20 cancer cases (Reiter 2003). In order to adequately evaluate a population, a greater number of residents is required or many more years of data is needed for statistically significant results.

In 2004 a similar study was conducted by the Northern California Cancer Center (Le 2004) which reported that for 1996-2000 fewer than 5 childhood leukemia cases were observed in

the Bayview Hunters Point neighborhood while 1.57 cases were expected based on childhood leukemia cancer rates in the Greater Bay Area. The exact number of cases reported in the Bayview Hunters Point neighborhood is not provided in order to protect the privacy of the patients.

The authors of the Glaser study concluded that the observed numbers of cancers among children and adolescents "were not meaningfully increased over the expected number." Additionally, the Glaser study cited a similar 1988-1992 study, which likewise did not show an elevated incidence of childhood cancer compared to Bay Area and San Francisco rates. The results of the Le 2004 study also support the findings and conclusions of the Glaser study.

DISCUSSION

Certain cancer incidence and mortality rates for adults and children have been presented in this report for the United States, California, the Greater San Francisco Bay Area and the Bayview Hunters Point neighborhood.

Cancer incidence rates for areas smaller than the county level are generally not available. The Northern California Cancer Registry conducts cancer incidence analyses at the county level (Unger Hu 2003). The Glaser (1998) and Le (2004) reports on cancer incidence in BVHP are the only reports specific for the population of the southeastern region of San Francisco. CEC Staff contacted two members of the San Francisco health community in an effort to identify additional reports on cancer incidence rates for geographic areas in San Francisco smaller than zip code areas. Specifically, Terry Giovannini, MSW, MPH, PhD, Director of Community Health Programs at California Pacific Medical Center (and an author of the “2004 Community Health Assessment, Building a Healthier San Francisco”; Hospital Council 2004) and Jim Soos, Senior Health Program Planner at the San Francisco Department of Public Health, were contacted. Neither Dr. Giovannini nor Mr. Soos were aware of recent reports on cancer incidence rates in San Francisco for areas smaller than zip code areas (Giovannini 2005; Soos 2005).

Dr. Mitchell Katz, Director of San Francisco Department of Public Health, addressed a meeting of the Southeast Community Facility Commission on July 28, 2004. Dr. Katz reported that rates of breast, prostate, lung and cervical cancers in the Bayview Hunters Point community are the same as rates three years ago. Dr. Katz indicated that, since there has been no change in environmental toxicants in the area in the past three years, the disparity in health (cancer and asthma) between the African American community and other ethnic communities of San Francisco is “due mainly to poverty and social/environmental factors” (Katz 2004). A greater commitment on the City’s part in terms of environmental justice issues was recommended by Dr. Katz.

Dr. Katz addressed the Southeast Community Facility Commission again on May 25, 2005. Dr. Katz was asked a question regarding diabetes and cancer rates in Bayview Hunters Point. The minutes of the meeting read: “Dr. Katz responded that the incidence of cancers, such as breast, cervical and prostate as well as diabetes is higher in the BVHP community than anywhere else in the city” (Katz 2005). CEC Staff has left two phone messages for Dr. Katz and sent two e-mail messages, but none of the messages has been returned.

Thus, Staff has not received any information from Dr. Katz to indicate what data set he is basing his statement on regarding increased cancer incidence in Bayview Hunters Point.

ALL CANCERS

Cancers of the following sites were not shown to be increased in Bayview Hunters Point by the Glaser (1998) study: breast, cervical, bladder, colon, lung, prostate, rectum, leukemia, non-Hodgkin's lymphoma, cancers among children and adolescents and all cancers combined. Likewise, cancers of the following sites were not shown to be statistically significantly increased by the Le (2004) study: breast cancer, cervical cancer, childhood leukemia, and brain and other nervous system cancer.

Breast Cancer

Breast and cervical cancer incidence rates in women of the Bayview Hunters Point neighborhood were not elevated above the rates expected for this population based on gender-, race/ethnicity-, and age-controlled rates observed in the San Francisco Bay Area.

Childhood Cancer

The population of children and adolescents under the age of 19 for the four zip codes that comprise the southeastern area of San Francisco is 38,471, based on the 2000 U.S. census[2]. Applying the childhood cancer incidence rate reported for male and female children in the U.S. of approximately 20 cases/100,000[3] results in an equivalent expected childhood cancer count of 8 cases for the population of the southeastern area of San Francisco. Application of this rate to the child population of the BVHP neighborhood would result in an expected childhood cancer count in that area of 2.2 cases, which is consistent with the results reported by the Glaser 1998 and Le 2004 studies (<5 cases). Therefore, these results indicate that the incidence of childhood cancer in the southeastern section of San Francisco, and particularly in the Bayview-Hunter's Point neighborhood, has not been shown to be increased above the expected incidence rate of childhood cancer.

Racial Disparities

The cancer incidence and mortality rates presented in this report have demonstrated the disparities that exist in this country regarding cancer incidence and deaths in minority populations, particularly African-American males and females. The American Cancer Society, in its report titled "Cancer Facts and Figures for African-Americans 2005-2006," has indicated that these disparities may be based on socioeconomic differences and unequal access to medical care. Specifically, the American Cancer Society states that the higher cancer incidence and mortality rates seen in African-Americans compared to whites may be due to issues of poverty, treatment disparities, reduced access to medical care, and diagnosis at a more advanced stage of disease, which has been shown to occur in a higher proportion of African-Americans compared to whites.

---

[2] The following population statistics for children and adolescents under the age of 19 were obtained from the 2000 U.S. census: zip code 94107, Potrero Hill, 2,094 children; zip code 94110, Mission/Bernal Heights, 14,760 children; zip code 94124, BVHP, 11,046 children; zip code 94134, Visitacion Valley, 10,571 children (Census Bureau 2003).

[3] The rate of 20 cases/100,000 population is consistent with the data presented for male and female children in California and the Greater San Francisco Bay Area.

CONCLUSION

Available data show that cancer incidence rates in the population located near the proposed SFERP power plant in the southeast part of San Francisco are not elevated above those found in the general population. The observed cancer incidence rates for all cancers, breast cancer and childhood cancer for the Bayview-Hunters Point neighborhood are not greater than the rates expected for that population based on the rates reported for the greater San Francisco Bay Area, the state, and the nation.

REFERENCES

American Cancer Society. 2005a. "Cancer Facts and Figures 2005." http://www.cancer.org/downloads/STT/CAFF2005f4PWSecured.pdf

American Cancer Society. 2005b. "Cancer Facts and Figures for African-Americans 2005-2006." http://www.cancer.org/downloads/STT/CAFF2005AACorrPWSecured.pdf

American Cancer Society, California Division and Public Health Institute, California Cancer Registry. 2005c. "California Cancer Facts and Figures 2005." Oakland, CA: American Cancer Society, California Division. September. http://www.ccrcal.org/PDF/ACS2005.pdf

American Cancer Society. 2005d. "Breast Cancer Facts and Figures 2005-2006." Atlanta: American Cancer Society. http://www.cancer.org/downloads/STT/CAFF2005BrF.pdf

Aragon T, Reiter R, Katcher B. 1998. "San Francisco Burden of Disease and Injury: Mortality Analysis, 1990-1995." Division of Population Health & Prevention, San Francisco Department of Public Health. December. http://www.dph.sf.ca.us/Reports/DiseaseInjury/bdi9095b1.pdf

Campleman SL, Wright WE. 2004a. "Childhood Cancer in California 1988 to 1999, Volume I: Birth to Age 14." Sacramento, CA: California Department of Health Services, Cancer Surveillance Section, July.

Campleman SL, Wright WE. 2004b. "Childhood Cancer in California 1988 to 1999 Volume II: Adolescents Ages 15 to 19." Sacramento, CA: California Department of Health Services, Cancer Surveillance Section, July.

Clarke CA, Glaser SL, West DW, Ereman RR, Erdmann CA, Barlow, JM, Wrensch MR. 2002. "Breast cancer incidence and mortality trends in an affluent population: Marin County, California, USA, 1990-1999. Breast Cancer Research. 4(6): R13. http://www.pubmedcentral.nih.gov/articlerender.fcgi?tool=pubmed&pubmedid=12473174

Clarke C, Keegan T, Le G, Glaser S, West D. 2004. "Update on breast cancer incidence patterns in Marin County and the San Francisco Bay Area, California." Union City: Northern California Cancer Center (NCCC). September. http://www.nccc.org/ResearchandTraining/studies/pdf/bcr_marin2001_0904.pdf

Cockburn M, Deapen D (eds). 2004. "Cancer Incidence and Mortality in California: Trends by Race/Ethnicity, 1988-2001." Los Angeles Cancer Surveillance Program, University of Southern California, http://www.ccrcal.org/PDF/CCRMonograph12-04.pdf

Giovannini T. 2005. Electronic communication. October 6.

Glaser E, Davis MM, Leung RW, Aragon T. 1998. "Cancer Incidence Among Residents of the Bayview-Hunters Point Neighborhood, San Francisco, California. 1993-1995." January. http://www.dph.sf.ca.us/Reports/DiseaseInjury/bvhuntca.pdf

Horn-Ross PL et al. 2004. "Patterns of alcohol consumption and breast cancer risk in the California Teachers Study Cohort." Cancer Epidemiology, Biomarkers and Prevention. 13(3): 405. March.

Hospital Council of Northern and Central California. 2004. "2004 Community Health Assessment: Building a Healthier San Francisco." December. http://www.hcncc.org/doc/SF%20Needs%20Assessment%202004.pdf

Jemal A, et al. 2004. "Annual Report to the Nation on the Status of Cancer, 1975-2001, with a Special Feature Regarding Survival." Cancer. 101(1):3-27. July 1. www.interscience.wiley.com

John EM, Horn-Ross PL, Koo J. 2003. "Lifetime physical activity and breast cancer risk in a multiethnic population: the San Francisco Bay Area Breast Cancer Study." Cancer Epidemiology, Biomarkers and Prevention. Vol 12: 1143-1152. November.

Katz M. 2005. Minutes of the May 25, 2005 meeting of the Southeast Community Facility Commission. http://www.ci.sf.ca.us/site/sefacility_page.asp?id=33991

Katz M. 2004. Minutes of the July 28, 2004 meeting of the Southeast Community Facility Commission. http://www.sfgov.org/site/sefacility_page.asp?id=26863

Kwong SL, Perkins CI, Morris CR, Cohen R, Allen M, Wright WE. 2001. "Cancer in California 1988-1999." Sacramento, CA: California Department of Health Services, Cancer Surveillance Section. December.

Le GM, Gomez SL, O'Malley CD, Clarke CA, Keegan THM, Stroup A, Unger Hu K, Glaser SL, and West DW. 2005. "Cancer Incidence and Mortality in the Greater Bay Area, 1988-2002." Fremont, CA: Northern California Cancer Center (NCCC), February. http://www.nccc.org/ResearchandTraining/pubs/annual_report.html

Le GM, O'Malley CD, Gomez SL, Clarke CA, Keegan THM, Unger Hu K, Leung RW, Glaser SL, West DW. 2004. "Cancer Incidence and Mortality in the Greater Bay Area. 1988-2001." Union City: Northern California Cancer Center (NCCC). August. http://www.nccc.org

Le G, O'Malley C, Aragon T. 2004. "Inquiry regarding cancer rates in San Francisco County: Report on incidence of cancer in Bayview-Hunter's Point from the Greater Bay Area Cancer Registry." Union City: Northern California Cancer Center (NCCC). August 11.

Morris CR, and Kwong SL (eds). 2004. "Breast Cancer in California, 2003." Sacramento, CA; California Department of Health Services, Cancer Surveillance Section, July.

National Cancer Institute (NCI). 2002. "Cancer Facts. National Cancer Institute Research on Childhood Cancers." February 12. http://cis.nci.nih.gov/fact/6_40.htm

Northern California Cancer Center (NCCC). 2002a. "Colorectal Cancer in the San Francisco Bay Area 1988-1999." Greater Bay Area Cancer Registry. March.

Northern California Cancer Center (NCCC). 2002b. "Breast Cancer in the San Francisco Bay Area 1988-1999." Greater Bay Area Cancer Registry. March.

Northern California Cancer Center (NCCC). 2000. "Childhood Cancer in the Greater Bay Area, 1988-1996." Greater Bay Area Cancer Registry. Volume 10, Number 1.

Phipps AI, Clarke CA, Ereman RR. 2005. "Impact of intercensal population projections and error of closure on breat cancer surveillance: examples from 10 California counties." Breast Cancer Research. 7:R655-R660. http://breast-cancer-research.com/content/7/5/R655

Prehn AW, Clarke C, Topol B, Glaser S, West D. 2002. "Increase in breast cancer incidence in middle-aged women during the 1990s." Annals of Epidemiology. 12(7): 476-481. October.

Prehn AW and West DW. 1998. "Evaluating local differences in breast cancer incidence rates: A census-based methodology (United States)." Cancer Causes and Control. 9: 511-517.

Reiter, Randy. 2003. Epidemiologist, Community Epidemiology Branch, San Francisco Department of Public Health. Personal communication. November 14.

Ries LAG, Smith MA, Gurney JG, Linet M, Tamra T, Young JL, Bunin GR (eds). 1999. "Cancer Incidence and Survival among Children and Adolescents: United States SEER Program 1975-1995." National Cancer Institute, SEER Program. NIH Pub. No. 99-4649. Bethesda, MD. http://seer.cancer.gov/publications/childhood/

Soos J. 2005. Electronic communication. October 7.

Unger Hu, Kristen. 2003. Data Release Coordinator, Northern California Cancer Center. Personal communication. November 12.

U.S. Census Bureau, United States Department of Commerce. 2003. "American Factfinder. Profile of General Demographic Characteristics: 2000" http://factfinder.census.gov/home/saff/main.html?_lang=en&_ts=

Wrensch M. et al. 2003. "Risk factors for breast cancer in a population with high incidence rates." Breast Cancer Research. 5(4): R88. http://www.pubmedcentral.nih.gov/articlerender.fcgi?tool=pubmed&pubmedid=12817999

Yost K, Perkins C, Cohem R, Morris C, Wright W. 2001. "Socioeconomic status and breast cancer incidence in California for different race/ethnic groups." Cancer Causes and Control. 12: 703-711

ATTACHMENT 1

Cancer concern in San Francisco County:
Report on incidence of cancer in Bayview-Hunter's Point
from the Greater Bay Area Cancer Registry
August 11, 2004

INTRODUCTION

In response to a request from a consultant for the California Energy Commission, the Greater Bay Area Cancer Registry (GBACR), part of the Northern California Cancer Center in Union City, California, has completed a review of the incidence of selected cancers (cancers of the breast, cervix, brain, and childhood leukemia) occurring in the Bayview-Hunter's Point neighborhood in San Francisco County. This cancer assessment report will be included in the public health assessment for the proposed San Francisco Electric Reliability Project (SFERP), which is proposed to be located in the Bayview-Hunter's Point section of San Francisco.

METHODS

The Greater Bay Area Cancer Registry (GBACR) collects and manages information on persons diagnosed with cancer. These data are obtained according to state law from physicians, hospitals, and other cancer treatment facilities, which are required by the state to report all cancer cases to the registry. Cancer data in the San Francisco Bay Area (Alameda, Contra Costa, Marin, San Francisco, and San Mateo counties) are available from 1973 onward; data are currently complete through 2001. In this report, we examined reviewed the incidence of childhood leukemia (ages 0-19) and breast, cervical, and brain cancers in the Bayview-Hunter's Point neighborhood during the period 1988-2000.

To determine the number of cases that were diagnosed among residents of a certain geographic area, the GBACR collects information on cancer patients upon diagnosis, including his/her address. However, the data are limited to the address at the time of diagnosis and do not include a residential history. Since the development of cancer is a multi-step process and there is a long time between the start of tumor development and a clinically diagnosable cancer, some former residents will have been diagnosed with cancer after moving out of the area, and some new residents will be diagnosed shortly after moving into the area. However, if there were a major increase in cancer among people who have lived in the area for a long period of time, it is likely to be seen in this type of investigation.

The Bayview-Hunter's Point neighborhood was defined using Census 2000 census tract boundary definitions and included the following census tracts: 230.01, 230.02, 230.03, 231.01, 231.02, 232, 233, 234, 606, and 610 (see attached maps). To determine if the occurrence of specific cancers has been unusual in this neighborhood, we compared the number of cases for these cancers (the observed number) in the region of concern with the number that would be expected to occur if these neighborhood residents had the same rate of cancer occurrence as the entire five-county San Francisco Bay Area. To determine the expected number of cancers, we applied the average annual incidence rate of cancer from the reference region (San Francisco Bay Area) to the

Census 2000 population in Bayview-Hunter's Point by age, race, and sex. This number was multiplied by 5 to reasonably estimate the number of expected cancers during the time period 1996-2000.

RESULTS

Table 1 shows the estimate of the number of breast, cervical, brain, and childhood leukemia cases expected to be diagnosed in Bayview-Hunter's Point and the number of cases actually diagnosed (observed number) for the period 1996-2000. Counts less than five are not shown due to confidentiality of small numbers. The expected and observed numbers can be compared directly using the standardized incidence ratio (SIR). If the 99% confidence interval for the SIR contains 1, then any difference between the observed and expected number is not significant and is likely due to chance. As shown in Table 1, all confidence intervals included 1, indicating that there was no significant difference in cancer incidence between the Bayview-Hunter's Point neighborhood and the rest of the San Francisco Bay Area during this time period for these specific cancers.

Table 1. Incidence of selected invasive cancers in Bayview-Hunters Point[1]
San Francisco, CA

	1996-2000			
Type of Cancer	**Observed number**	**Expected number**	**SIR[2]**	**99% CI[3]**
Breast (female)	72	74.34	0.97	(0.71, 1.31)
Cervix	10	6.39	1.57	(0.69, 3.54)
Childhood leukemia[4]	< 5	1.57	-	-
Brain and other nervous system	8	5.50	1.45	(0.58, 3.62)

[1]Includes Census Tracts 230.01, 230.02, 230.03, 231.01, 231.02, 232, 233, 234, 606, and 610 based on Census 2000 census tract boundary definitions.
[2]SIR = Standardized Incidence Ratio = Observed number of cases/Expected number of cases.
[3]If the 99% confidence interval (CI) for the SIR contains 1, then any difference between the observed and expected number is not significant and could have been due to chance.
[4]Cases in children and adolescents aged 0-19.

CONCLUSIONS

Our assessment indicates that during the period 1996-2000, the incidence of childhood leukeumia and breast, cervical, and brain cancer in the Bayview-Hunter's Point neighborhood did not differ substantially from that of the entire five-county San Francisco Bay Area.

REFERENCES

American Cancer Society. 2004. "Cancer Facts and Figures." http://www.cancer.org/docroot/STT/stt_0.asp

American Cancer Society. 2003. "Cancer Facts and Figures for African-Americans 2003-2004." http://www.cancer.org/downloads/STT/861403.pdf

American Cancer Society, California Division and Public Health Institute, California Cancer Registry. 2001. "California Cancer Facts and Figures 2001." Oakland, CA: American Cancer Society, California Division. September. http://www.cancer.org/downloads/COM/CA_CancerFacts2001.pdf

Aragon T, Reiter R, Katcher B. 1998. "San Francisco Burden of Disease and Injury: Mortality Analysis, 1990-1995." Division of Population Health & Prevention, San Francisco Department of Public Health. December. http://www.dph.sf.ca.us/Reports/DiseaseInjury/bdi9095b1.pdf

Campleman SL, Schlag R, Perkins CI, Glaser E, Kwong SL, Cress RD, Wright WE. 1999. "Childhood Cancer in California, 1988-1994." Sacramento, California: California Department of Health Services, Cancer Surveillance Section. April. http://www.ccrcal.org/childhood94/index.html

Clarke CA, Glaser SL, West DW, Ereman RR, Erdmann CA, Barlow, JM, Wrensch MR. 2002. "Breast cancer incidence and mortality trends in an affluent population: Marin County, California, USA, 1990-1999. Breast Cancer Research. 4(6): R13. http://www.pubmedcentral.nih.gov/articlerender.fcgi?tool=pubmed&pubmedid=12473174

Glaser E, Davis MM, Leung RW, Aragon T. 1998. "Cancer Incidence Among Residents of the Bayview-Hunters Point Neighborhood, San Francisco, California. 1993-1995." January. http://www.dph.sf.ca.us/Reports/DiseaseInjury/bvhuntca.pdf

Horn-Ross PL et al. 2004. "Patterns of alcohol consumption and breast cancer risk in the California Teachers Study Cohort." Cancer Epidemiology, Biomarkers and Prevention. 13(3): 405. March.

Jemal A, et al. 2004. "Annual Report to the Nation on the Status of Cancer, 1975-2001, with a Special Feature Regarding Survival." Cancer. 101(1):3-27. July 1. www.interscience.wiley.com

John EM, Horn-Ross PL, Koo J. 2003. "Lifetime physical activity and breast cancer risk in a multiethnic population: the San Francisco Bay Area Breast Cancer Study." Cancer Epidemiology, Biomarkers and Prevention. Vol 12: 1143-1152. November.

Kwong SL, Perkins CI, Morris CR, Cohen R, Allen M, Wright WE. 2001. "Cancer in California 1988-1999." Sacramento, CA: California Department of Health Services, Cancer Surveillance Section. December.

Le GM, O'Malley CD, Leung RW, Stroup A, Clarke CA, Gomez SL, Glaser SL, West DW. 2003. "Cancer Incidence and Mortality in the Greater San Francisco Bay Area. 1988-2000." Union City: Northern California Cancer Center (NCCC). February. http://www.nccc.org

National Cancer Institute (NCI). 2002. "Cancer Facts. National Cancer Institute Research on Childhood Cancers." February 12. http://cis.nci.nih.gov/fact/6_40.htm

Northern California Cancer Center (NCCC). 2002a. "Colorectal Cancer in the San Francisco Bay Area 1988-1999." Greater Bay Area Cancer Registry. March.

Northern California Cancer Center (NCCC). 2002b. "Breast Cancer in the San Francisco Bay Area 1988-1999." Greater Bay Area Cancer Registry. March.

Northern California Cancer Center (NCCC). 2000. "Childhood Cancer in the Greater Bay Area, 1988-1996." Greater Bay Area Cancer Registry. Volume 10, Number 1.

Prehn AW, Clarke C, Topol B, Glaser S, West D. 2002. "Increase in breast cancer incidence in middle-aged women during the 1990s." Annals of Epidemiology. 12(7): 476-481. October.

Prehn AW and West DW. 1998. "Evaluating local differences in breast cancer incidence rates: A census-based methodology (United States)." Cancer Causes and Control. 9: 511-517.

Reiter, Randy. 2003. Epidemiologist, Community Epidemiology Branch, San Francisco Department of Public Health. Personal communication. November 14.

Ries LAG, Smith MA, Gurney JG, Linet M, Tamra T, Young JL, Bunin GR (eds). 1999. "Cancer Incidence and Survival among Children and Adolescents: United States SEER Program 1975-1995." National Cancer Institute, SEER Program. NIH Pub. No. 99-4649. Bethesda, MD. http://seer.cancer.gov/publications/childhood/

Unger Hu, Kristen. 2003. Data Release Coordinator, Northern California Cancer Center. Personal communication. November 12.

U.S. Census Bureau, United States Department of Commerce. 2003. "American Factfinder. Profile of General Demographic Characteristics: 2000" http://factfinder.census.gov/home/saff/main.html?_lang=en&_ts=

Wrensch M. et al. 2003. "Risk factors for breast cancer in a population with high incidence rates." Breast Cancer Research. 5(4): R88. http://www.pubmedcentral.nih.gov/articlerender.fcgi?tool=pubmed&pubmedid=12817999

Yost K, Perkins C, Cohem R, Morris C, Wright W. 2001. "Socioeconomic status and breast cancer incidence in California for different race/ethnic groups." Cancer Causes and Control. 12: 703-711

Public Health Appendix D

Childhood Mortality in San Francisco

October 2005

LEADING CAUSES OF CHILDHOOD MORTALITY IN THE UNITED STATES

The Federal Interagency Forum on Child and Family Statistics presented data on infant and child mortality rates in the United States in their publication "America's Children In Brief: Key National Indicators of Well-Being, 2004" (Forum 2004). Data presented indicate that the six leading causes of death in children in the US ages 1-14 are: unintentional injuries, cancer, birth defects, homicide, heart disease and pneumonia/influenza (Forum 2004, UCSF 2003).

Childhood Mortality by Race/Ethnicity in the United States

Nationwide, child death rates by race/ethnicity are highest in non-Hispanic African American children (Forum 2004):

Age	< 1	1 - 4	5 - 14	15 - 19	
Gender				Males	Females
Non-Hispanic African American	13.5	47.5	23.3	130.4	40.8
Non-Hispanic White	5.7	30.1	17.7	86.1	39.6
Hispanic	5.4	30.6	14.7	92.0	31.1
Asian/Pacific Islander	4.7	22.3	12.2	52.1	23.3

The California Department of Health Services reported infant and child mortality rates for 2003 compared to the Healthy People 2010 objectives, by age, gender and race/ethnicity (DHS 2005). Rates are per 100,000 population for all ages except < 1 yr old which is per 1,000 live births:

Race/gender	< 1 yr old*	1-4 yrs old	5-9 yrs old	10-14 yrs old	15-19 yrs old
HP2010 Goal	4.5	18.6	12.3	16.8	39.8
California Total	5.5	27.8	13.6	17.2	58.7
White	4.8	24.5	13.5	16.5	55.8
African American	11.6	52.1	17.8	22.7	95.5
Hispanic	5.2	29.7	13.7	17.4	61.4
Asian	4.0	20.3	14.7	18.3	38.3
Male	6.1	31.4	15.2	19.8	83.9
Female	4.8	24.0	12.0	14.4	31.8

*Rate for < 1 yr old from 2002 (all other rates from 2003)

Unintentional injury and homicide rates recorded in 1999-2000 are also highest in non-Hispanic African American children (ages 6-11) in the US (UCSF 2003):

	Deaths per 100,000 population	
	Unintentional injury	Homicide
Non-Hispanic African American	11.7	1.5
Non-Hispanic White	6.1	0.54
Hispanic	5.4	0.86
Asian/Pacific Islander	3.3	0.41
American Indian/Alaska native	11.3	0.86

Leading Causes of Childhood Mortality in San Francisco

The San Francisco Department of Public Health reported "The Health and Well-Being of Children and Youth in San Francisco, 1998" (DPH 1998). From 1990 to 1995 there were 1,027 deaths in San Francisco in children ages from birth to 24 years old. The five leading causes of death and numbers of death, by age, for children in San Francisco in 1990-1995 are ranked below:

	Number of Deaths
Infants age 0-1	
1. SIDS	85
2. Congenital anomalies	70
3. Birth asphyxia/trauma	43
4. Growth/gestation/low birthweight	14
5. Pneumonia	8
Children age 1-4	
• Congenital anomalies	16
• Homicide	7
• Motor vehicle-traffic	5
• Fires, unintentional	4
• HIV/AIDS	3
Children age 5-14	
1. Motor vehicle-traffic	15
2. Congenital anomalies	8
3. Homicide	7
4. Leukemia	5
5. Brain Cancer	4
Youths age 15-24	
1. Homicide	157
2. Suicide	79
3. Motor vehicle-traffic	78
4. HIV/AIDS	30
5. Drug poisoning, unintentional	22

Infant Mortality Rates in the United States

The California Department of Health Services reported rates of low birth weight births (LBW, < 2,500 g) and very low birth weight births (VLBW, < 1,500 g) for 2004 compared to the Healthy People 2010 objectives, by gender and race/ethnicity (DHS 2005):

Race/gender	LBW births	VLBW births
HP2010 Goal	5.0%	0.9%
California Total	6.7%	1.18%
African American	12.6%	2.75%
American Indian	6.1%	1.16%
Asian	7.4%	1.08%
Hawaiian/PI	7.1%	1.42%
Hispanic	6.1%	1.11%
White	6.3%	1.02%
Female child	7.1%	1.16%
Male child	6.3%	1.20%

Infant Mortality Rates in San Francisco

Overall, San Francisco's infant mortality rate for 1998 was 5.3 deaths per 1,000 live births (Bosley and Evans 1998). This rate is better than the Healthy People 2000 objective of 7 deaths per 1,000 live births but greater than the Healthy People 2010 objective of 4.5 deaths per 1,000 live births. African-Americans had the highest infant mortality rate in San Francisco in 1998 (Bosley and Evans 1998) and the highest percentage of low birth weight babies in 1998 (Harris et al. 2000):

Infant Mortality in San Francisco in 1998 (Bosley and Evans 1998) and Percentage of Low Birth Weight Babies in 1998 (Harris et al. 2000), by race/ethnicity

	Infant deaths per 1,000 live births	Low Birth Weight
Non-Hispanic African American	14.8	13.7 %
Non-Hispanic White	4.4	7.1 %
Hispanic	2.9	6.1 %
Asian	4.0	5.9 %

The Hospital Council (2004) reported low birth weight in terms of percentage of live births for San Francisco and California in 2001. In California, 6.3% of live births were low birth weight in 2001 while the percentage in San Francisco was 7.4%. In San Francisco, the low birth weight rate, by race was: white = 6.2%, African American = 16.3%, Hispanic = 6.5% and Chinese American = 6.2%.

Infant and childhood mortality rates specific to the Bayview Hunters Point and Potrero Hill neighborhoods of San Francisco were not identified in the literature.

San Francisco Demographics

Duh et al. (1999) reported the following population statistics by race/ethnicity for San Francisco's general population and youth population ages 10-24 years old:

Demographics of San Francisco

	General Population	Youth
African-American	10%	14%
White	40%	23%
Latino	16%	21%
Asian	33%	42%

The San Francisco Planning Department reports that 27% of San Francisco's African American population resides in Bayview Hunters Point (SFPD 2002). In the Bayview Hunters Point, 46% of the residents are African American, 24% are Asian, 17% are Hispanic and 6% are white. Similar demographic data is reported by the Hospital Council (2004): in the Bayview Hunters Point, 47% of the residents are African American, 28% are Asian, 17% are Hispanic and 5% are white. In Potrero Hill, 11% of the residents are African American, 18% are Asian, 8% are Hispanic and 59% are white. Overall for San Francisco, 8% of residents are African American, 31% are Asian, 14% are Hispanic and 44% are white.

CONCLUSIONS

In 1998 the overall infant mortality rate in San Francisco was lower than the Healthy People 2000 objective for infant mortality (5.3 deaths in SF per 1,000 live births versus the objective of 7 deaths per 1,000 live births). Infant and childhood mortality rates specific to the Bayview Hunters Point neighborhood of San Francisco were not identified in the literature.

Within the African American population of San Francisco, however, the infant mortality rate was more than 3 times greater than the rate reported in white residents and 5 times greater than the rate in Hispanic residents. This trend is consistent with the Forum study (2004) that reports child death rates in the U.S. by race/ethnicity are highest in non-Hispanic African American children. Since nearly half of the Bayview Hunters Point residents are African American (SFPD 2002), it seems likely that an increased rate of infant/childhood mortality would probably be observed in this population, as it is observed in the entire City of San Francisco and nation-wide.

REFERENCES

Bosley L, Evans PE. 1998. "Fetal Infant Mortality Review Program 1998. Annual report of findings to the community." San Francisco Department of Public Health. Children, Youth and Families Section. http://www.dph.sf.ca.us/Reports/1998FIMRRpt.pdf

California Department of Health Services (DHS), Center for Health Statistics, Office of Health and Information Research, 2005. "Healthy California 2010: Progress in Achieving the Healthy People 2010 Objectives, 2000-2003." April. http://www.dhs.ca.gov/hisp/chs/OHIR/hp2010/hc2010progress.htm

Department of Public Health (DPH). 1998. "The Health and Well-Being of Children and Youth in San Francisco, 1998." Office of Policy and Planning. http://www.dph.sf.ca.us/Reports/98ChildHealth/98ChildHealthMenu.htm

Duh HJ, Shalwitz J, Tsoulos B. 1999. "A Snapshot of Adolescent Health in San Francisco." San Francisco Department of Public Health. Adolescent Committee, Coordinating Council of Children, Youth and Families. November. http://www.dph.sf.ca.us/Reports/adolsnap.pdf

Federal Interagency Forum on Child and Family Statistics (Forum). 2004. "America's Children in Brief: Key National Indicators of Well-Being, 2004." http://childstats.gov/americaschildren/

Harris L, et al. 2000. "First Steps: Children 0-5 in San Francisco. A Data Report on the Status of San Francisco's Young Children." San Francisco Starting Points Initiative. http://www.dcyf.org/404_images/pdf/datarprt.pdf

San Francisco Planning Department (SFPD). 2002. "Profiles of Community Planning Areas: San Francisco's Eastern Neighborhoods." January. http://sfgov.org/site/planning_index.asp?id=25368

University of California San Francisco. 2003. "Fact Sheet on Mortality: Middle Childhood." Public Policy Analysis and Education Center for Middle Childhood and Adolescent Health.

Public Health Appendix E

Staff's Health Risk Assessment
and
Cumulative Risk Assessment for SFERP

June 20, 2005

1. Introduction
2. Dispersion Modeling
3. Health Risk Assessment
4. Results
   A. All Sources at SFERP
   B. SFERP Combustion Turbines Only
   C. SFERP Cooling Towers Only
   D. 20 Facilities in Southeastern San Francisco
5. Discussion

List of Tables

Table 1* SFERP Cumulative Analysis: Stack Input Data.
Table 2* SFERP Cumulative Analysis: Facility Emissions in lbs/year
Table 3 Cancer Risk and Noncancer Hazard due to Emissions from SFERP
Table 4 Cancer Risk and Noncancer Hazard due to Emissions from SFERP Combustion Turbines
Table 5 Cancer Risk and Noncancer Hazard due to Emissions from SFERP Cooling Towers
Table 6 Cancer Risk and Noncancer Hazard due to Emissions from 20 Facilities

*Tables 1 and 2 are attached at the end of this document.

List of Figures

Figure 1 Sources at SFERP only (coarse grid): Cancer Risk Assessment
Figure 2 Sources at SFERP only (coarse grid): Noncancer Chronic Hazard Index Assessment
Figure 3 Sources at SFERP only (coarse grid): Noncancer Acute Hazard Index Assessment
Figure 4 Sources at SFERP only (fine grid): Cancer Risk Assessment
Figure 5 Sources at SFERP only (fine grid): Noncancer Chronic Hazard Index Assessment
Figure 6 Sources at SFERP only (fine grid): Noncancer Acute Hazard Index Assessment

Figure 7 Combustion Turbine Emissions at SFERP only (fine grid): Cancer Risk Assessment
Figure 8 Combustion Turbine Emissions at SFERP only (fine grid): Noncancer Chronic Hazard Assessment
Figure 9 Combustion Turbine Emissions at SFERP only (fine grid): Noncancer Acute Hazard Assessment
Figure 10 Cooling Tower Emissions at SFERP only (fine grid): Cancer Risk Assessment
Figure 11 Cooling Tower Emissions at SFERP only (fine grid): Noncancer Chronic Hazard Assessment
Figure 12 Cooling Tower Emissions at SFERP only (fine grid): Noncancer Acute Hazard Assessment
Figure 13 Emissions from 50 Sources in Southeast San Francisco (coarse grid): Cancer Risk Assessment
Figure 14 Emissions from 50 Sources in Southeast San Francisco (coarse grid): Noncancer Chronic Hazard Assessment
Figure 15 Emissions from 50 Sources in Southeast San Francisco (coarse grid): Noncancer Acute Hazard Assessment
Figure 16 Emissions from 50 Sources in Southeast San Francisco (fine grid): Cancer Risk Assessment
Figure 17 Emissions from 50 Sources in Southeast San Francisco (fine grid, close-up of SE WPCP vicinity): Cancer Risk Assessment
Figure 18 Emissions from 50 Sources in Southeast San Francisco (fine grid, close-up of SE WPCP vicinity): Noncancer Chronic Hazard Index Assessment
Figure 19 Emissions from 50 Sources in Southeast San Francisco (fine grid, close-up of SE WPCP vicinity): Acute Hazard Index Assessment

1. INTRODUCTION

A risk assessment was conducted for the proposed San Francisco Electric Reliability Project (SFERP). A cumulative risk assessment was also conducted for emissions from SFERP and emissions from 20 other facilities located in the southeastern region of San Francisco, for a total of 50 sources evaluated.

This report presents the approach that was used, assumptions that were made, and results of the risk assessments. Facility-specific values were used wherever available.

2. DISPERSION MODELING

Dispersion modeling and health risk assessment were conducted using the California Air Resources Board's "Hot Spots Analysis and Reporting Program," HARP version 1.1 (build 23.02.10). The program was obtained from the website of Dillingham Software Engineering, Inc. (http://www.dillinghamsoftware.com)

Modeling was conducted using coarse and fine grids and representative meteorology (Potrero Power Plant 1992 meteorological data set).

For properties which had enough information on existing buildings (provided by BAAQMD), building dimensions were included in the analysis for building downwash effects. These facilities include: SFERP, Mirant Potrero, PG&E Hunters Point, Southeast Water Pollution Control Plant, Bell Cleaners, One-Hour Martinizing and Vermont Cleaners. Properties for which building dimensions were not available include: Gonzalez Steel Drum Company, San Francisco Petroleum Company, VIP Litho and 10 gasoline dispensing service stations.

The data for each facility stack evaluated in the risk analyses are summarized in Table 1. Data are listed for all 50 sources at the 20 facilities included in the cumulative risk analysis. Any assumptions that were made in the analysis due to lack of information are indicated by a shaded background (which appears yellow on screen and if printed in color).

Emissions of toxic air contaminants from each facility are listed in Table 2. For SFERP, emissions were obtained from the AFC for the three gas turbines and two cooling towers. Maximum impacts were modeled for this facility based on Turbine Case 6 (worst case for all impacts; Table 8.1B-3 of the AFC). Emissions for all other facilities were obtained from information provided by BAAQMD.

3. HEALTH RISK ASSESSMENT

Point estimate risk analysis was conducted using the Derived (OEHHA) Method option. Risks and hazards were calculated under the residential exposure scenario, unless otherwise noted.

Cancer risk, noncancer chronic hazard and noncancer acute hazard were determined and are presented in this report, along with isopleths for each scenario. The maps upon which the risk isopleths are superimposed are accurate to within +/- 10 to 20 m.

4. RESULTS

Dispersion modeling and risk assessment were conducted for source emissions under the following scenarios:

- all sources at SFERP (3 combustion turbines and 2 cooling towers)
- SFERP combustion turbines only
- SFERP cooling towers only
- 20 facilities in southeastern San Francisco, including SFERP (50 sources)

A. ALL SOURCES AT SFERP

Dispersion modeling using a coarse grid and then a fine grid was conducted for emissions from SFERP using the HARP program. First a coarse grid of 5000 m with 200 m resolution was run, centered on SFERP (2,748 receptors). Then, to better define the risks near the SFERP, a fine grid was run of 1500 m, 25 m resolution centered on the proposed location of SFERP (14,788 receptors).

Results of this analysis are presented in Table 3 and in Figures 1, 2 and 3 for coarse grid modeling and Figures 4, 5 and 6 for fine grid modeling.

Results of the coarse grid dispersion modeling indicate that the off-site PMI (point of maximum impact) for cancer risk and chronic noncancer hazard index (HI) due to emissions from all sources at SFERP is located in the San Francisco Bay. The results of the fine grid dispersion modeling indicate that the PMI for cancer risk is located to the northeast of the facility boundary.

Table 3 lists the total maximum cancer risk, chronic HI and acute HI which occur at three separate locations in the San Francisco Bay, from the coarse grid modeling. Results for the fine grid modeling are also presented, as well as risks and hazards at the facility fenceline (assumed to be the nearest workplace and modeled under the worker exposure scenario), the nearest residence (located approximately 1,600 feet from the facility on the northeast corner of Minnesota and Cesar Chavez streets), the nearest sensitive receptor (located approximately 550 feet north of the facility at the Warm Water Cove Public Access Park), and the maximally exposed sensitive receptor.

B. SFERP COMBUSTION TURBINES ONLY

Emissions from the combustion turbine generators and the cooling towers at SFERP were modeled separately.

Dispersion modeling using a coarse grid and then a fine grid was conducted for emissions from SFERP combustion turbines using the HARP program. First a coarse grid of -2000 m east to 5000 m east with 200 m resolution and -2500 m north to 2500 m north with 200 m resolution was run, centered on SFERP (1,083 receptors). Then, to better define the risks

near the SFERP, a fine grid was run of -2000 m east to 2500 m east, 20 m resolution and -2000 m north to 2000 m north with 20 m resolution, centered on the proposed location of SFERP (45,573 receptors).

Results of this analysis are presented in Table 4 and in Figures 7, 8 and 9 for fine grid modeling. Results of the fine grid dispersion modeling indicate that the cancer and chronic HI PMI under this scenario is located in the San Francisco Bay. Table 4 lists the total maximum cancer risk, chronic HI and acute HI which occur at the PMI, the facility fenceline, the nearest residence, the nearest sensitive receptor and the maximally exposed sensitive receptor.

C. SFERP COOLING TOWERS ONLY

Emissions from the combustion turbine generators and the cooling towers at SFERP were modeled separately.

Dispersion modeling using a coarse grid and then a fine grid was conducted for emissions from SFERP cooling towers using the HARP program. First a coarse grid of -500 m east to 1500 m east with 200 m resolution and -1000 m north to 1000 m north with 200 m resolution was run, centered on SFERP (268 receptors). Then, to better define the risks near the SFERP, a fine grid was run of -500 m east to 1500 m east, 20 m resolution and -1000 m north to 1000 m north with 20 m resolution, centered on the proposed location of SFERP (10,348 receptors).

Results of this analysis are presented in Table 5 and in Figures 10, 11 and 12 for fine grid modeling. Results of the fine grid dispersion modeling indicate that the PMI under this scenario is located close to the eastern boundary of the facility. Table 5 lists the total maximum cancer risk, chronic HI and acute HI which occur at the PMI, the facility fenceline, the nearest residence, the nearest sensitive receptor and the maximally exposed sensitive receptor.

D. 20 FACILITIES IN SOUTHEASTERN SAN FRANCISCO

Dispersion modeling using a coarse grid and then a fine grid was conducted for the 20 facilities modeled in the southeastern section of San Francisco using the HARP program. Emissions from SFERP were included in this analysis. First a coarse grid of 5000 m with 200 m resolution was run, centered on SFERP (2,748 receptors). Then, to better define the risks in

the vicinity, a fine grid was run of 2000 m, 50 m resolution centered on SFERP (6,708 receptors).

A cumulative risk analysis was conducted for each modeling run based on emissions from the 20 facilities (50 sources total). The cancer PMI is located near One Hour Martinizing and the Southeast Water Pollution Control Plant. The results of the risk assessment based on coarse grid and fine grid modeling are presented in Table 6. Risks and hazards at the PMI and the maximally impacted sensitive receptor for the cumulative analysis are presented. Also listed are risks and hazards at the residence and sensitive receptor located nearest SFERP.

Results are also presented in Figures 13, 14 and 15 for coarse grid modeling and Figures 16, 18 and 19 for fine grid modeling. Figure 17 presents a close-up of the residential neighborhood to the east of the SE WPCP in which risks exceed 1 in a million. The maximum cancer risk estimated in this neighborhood is 19 in one million and occurs in the neighborhood near One-Hour Martinizing.

5. DISCUSSION

In this analysis, cancer risk and noncancer hazard due to emissions from the proposed SFERP facility are estimated due to emissions from all 5 on-site sources (3 combustion turbines and 2 cooling towers). Using fine grid dispersion modeling, the estimated cancer risk due to facility emissions is 0.073 in one million at the point of maximum impact (PMI) which is located east of the facility boundary. At the facility fenceline (assumed to be the location of the nearest workplace), cancer risk under the worker exposure scenario is 0.021 in one million. At the nearest residence located approximately 1,600 feet west of the facility, cancer risk is estimated to be 0.0014 in one million and at the nearest sensitive receptor located at Warm Water Cove Public Access (approximately 550 feet north of the facility), cancer risk is estimated to be 0.0027 in one million. Cancer risk at the maximally exposed sensitive receptor is 0.015 in one million. All cancer risks due to emissions from SFERP are less than 1 in one million. All chronic and acute noncancer hazard indices are less than 1.0 indicating a lack of noncancer hazard from facility emissions at all receptors evaluated.

Further analysis of SFERP emissions was conducted in which cancer risk and noncancer hazard were determined separately for the combustion turbines and the cooling towers.

Results indicated that the majority of cancer risk estimated for the facility (0.073 in one million at the PMI located just outside the eastern facility boundary) is due to cooling tower emissions (0.074 in one million at the PMI; slight difference due to grid resolution of 25 m for all sources and 20 m for cooling towers only).

A cumulative analysis was conducted for 20 facilities located in the southeastern area of San Francisco, including SFERP, for a total of 50 emitting sources. Using fine grid modeling, the PMI for this analysis was identified in the neighborhood near One-Hour Martinizing, with a cancer risk of 19 in one million. Thus, estimates of cancer risk due to emissions from the proposed SFERP project, 0.073 in one million, are much less than the cancer risk calculated due to the cumulative emissions of facilities in the southeastern section of San Francisco. In the cumulative analysis, all off-site chronic noncancer hazard indices are less than 1.0 indicating a lack of chronic noncancer hazard from cumulative facility emissions at all receptors evaluated. Acute noncancer hazard indices are less than 1.0 in all areas evaluated with the exception of the area just to the northeast of SE WPCP.

Based on the results presented in Tables 3 and 6, risk due to SFERP emissions contributes only 0.4% to the total risk estimated for the residence located nearest SFERP (0.0014 in one million for SFERP emissions compared to 0.37 in one million calculated for emissions from 20 facilities including SFERP). For the sensitive receptor located nearest SFERP, at Warm Water Cove Public Access Park, the contribution of risk due to SFERP emissions represents 1.2% to the total risk.

In conclusion, this analysis shows that estimated SFERP emissions do not represent a significant increase to existing cancer risk and noncancer hazards in the neighborhoods evaluated.

Table 3. Cancer Risk and Noncancer Hazard due to Emissions from SFERP.

Receptor	Cancer Risk	Chronic HI	Acute HI
PMI (coarse grid)	0.038 in one million	0.0027	0.036
PMI (fine grid)	0.073 in one million	0.0027	0.038
Facility fenceline*	0.021 in one million	0.00018	0.000077
Nearest residence	0.0014 in one million	0.000029	0.0027
Nearest sensitive receptor	0.0027 in one million	0.000020	0.00032
Maximally exposed sensitive receptor	0.015 in one million**	0.0011**	0.032***

*Cancer risk and chronic HI calculated under worker exposure scenario.

**Gloria B. Davis Middle School.

***San Francisco Head Start.

Table 4. Cancer Risk and Noncancer Hazard due to Emissions from SFERP Combustion Turbines.

Receptor	Cancer Risk	Chronic HI	Acute HI
PMI	0.036 in one million	0.0027	0.038
Facility fenceline*	0.000020 in one million	0.000010	0.00016
Nearest residence	0.00036 in one million	0.000027	0.0027
Nearest sensitive receptor	0.00022 in one million	0.000016	0.00032
Maximally exposed sensitive receptor	0.015 in one million**	0.0011**	0.032***

*Cancer risk and chronic HI calculated under worker exposure scenario.

**Gloria B. Davis Middle School.

***San Francisco Head Start.

Table 5. Cancer Risk and Noncancer Hazard due to Emissions from SFERP Cooling Towers.

Receptor	Cancer Risk	Chronic HI	Acute HI
PMI	0.074 in one million	0.00022	0.000092
Facility fenceline*	0.021 in one million	0.00017	0.000077
Nearest residence	0.0010 in one million	0.0000029	0.0000071
Nearest sensitive receptor	0.0025 in one million	0.0000073	0.000013
Maximally exposed sensitive receptor	0.0025 in one million**	0. 0000073**	0.000013**

*Cancer risk and chronic HI calculated under worker exposure scenario.

**Warm Water Cove.

Table 6. Cancer Risk and Noncancer Hazard due to Emissions from 20 Facilities.

Coarse Grid Modeling

Overall Cancer Risk PMI (located near Bell Cleaners):	8.3 in one million
Overall Chronic HI PMI (located near SE WPCP)	0.17
Overall Acute HI PMI (located near SE WPCP)	2.2

Fine Grid Modeling

Overall Cancer Risk PMI (located near One Hour Martinizing)	19 in one million
Overall Chronic HI PMI (located near SE WPCP)	0.5
Overall Acute HI PMI (located near SE WPCP)	3.9

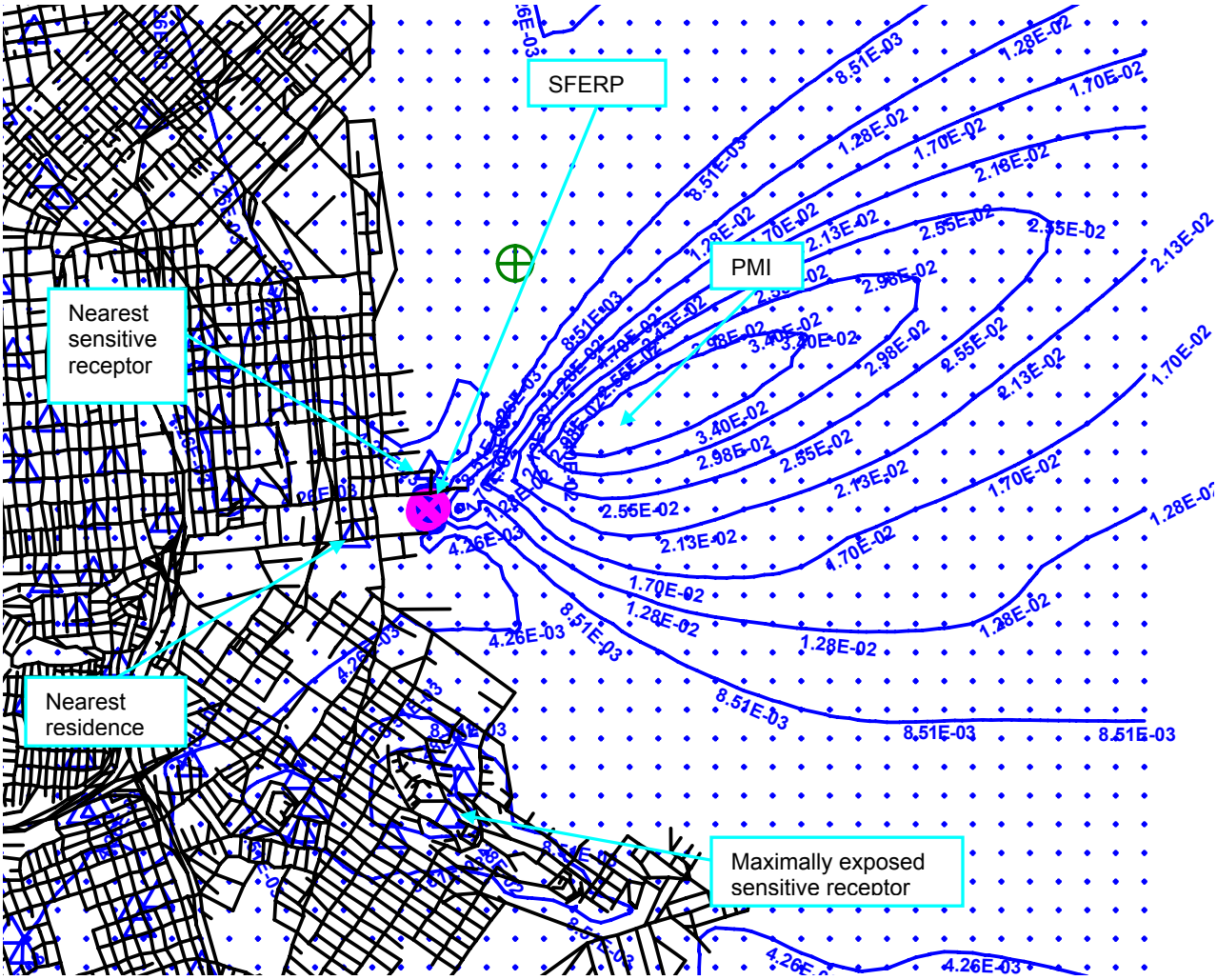
Receptor *(fine grid modeling results continued)*	Cancer Risk	Chronic HI	Acute HI
Near One-Hour Martinizing	19 in one million	0.063	0.65
Near Chevron 0683	12 in one million	0.0053	0.11
Near SE WPCP	11 in one million	0.60	3.0
Near San Francisco Petroleum	11 in one million	0.027	0.081
Near Vermont Cleaners	9.5 in one million	0.034	0.13
Near 3rd Street Shell	9.0 in one million	0.0052	0.096
Near Bell Cleaners	8.3 in one million	0.029	0.22
Near VIP Litho	2.5 in one million	0.0091	0.12
Near DeSoto Cab Co.	2.1 in one million	0.0091	0.40
Residence nearest SFERP	0.37 in one million	0.010	0.23
Sensitive receptor nearest SFERP	0.22 in one million*	0.0047*	0.093*
Maximally impacted sensitive receptor	2.1 in one million**	0.014***	0.24***

*Warm Water Cove

**International Studies Academy (near Vermont Cleaners)

***SF Southeast Headstart

Figure 1. Sources at SFERP only (coarse grid): Cancer Risk Assessment.



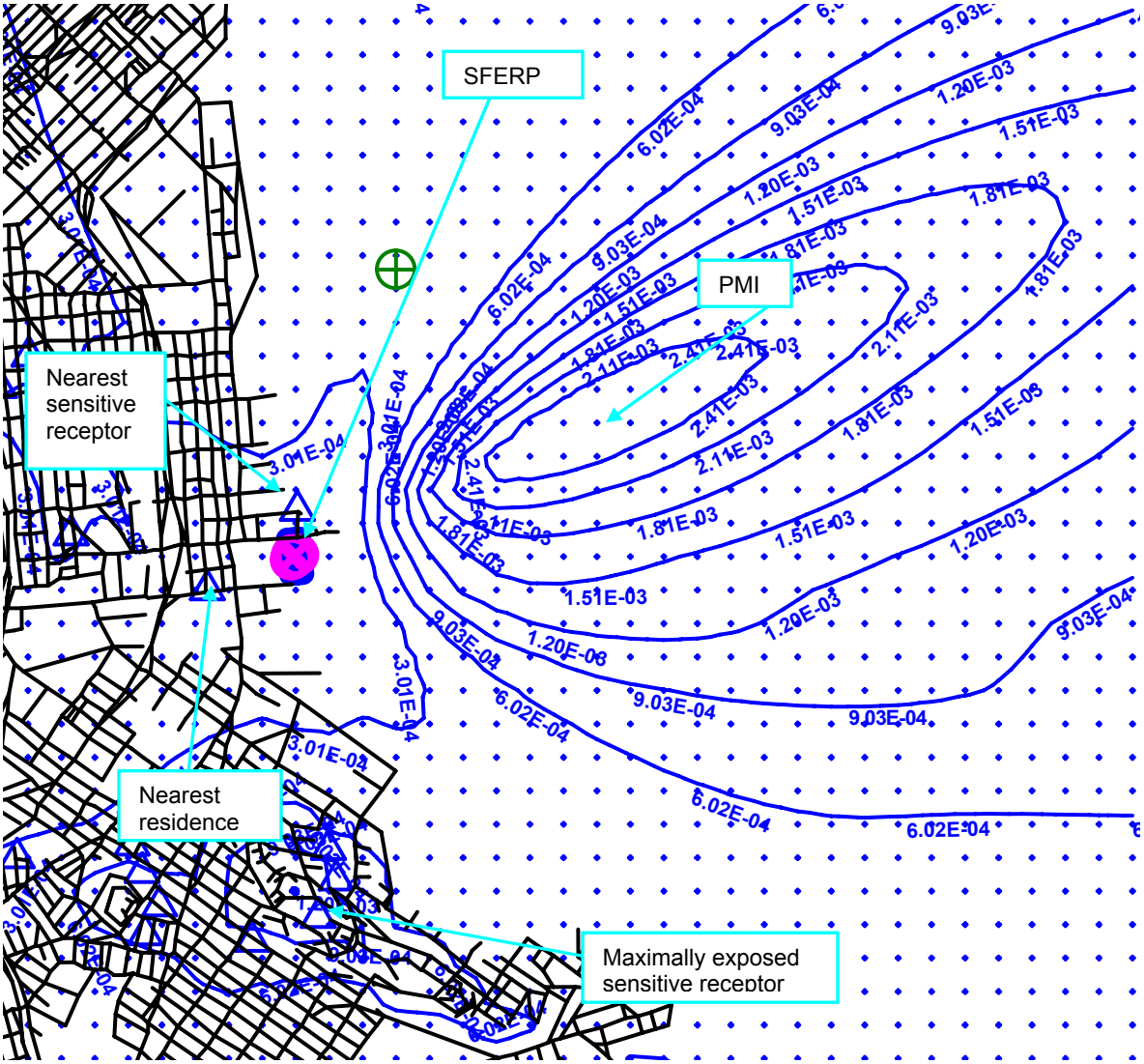
Isopleths are in 1E-06.

Receptor Location	Cancer Risk
PMI (Point of maximum impact)	3.8E-08
Receptors Near SFERP	
Fenceline receptor (worker exposure scenario)	2.1E-08
Nearest residence to SFERP	1.4E-09
Nearest sensitive receptor (Warm Water Cove)	2.7E-09
Maximally exposed sensitive receptor*	1.5E-08

*Gloria B. Davis Middle School

KEY: Blue crosses are grid receptors
Blue triangles are sensitive receptors
Pink circles with X's in them are sources
Green circle with a cross in it is location of fishing receptor

Figure 2. Sources at SFERP only (coarse grid): Noncancer Chronic Hazard Index Assessment.

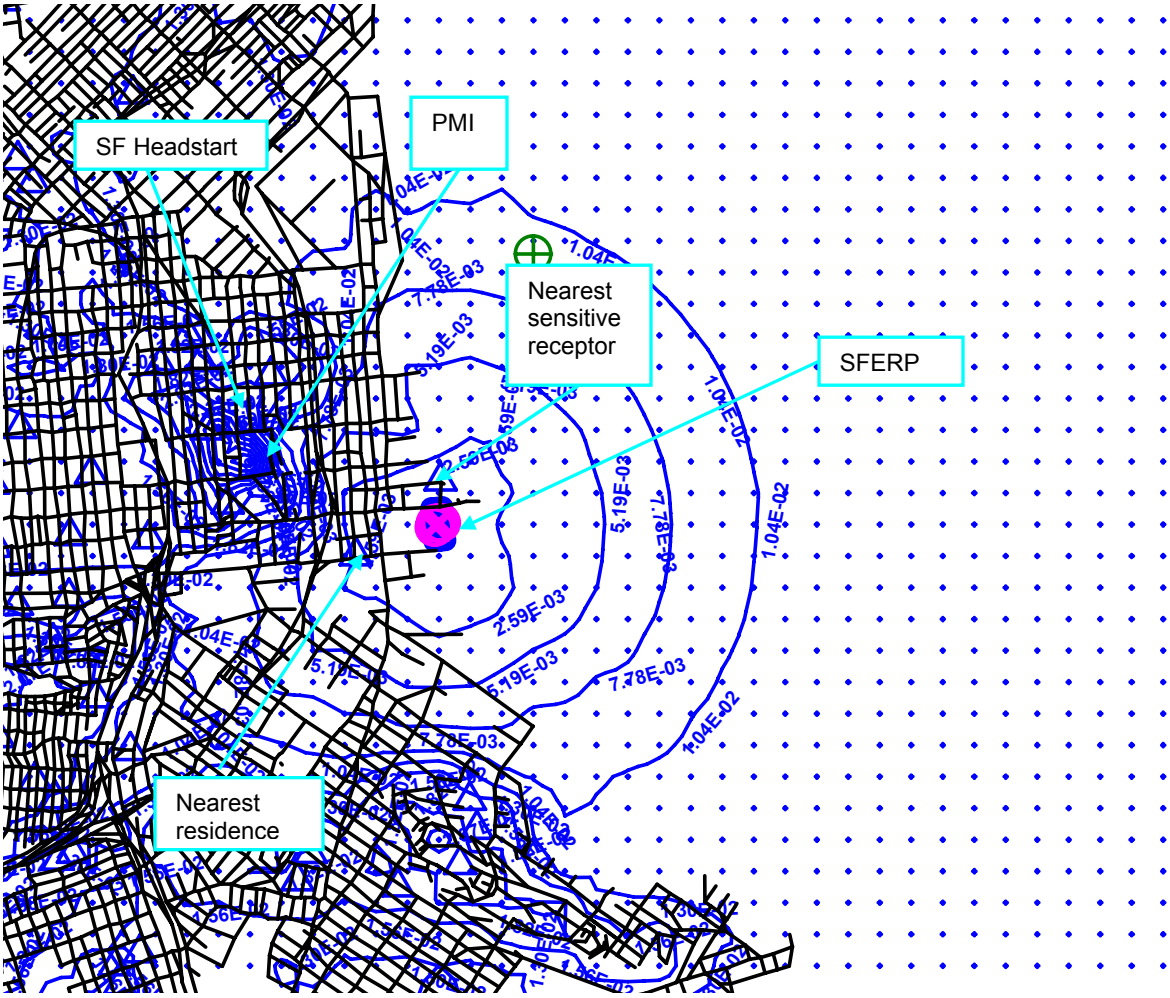


Receptor Location	Chronic Hazard Index
PMI (Point of maximum impact)	0.0027
Receptors Near SFERP	
Fenceline receptor (worker exposure scenario)	0.00018
Nearest residence to SFERP	0.000029
Nearest sensitive receptor (Warm Water Cove)	0.000020
Maximally exposed sensitive receptor*	0.0011

*Gloria B. Davis Middle School

KEY: Blue crosses are grid receptors
Blue triangles are sensitive receptors
Pink circles with X's in them are sources
Green circle with a cross in it is location of fishing receptor

Figure 3. Sources at SFERP only (coarse grid): Noncancer Acute Hazard Index Assessment.

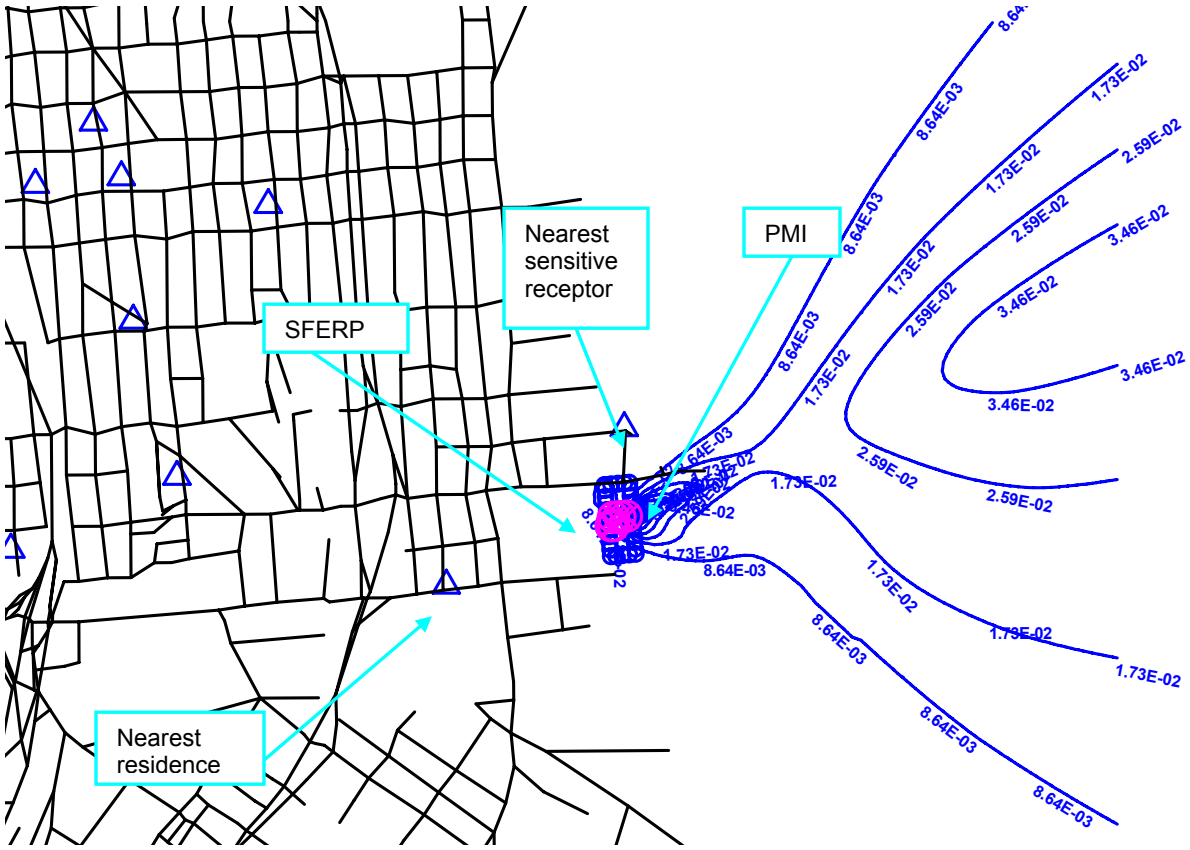


Receptor Location	Acute Hazard Index
PMI (Point of maximum impact)	0.036
Receptors Near SFERP	
Fenceline receptor (worker exposure scenario)	0.000077
Nearest residence to SFERP	0.0027
Nearest sensitive receptor (Warm Water Cove)	0.00032
Maximally exposed sensitive receptor*	0.032

*San Francisco Headstart

KEY: Blue crosses are grid receptors
Blue triangles are sensitive receptors
Pink circles with X's in them are sources
Pink squares are census tracts
Green circle with a cross in it is location of fishing receptor

Figure 4. Sources at SFERP only (fine grid): Cancer Risk Assessment.



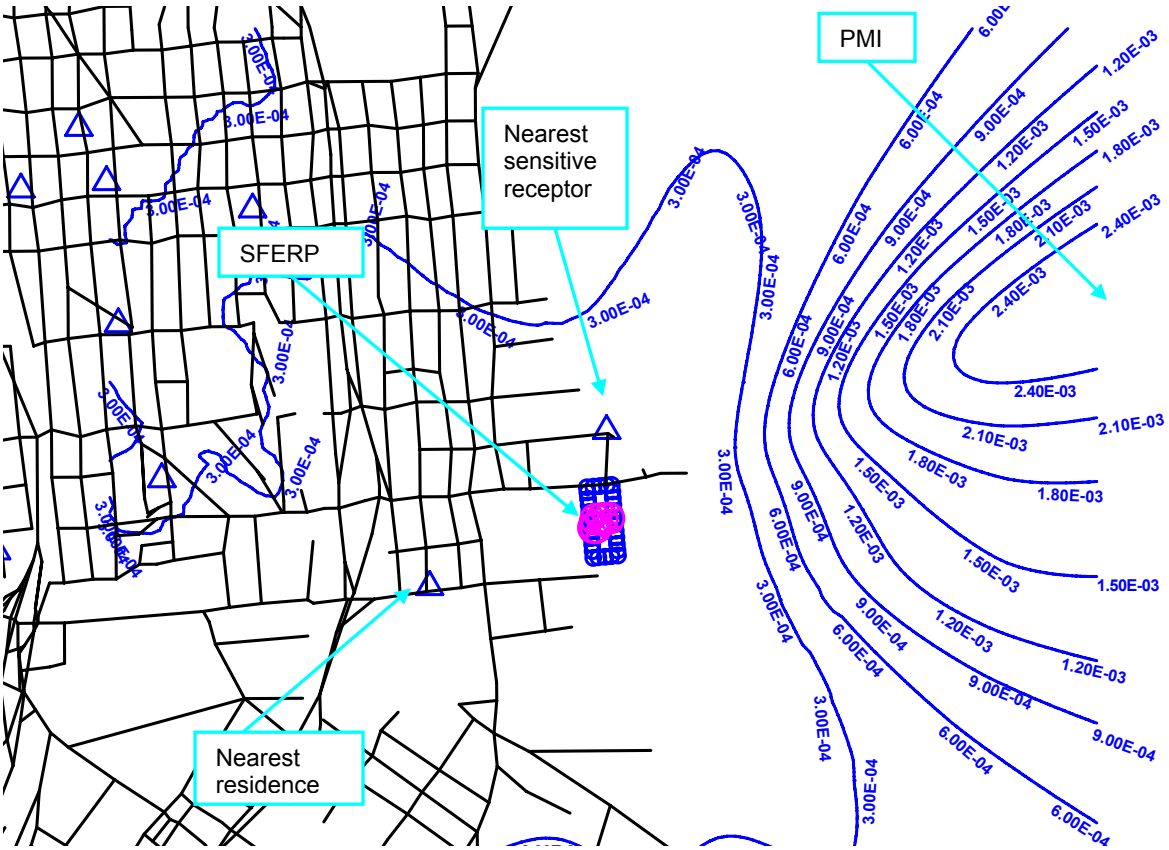
Isopleths are in 1E-06.

Receptor Location	Cancer Risk
PMI (Point of maximum impact)	7.3E-08
Receptors Near SFERP	
Fenceline receptor (worker exposure scenario)	2.1E-08
Nearest residence to SFERP	1.4E-09
Nearest sensitive receptor (Warm Water Cove)	2.7E-09
Maximally exposed sensitive receptor*	1.5E-08

*Gloria B. Davis Middle School

KEY: Blue triangles are sensitive receptors
Pink circles with X's in them are sources

Figure 5. Sources at SFERP only (fine grid): Noncancer Chronic Hazard Index Assessment

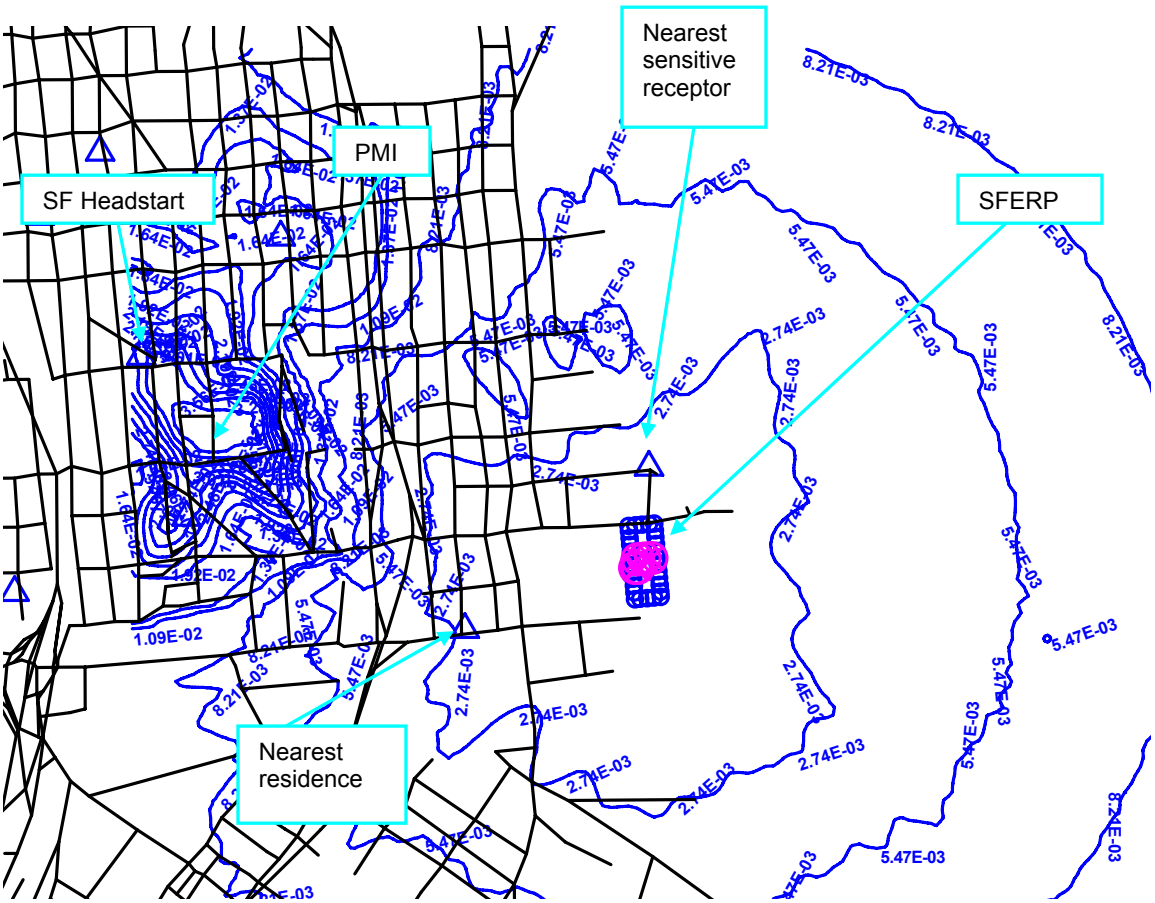


Receptor Location	Chronic Hazard Index
PMI (Point of maximum impact)	0.0027
Receptors Near SFERP	
Fenceline receptor (worker exposure scenario)	0.00018
Nearest residence to SFERP	0.000029
Nearest sensitive receptor (Warm Water Cove)	0.000020
Maximally exposed sensitive receptor*	0.0011

*Gloria B. Davis Middle School

KEY: Blue triangles are sensitive receptors
Pink circles with X's in them are sources

Figure 6. Sources at SFERP only (fine grid): Noncancer Acute Hazard Index Assessment

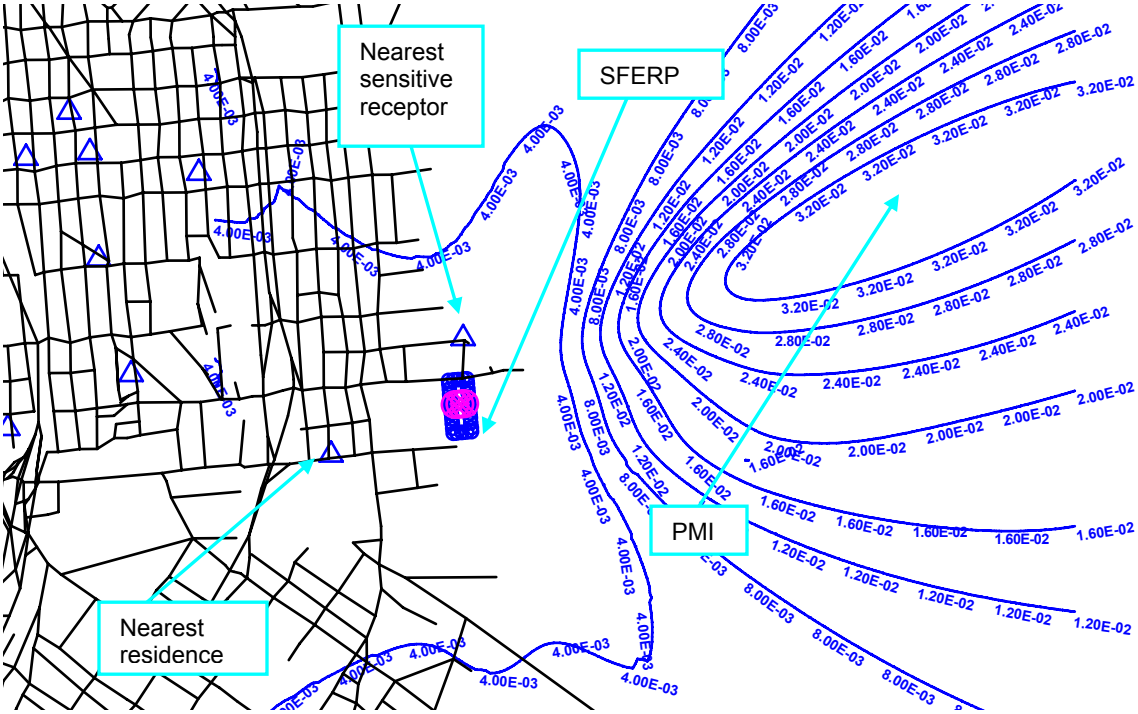


Receptor Location	Acute Hazard Index
PMI (Point of maximum impact)	0.038
Receptors Near SFERP	
Fenceline receptor (worker exposure scenario)	0.000077
Nearest residence to SFERP	0.0027
Nearest sensitive receptor (Warm Water Cove)	0.00032
Maximally exposed sensitive receptor*	0.032

*San Francisco Headstart

KEY: Blue triangles are sensitive receptors
Pink circles with X's in them are sources

Figure 7. Combustion Turbine Emissions at SFERP only (fine grid): Cancer Risk Assessment



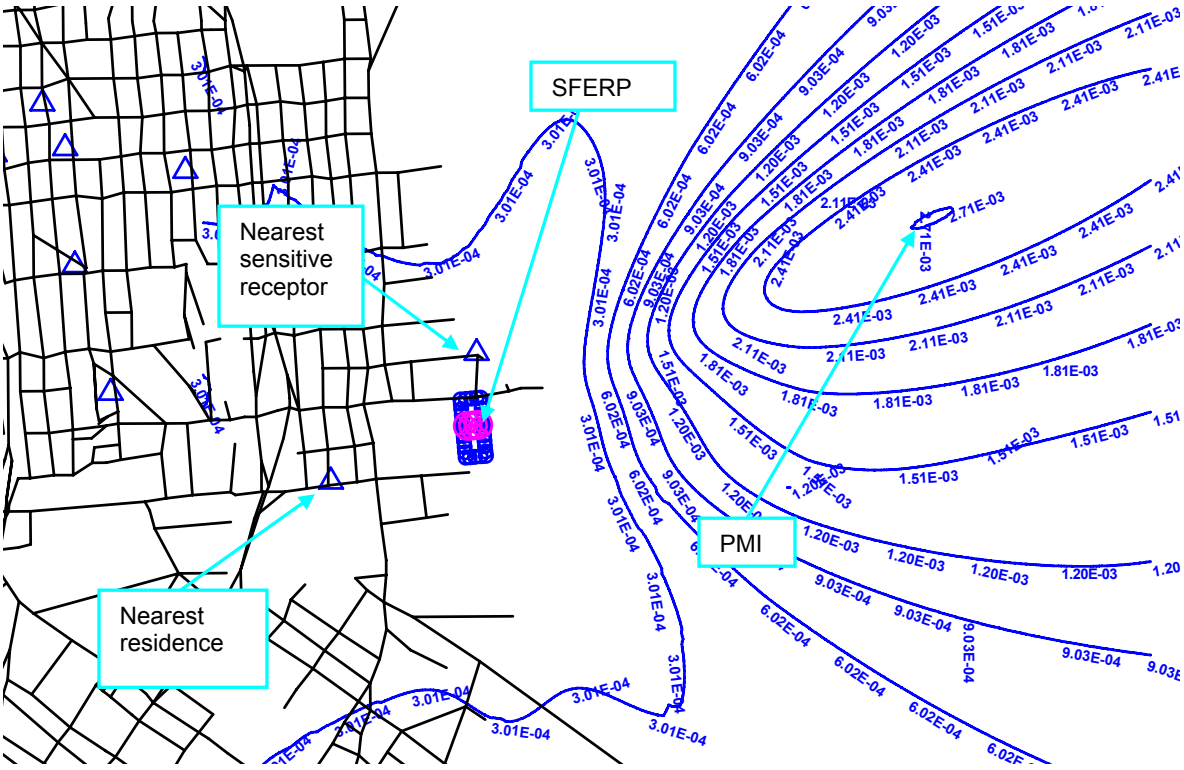
Isopleths are in 1E-06.

Receptor Location	Cancer Risk
PMI (Point of maximum impact)	3.6E-08
Receptors Near SFERP	
Fenceline receptor (worker exposure scenario)	2.0E-11
Nearest residence to SFERP	3.6E-10
Nearest sensitive receptor (Warm Water Cove)	2.2E-10
Maximally exposed sensitive receptor*	1.5E-08

*Gloria B. Davis Middle School

KEY: Blue triangles are sensitive receptors
Pink circles with X's in them are sources

Figure 8. Combustion Turbine Emissions at SFERP only (fine grid): Noncancer Chronic Hazard Assessment

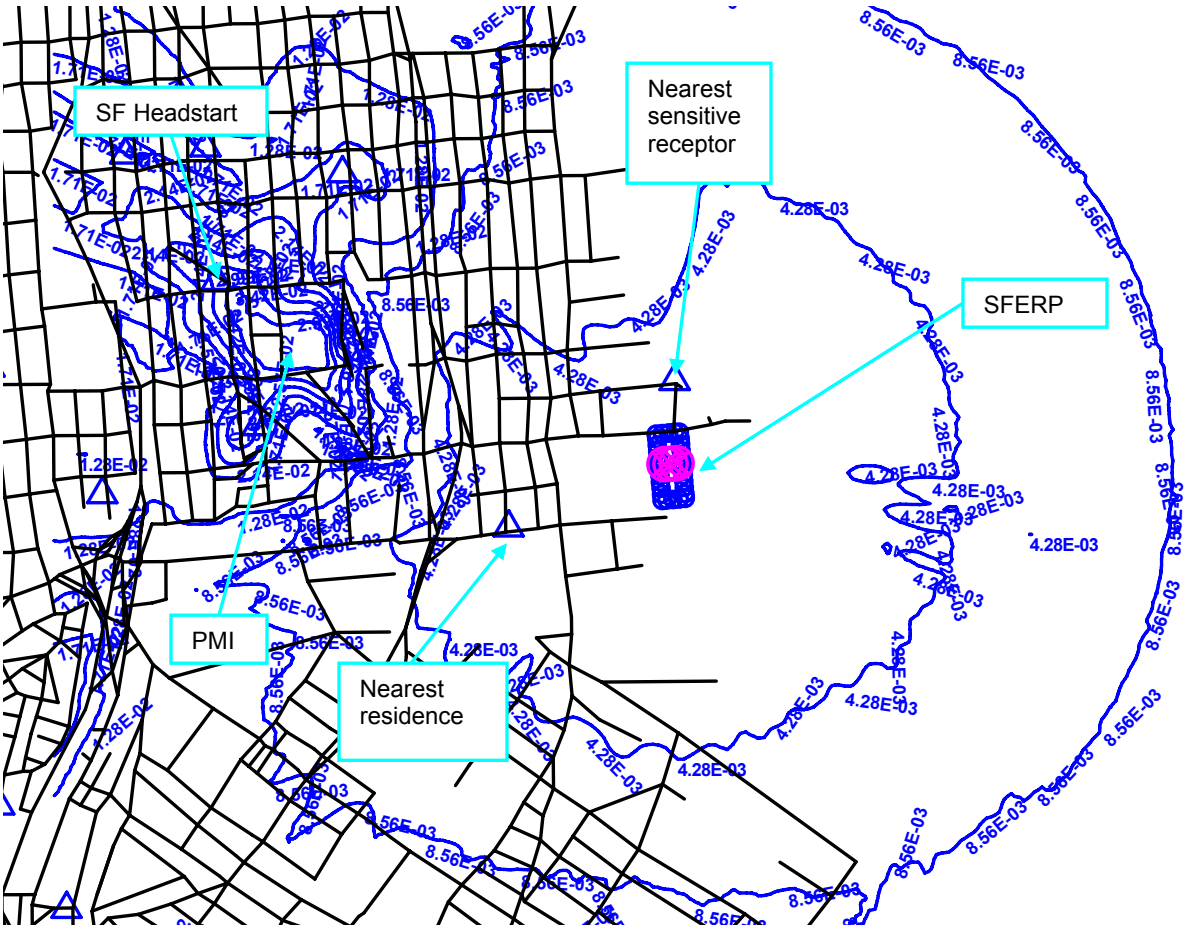


Receptor Location	Chronic Hazard Index
PMI (Point of maximum impact)	0.0027
Receptors Near SFERP	
Fenceline receptor (worker exposure scenario)	0.000010
Nearest residence to SFERP	0.000027
Nearest sensitive receptor (Warm Water Cove)	0.000016
Maximally exposed sensitive receptor*	0.0011

*Gloria B. Davis Middle School

KEY: Blue triangles are sensitive receptors
Pink circles with X's in them are sources

Figure 9. Combustion Turbine Emissions at SFERP only (fine grid): Noncancer Acute Hazard Assessment

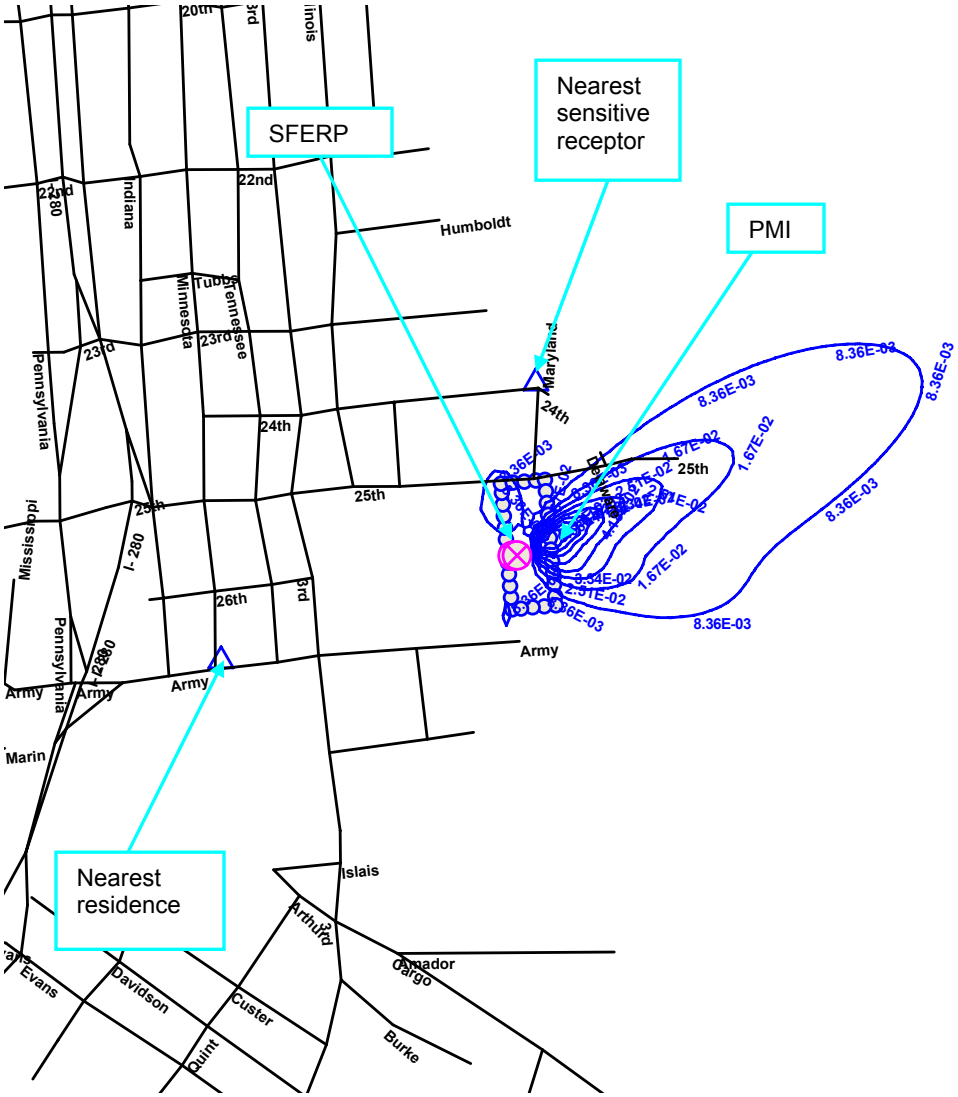


Receptor Location	Acute Hazard Index
PMI (Point of maximum impact)	0.038
Receptors Near SFERP	
Fenceline receptor (worker exposure scenario)	0.00016
Nearest residence to SFERP	0.0027
Nearest sensitive receptor (Warm Water Cove)	0.00032
Maximally exposed sensitive receptor*	0.032

*San Francisco Headstart

KEY: Blue triangles are sensitive receptors
Pink circles with X's in them are sources

Figure 10. Cooling Tower Emissions at SFERP only (fine grid): Cancer Risk Assessment.



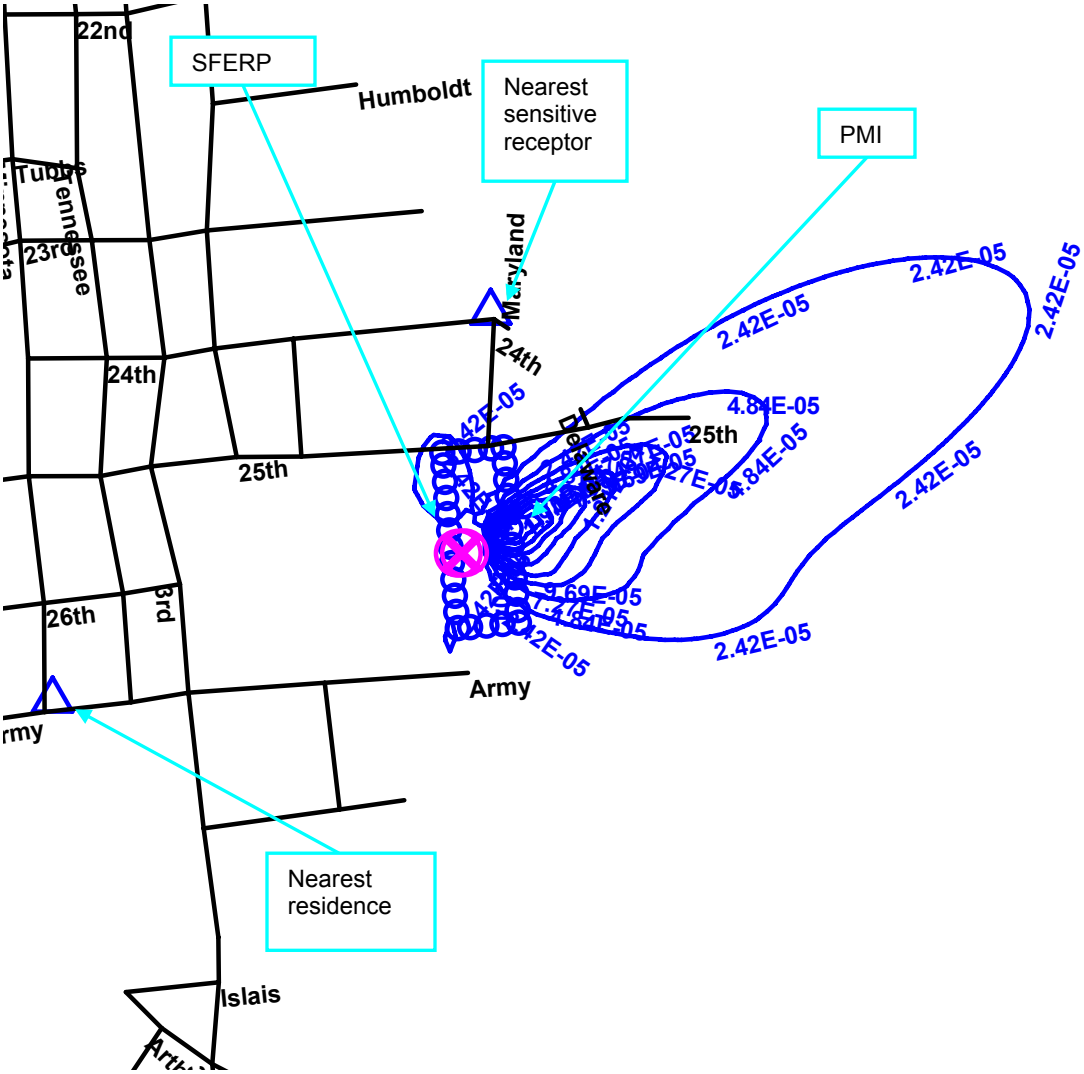
Isopleths are in 1E-06.

Receptor Location	Cancer Risk
PMI (Point of maximum impact)	7.4E-08
Receptors Near SFERP	
Fenceline receptor (worker exposure scenario)	2.1E-08
Nearest residence to SFERP	1.0E-09
Nearest sensitive receptor (Warm Water Cove)	2.5E-09
Maximally exposed sensitive receptor*	2.5E-09

*Warm Water Cove

KEY: Blue triangles are sensitive receptors
Pink circles with X's in them are sources

Figure 11. Cooling Tower Emissions at SFERP only (fine grid): Noncancer Chronic Hazard Assessment.

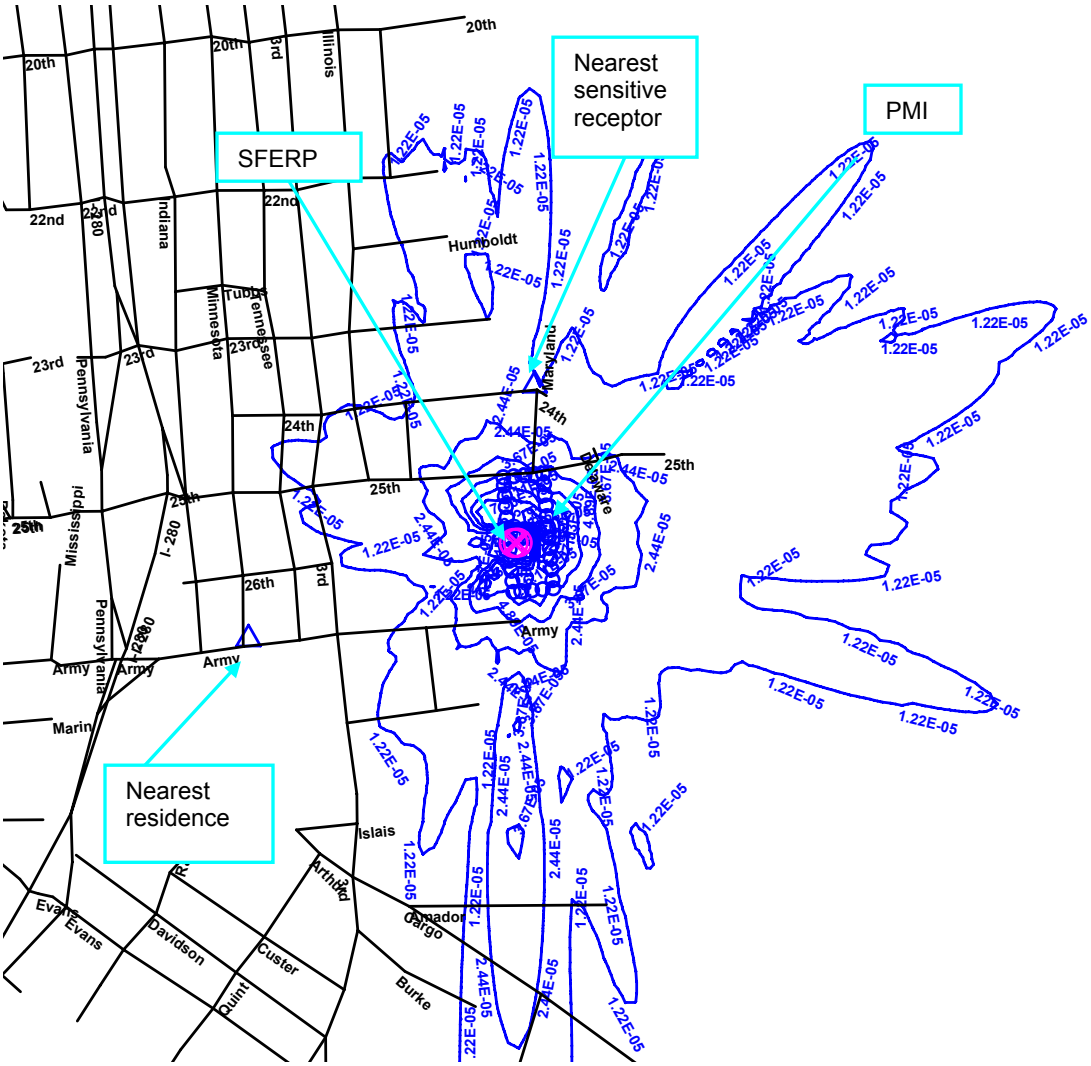


Receptor Location	Chronic Hazard Index
PMI (Point of maximum impact)	0.00022
Receptors Near SFERP	
Fenceline receptor (worker exposure scenario)	0.00017
Nearest residence to SFERP	0.0000029
Nearest sensitive receptor (Warm Water Cove)	0.0000073
Maximally exposed sensitive receptor*	0.0000073

*Warm Water Cove

KEY: Blue triangles are sensitive receptors
Pink circles with X's in them are sources

Figure 12. Cooling Tower Emissions at SFERP only (fine grid): Noncancer Acute Hazard Assessment.

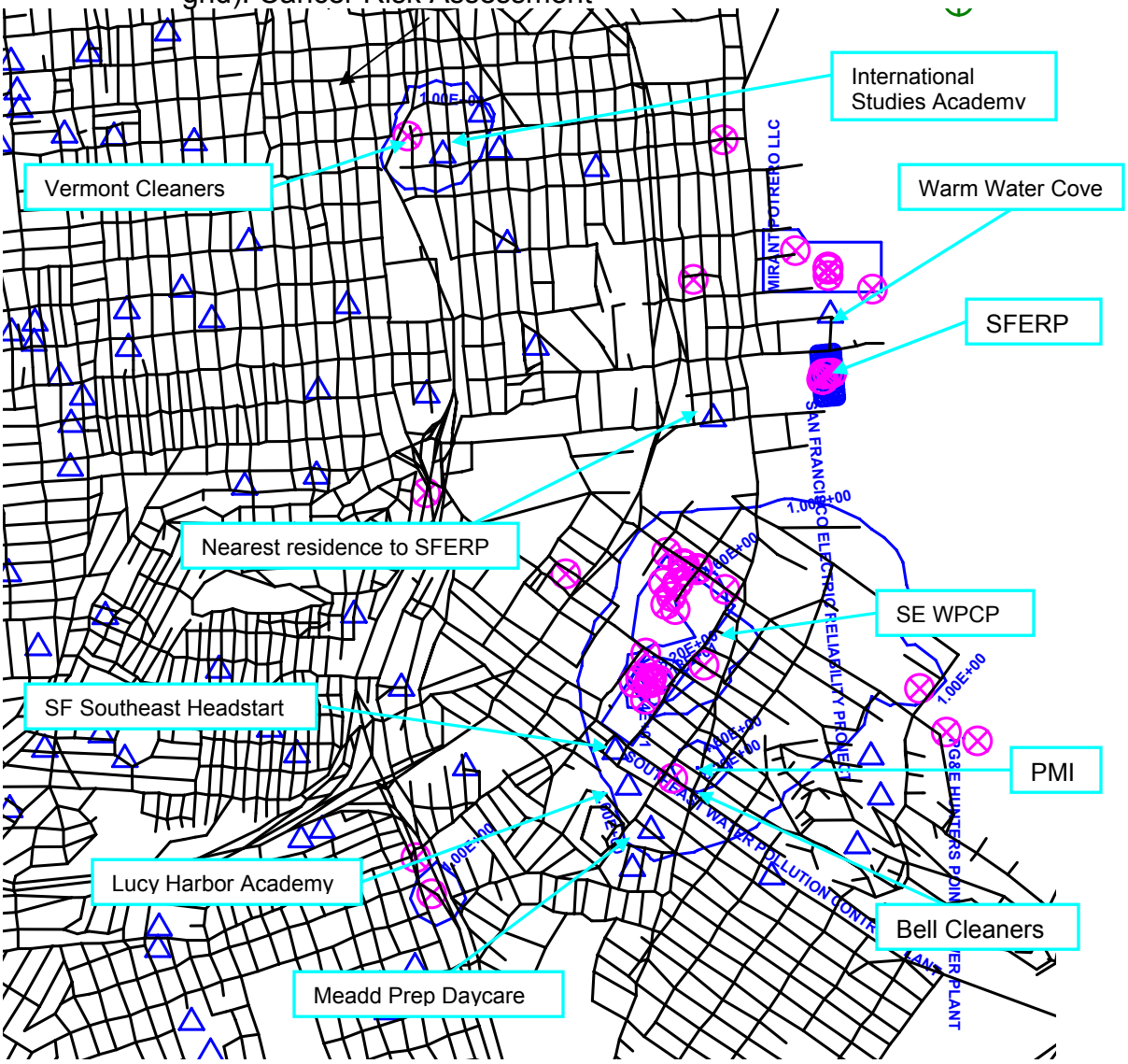


Receptor Location	Acute Hazard Index
PMI (Point of maximum impact)	0.000092
Receptors Near SFERP	
Fenceline receptor (worker exposure scenario)	0.000077
Nearest residence to SFERP	0.0000071
Nearest sensitive receptor (Warm Water Cove)	0.000013
Maximally exposed sensitive receptor*	0.000013

*Warm Water Cove

KEY: Blue triangles are sensitive receptors
Pink circles with X's in them are sources

Figure 13. Emissions from 50 Sources in Southeast San Francisco (coarse grid): Cancer Risk Assessment

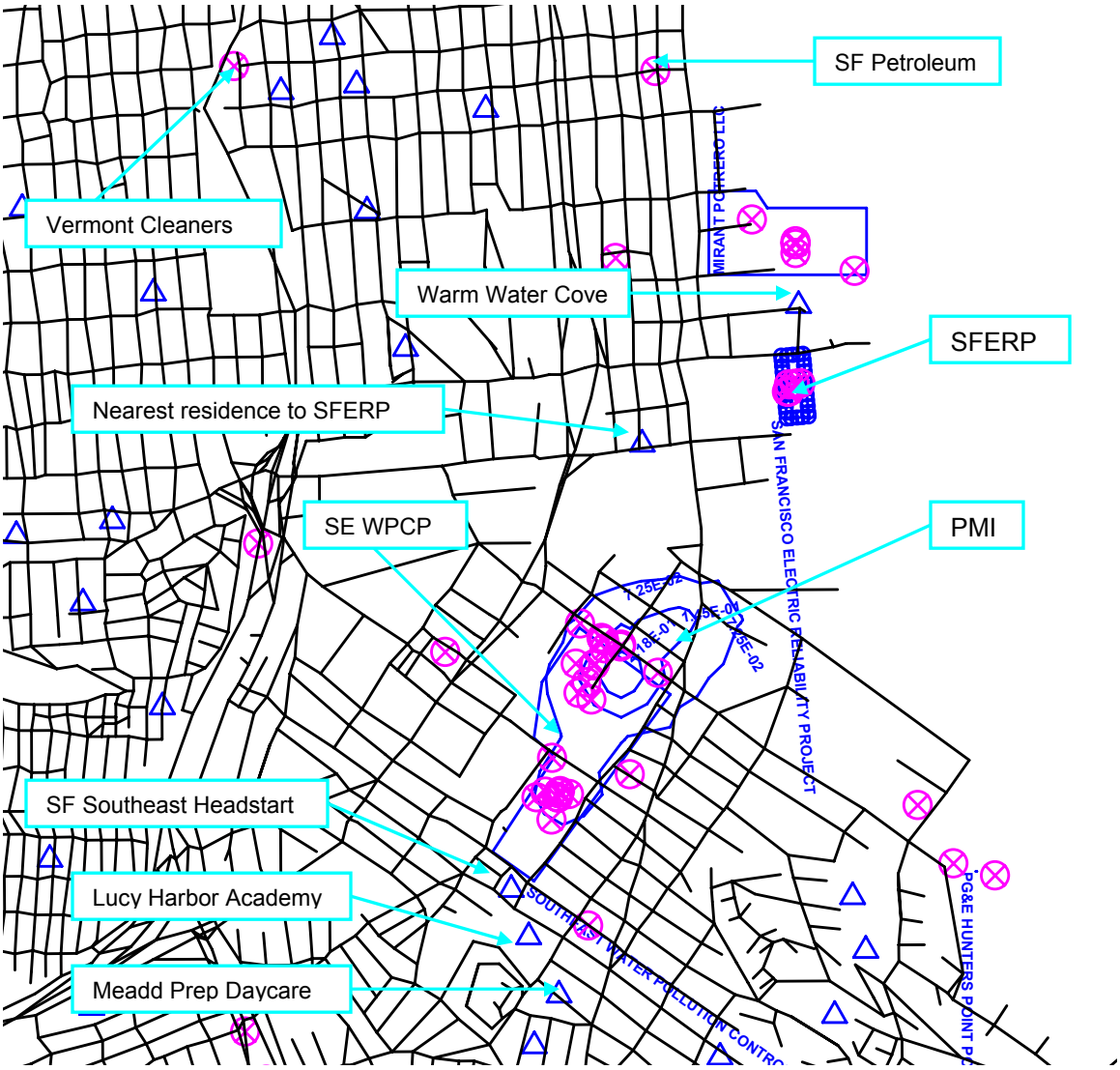


Isopleths are in 1E-06.

Receptor Location	Cancer Risk
PMI (Point of maximum impact)	
Near Bell Cleaners	8.3E-06
Near SE WPCP	7.6E-06
Near Vermont Cleaners	3.7E-06
Receptors Near SFERP	
Nearest residence to SFERP	3.7E-07
Nearest sensitive receptor (Warm Water Cove)	2.2E-07
Maximally Exposed Sensitive Receptors	
International Studies Academy (near Vermont Cleaners)	2.1E-06
Meadd Preparatory Daycare (near SE WPCP & Bell Cleaners)	1.5E-06
SF Southeast Headstart (near SE WPCP& Bell Cleaners)	1.3E-06
Lucy Harbor Academy (near SE WPCP& Bell Cleaners)	1.2E-06

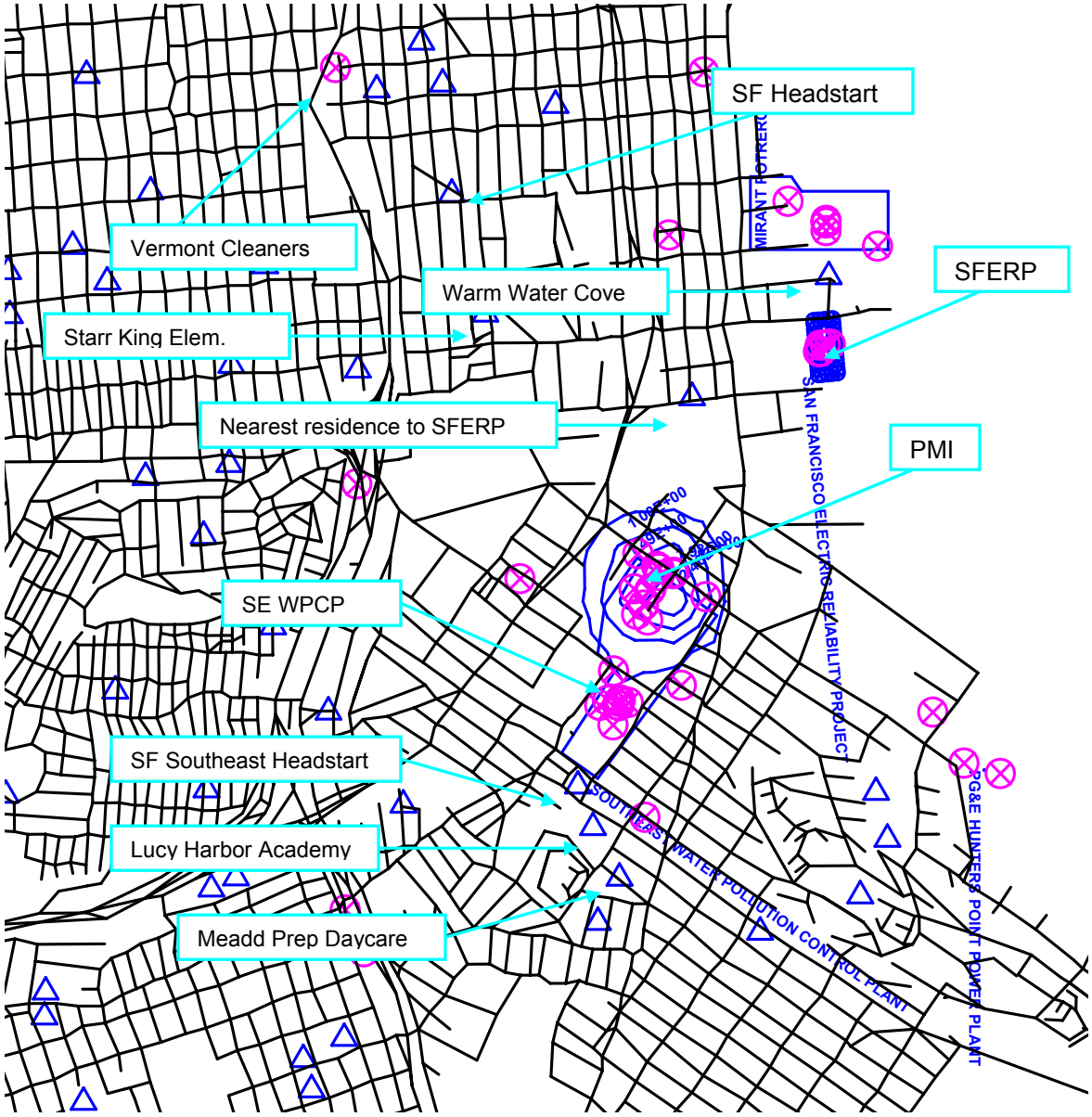
KEY: Blue triangles are sensitive receptors
Pink circles with X's in them are sources

Figure 14. Emissions from 50 Sources in Southeast San Francisco (coarse grid): Noncancer Chronic Hazard Assessment



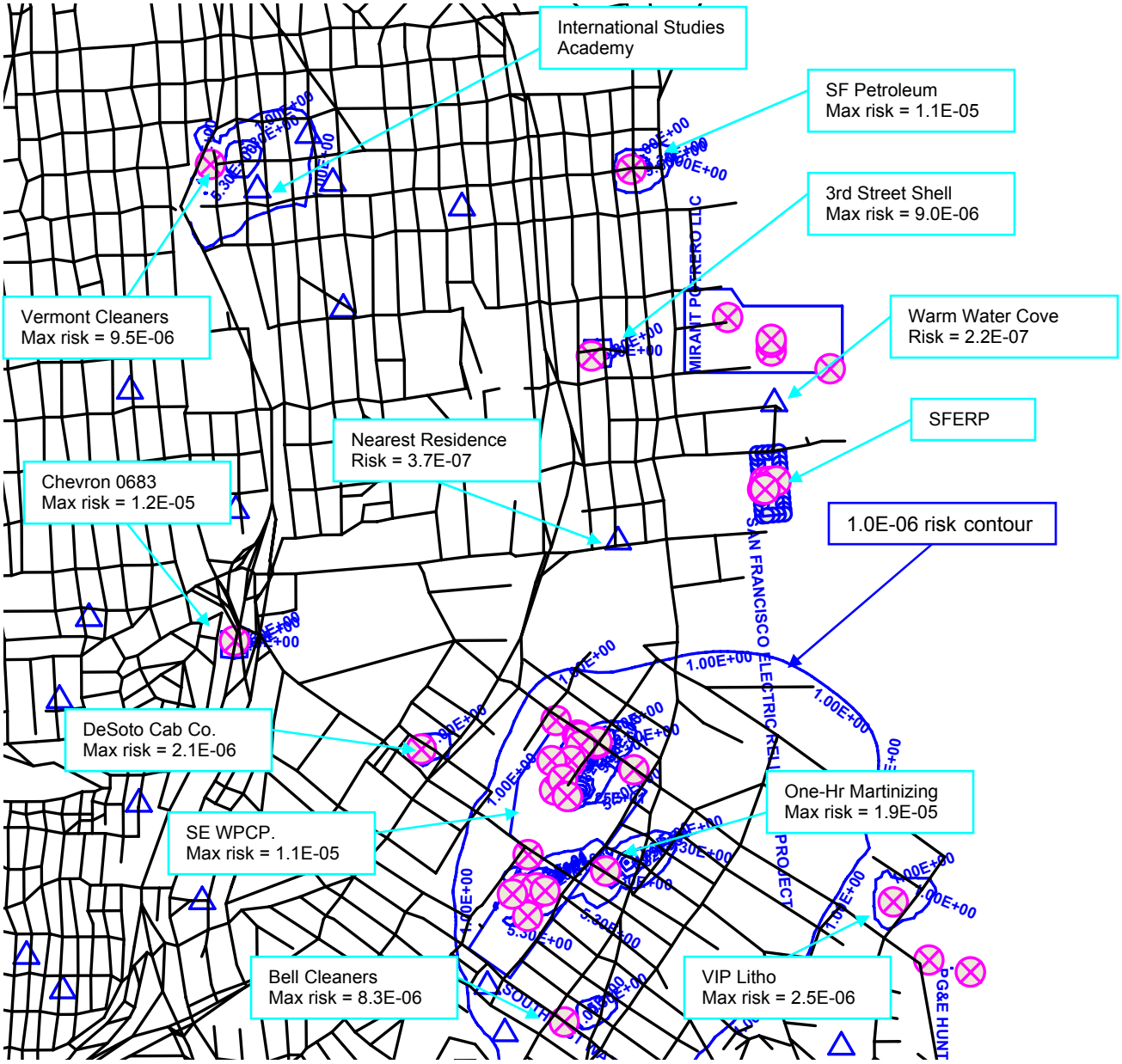
Receptor Location	Chronic Hazard Index
PMI (Point of maximum impact)	
Near SE WPCP	0.17
Receptors Near SFERP	
Nearest residence to SFERP	0.010
Nearest sensitive receptor (Warm Water Cove)	0.0047
Sensitive Receptors	
SF Southeast Headstart	0.014
Lucy Harbor Academy	0.011
Meadd Preparatory Daycare	0.0081

Figure 15. Emissions from 50 Sources in Southeast San Francisco (coarse grid): Noncancer Acute Hazard Assessment



Receptor Location	Acute Hazard Index
PMI (Point of maximum impact)	
Near SE WPCP	2.2
Receptors Near SFERP	
Nearest residence to SFERP	0.23
Nearest sensitive receptor (Warm Water Cove)	0.093
Sensitive Receptors	
SF Southeast Headstart	0.24
San Francisco Headstart & Starr King Elementary	0.20
Lucy Harbor Academy	0.13
Meadd Preparatory Day Care	0.12

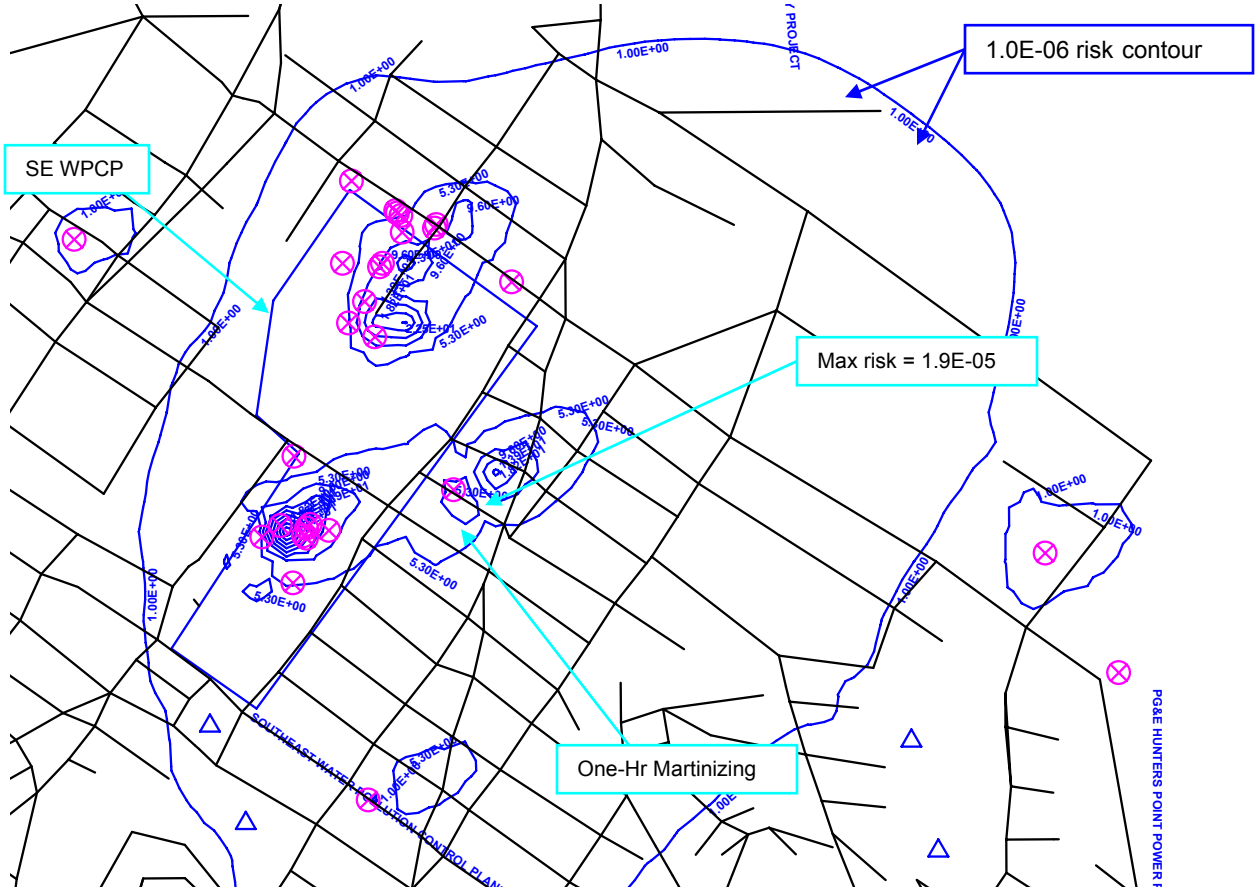
Figure 16. Emissions from 50 Sources in Southeast San Francisco (fine grid centered around SFERP): Cancer Risk Assessment



Receptor Location	Cancer Risk
PMI (Point of maximum impact)	
Near One-Hour Martinizing	1.9E-05
Near Chevron 0683	1.2E-05
Near SE WPCP	1.1E-05
Near San Francisco Petroleum	1.1E-05

Receptor Location	Cancer Risk
Receptors Near SFERP	
Nearest residence to SFERP	3.7E-07
Nearest sensitive receptor (Warm Water Cove)	2.2E-07
Maximally Exposed Sensitive Receptors	
International Studies Academy (near Vermont Cleaners)	2.1E-06
Meadd Preparatory Day Care (near SE WPCP & Bell Cleaners)	1.5E-06
San Francisco Southeast Headstart (near SE WPCP& Bell Cleaners)	1.3E-06
Lucy Harbor Academy (near SE WPCP& Bell Cleaners)	1.2E-06

Figure 17. Emissions from 50 Sources in Southeast San Francisco (fine grid, close-up of SE WPCP vicinity): Cancer Risk Assessment.

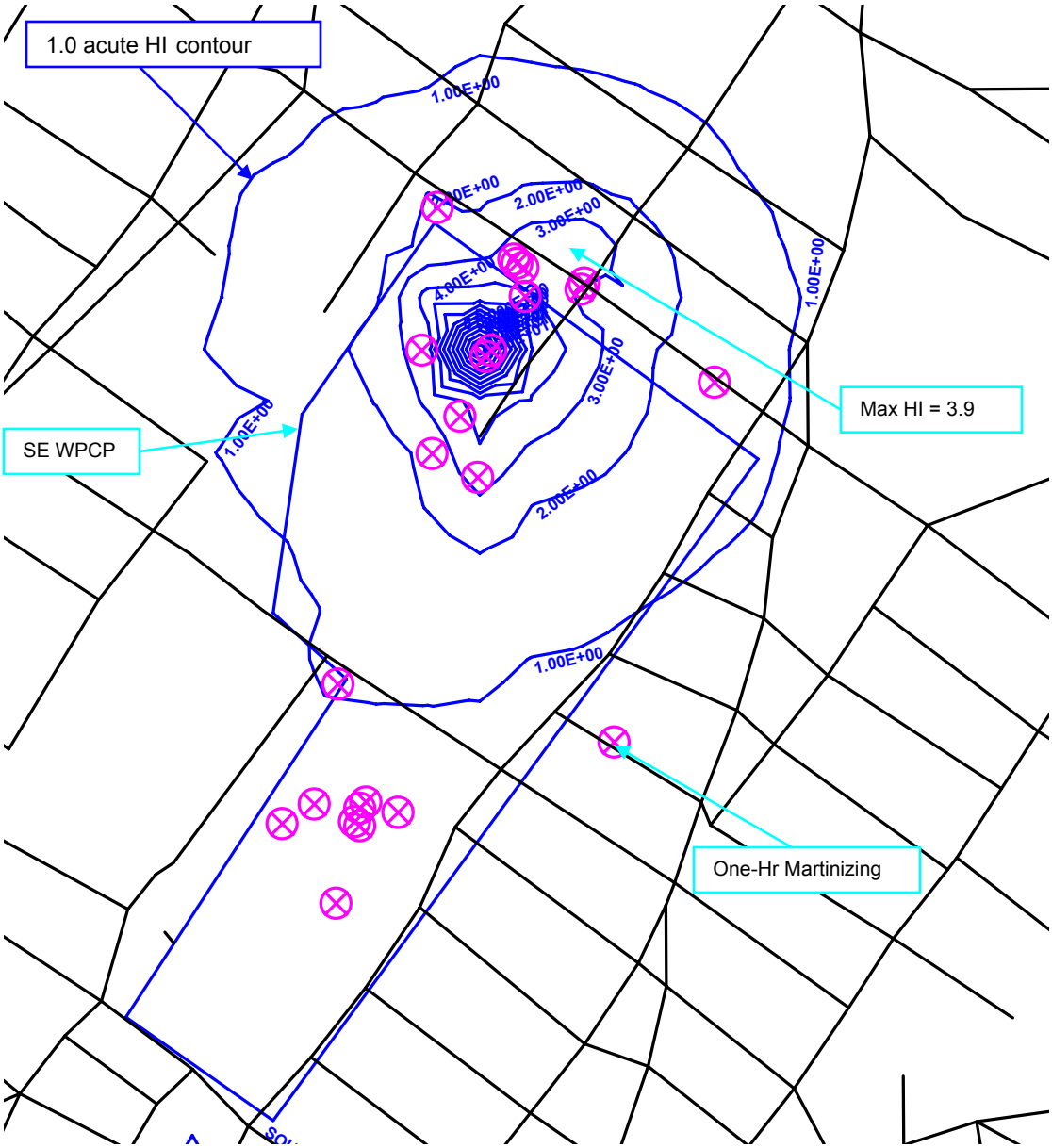


This figure illustrates that the neighborhood one block east of the SE WPCP is exposed to risks of 1E-06 and above.

Figure 18. Emissions from 50 Sources in Southeast San Francisco (fine grid, close-up of SE WPCP vicinity): Noncancer Chronic Hazard Index Assessment

Receptor Location	Chronic Hazard Index
PMI (Point of maximum impact)	
Near SE WPCP	0.5
Receptors Near SFERP	
Nearest residence to SFERP	0.010
Nearest sensitive receptor (Warm Water Cove)	0.0047
Sensitive Receptors	
SF Southeast Headstart	0.014
Lucy Harbor Academy	0.011
Meadd Preparatory Daycare	0.0081

Figure 19. Emissions from 50 Sources in Southeast San Francisco (fine grid, close-up of SE WPCP vicinity): Acute Hazard Index Assessment



Receptor Location	Acute Hazard Index
PMI (Point of maximum impact)	
Near SE WPCP	3.9
Receptors Near SFERP	
Nearest residence to SFERP	0.23
Nearest sensitive receptor (Warm Water Cove)	0.093
Sensitive Receptors	
SF Southeast Headstart	0.24
San Francisco Headstart & Starr King Elementary	0.20

Table 1: SFERP Cumulative Analysis: Stack Input Data

Release Height ft	Stack Diameter ft	Exit Temp F	Rate acfm	Velocity fpm
41.9	13.0	70	214958	1619
41.9	13.0	70	214958	1619
85.0	12.0	744	619920	3606
85.0	12.0	744	619920	3606
85.0	12.0	744	619920	3606
4	Dimensions: 1.8 ft x 1.8 ft			
4	Dimensions: 0.3 ft x 0.3 ft			
24	1	68	78.5	100
4	1.94	75.2	2176	736
4	1.94	75.2	2316	783.5
4	1.94	75.2	1885	637.7
4	1.94	75.2	1885	637.7
4	1.94	75.2	2444	826.8
4	1.94	75.2	2444	826.8
4	2.26	75.2	6788	1692
4	2.26	75.2	3589	894.7
4	2.26	75.2	3589	894.7
4	2.26	75.2	7462	1860
4	0.5	75.2	166	845.4
4	0.5	75.2	166	845.4
4	0.82	75.2	64	121.2
21.98	3.94	1340.6	36000	2952.8
21.98	3.94	1340.6	36000	2952.8
29.2	1.84	302	3560	1338.8
29.2	1.84	302	3560	1338.8
20.01 20.01 4	Dimensions: 60 ft x 60 ft Dimensions: 60 ft x 60 ft Dimensions: 19.2 ft x 19.2 ft			

Release Height m	Stack Diameter m	Exit Temp K	Rate	Velocity m/sec
12.8	4.0	294.1		8.2
12.8	4.0	294.1		8.2
25.9	3.7	668.556		18.3
25.9	3.7	668.556		18.3
25.9	3.7	668.556		18.3

4	Dimensions: 128 ft x 128 ft			
300	11	230	295553	3110
32	10.2	840	612846	7500
32	10.2	840	612846	7500
32	10.2	840	612846	7500
18	0.5	700	2035.9	16201
4				
145.01	15.35	840.2	1231287	6654
250	11.52	311	344784	3308
30	0.75	68	1200	2716
32	0.5	68	1000	5093
43	0.83	68	1000	1848
28	5	613	2886.7	146
5	0.5	68		30
5	0.5	68		30
5	0.5	68		30
5	0.5	68		30
5	0.5	68		30
5	0.5	68		30
5	0.5	68		30
5	0.5	68		30
5	0.5	68		30
5	0.5	68		30
5	0.5	68		30
5	0.5	68		30

Table 2: SFERP Cumulative Analysis: Facility Emissions in lbs/year

Source: Table 8.1A-5

Source: Table 8.1A-5

San Francisco Electric Reliability Project

Substance	Sources				
	Gas Turbine 1	Gas Turbine 2	Gas Turbine 3	Cooling Tower 1	Cooling Tower 2
Acetaldehyde	7.82E+01	7.82E+01	7.82E+01		
Acrolein	7.07E+00	7.07E+00	7.07E+00		
Ammonia	2.62E+04	2.62E+04	2.62E+04	3.43E-04	3.43E-04
Arsenic				3.43E-03	3.43E-03
Benzene	6.37E+00	6.37E+00	6.37E+00		
1,3-Butadiene	8.33E-01	8.33E-01	8.33E-01		
Cadmium				5.15E-04	5.15E-04
Chromium				2.23E-03	2.23E-03
Copper				2.50E-02	2.50E-02
Ethyl benzene	6.25E+01	6.25E+01	6.25E+01		
Formaldehyde	7.03E+02	7.03E+02	7.03E+02		
Hexane	4.96E+02	4.96E+02	4.96E+02		
Lead				4.27E-03	4.27E-03
Mercury				3.43E-05	3.43E-05
Naphthalene	3.17E+00	3.17E+00	3.17E+00		
Nickel				6.68E-03	6.68E-03
PAHs	3.33E-01	3.33E-01	3.33E-01	2.74E-04	2.74E-04
PCBs				1.71E-04	1.71E-04
Propylene	1.48E+03	1.48E+03	1.48E+03		
Propylene Oxide	5.67E+01	5.67E+01	5.67E+01		
Toluene	2.55E+02	2.55E+02	2.55E+02		
Xylenes	1.25E+02	1.25E+02	1.25E+02		
Zinc				1.06E-01	1.06E-01

Sources				
Gas Turbine 1	Gas Turbine 2	Gas Turbine 3	Cooling Tower 1	Cooling Tower 2
1.95E-02	1.95E-02	1.95E-02		
1.77E-03	1.77E-03	1.77E-03		
6.54E+00	6.54E+00	6.54E+00	3.91E-08	3.91E-08
			3.91E-07	3.91E-07
1.60E-03	1.60E-03	1.60E-03		
2.10E-04	2.10E-04	2.10E-04		
			5.87E-08	5.87E-08
			2.54E-07	2.54E-07
			2.85E-06	2.85E-06
1.56E-02	1.56E-02	1.56E-02		
1.80E-01	1.80E-01	1.80E-01		
1.20E-01	1.20E-01	1.20E-01		
			4.89E-07	4.89E-07
			3.91E-09	3.91E-09
7.95E-04	7.95E-04	7.95E-04		
			7.63E-07	7.63E-07
8.58E-05	8.58E-05	8.58E-05	3.13E-08	3.13E-08
			1.96E-08	1.96E-08
3.70E-01	3.70E-01	3.70E-01		
1.42E-02	1.42E-02	1.42E-02		
6.37E-02	6.37E-02	6.37E-02		
3.13E-02	3.13E-02	3.13E-02		
			1.21E-05	1.21E-05

Mirant Potrero LLC

Substance	Sources				
	Boiler 3	Gas Turbine 4A & B	Gas Turbine 5A & B	Gas Turbine 6A & B	Diesel Pump
Benzene	1.19E+01	7.88E+00	7.81E+00	6.56E+00	4.96E-01
Formaldehyde	1.13E+00	4.07E+01	4.04E+01	3.38E+01	6.06E-02
PAHs					3.37E-03
Arsenic					6.39E-04
Beryllium					3.72E-04
Cadmium					1.60E-03
Chromium					3.30E-05
Lead					1.35E-03
Manganese					2.12E-03
Mercury					4.53E-04
Nickel					2.58E-02

PG&E Hunters Point

Substance	Gas Turbine A & B	Boiler
Benzene	1.53E+02	2.31E+02
Formaldehyde	7.15E+02	1.13E+04

Gonzalez Steel Drum Co.

Substance	Emissions
Arsenic	3.96E-05
Benzene	9.72E-04
Beryllium	3.96E-05
Cadmium	5.70E-04
Chromium	3.13E-04
Copper	1.11E-03
Dioxins	7.64E-07
Formaldehyde	3.06E-03
Lead	1.67E-02
Manganese	4.03E-04
Mercury	2.92E-05

Naphthalene	4.65E-05
Nickel	3.13E-04
PAHs	2.26E-06
Selenium	3.96E-05
Vinyl Chloride	8.34E-04
Zinc	1.94E-02

San Francisco Petroleum Co.

Substance	Emissions
Benzene	1.30E+01
Ethylbenzene	3.03E+00
MTBE	5.26E+02
Toluene	4.42E+01
Xylenes	5.18E+00

Facility	Substance	Emissions
Bell Cleaners	Perc	1.35E+03
One Hour Martinizing	Perc	1.35E+03
Vermont Cleaners	Perc	1.35E+03
VIP Litho	Perc	4.30E+01
Third Street Shell	Benzene	6.64E+00
Unocal 0313	Benzene	7.99E+00
Bryant Shell	Benzene	6.43E+00
Chevron 0683	Benzene	1.21E+01
DT 76	Benzene	6.03E+00
DeSoto Cab Co.	Benzene	6.30E+00
Shell Oil Co.	Benzene	6.65E+00
Silver Arco	Benzene	2.05E+01
Simas	Benzene	7.48E+00
Southpark Shell	Benzene	9.63E+00

Southeast Water Pollution Control Plant

Substance	Source 1 Bar Rack C.U.	Source 2 Grit & Screen Loading C.U.	Source 3 Grit & Screen Trans. C.U. (1)	Source 4 Grit & Screen Trans. C.U. (2)	Source 5 Grit Tank C.U. (1)	Source 6 Grit Tank C.U. (2)	Source 7 Primary Inf. End C.U.	Source 8 Primary Eff. End C.U. (1)	Source 9 Primary Eff. End C.U. (2)
Acetaldehyde									
Acrolein									
Ammonia	3.99E-01	1.30E+00	1.25E+00	1.25E+00	1.75E+00	1.75E+00	4.90E+00	2.95E+00	2.95E+00
Benzene	4.29E+00				2.80E+00	2.80E+00	7.71E+00	8.61E+00	8.61E+00
Bromomethane					5.99E-01	5.99E-01			
Carbon disulfide	4.99E-01		4.99E-01	4.99E-01	3.65E+00	3.65E+00	6.20E+00	9.79E+00	9.79E+00
Carbon tetrachloride									
Chlorine	1.00E-01	2.00E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	3.99E-01	3.99E-01	3.99E-01
Chlorobenzene	5.99E-01	3.99E-01	3.99E-01	3.99E-01	7.99E-01	7.99E-01	1.60E+00	1.60E+00	1.60E+00
Chloroethane					1.00E+00	1.00E+00	1.70E+00		
Chloroform	4.10E+00	4.99E-01	1.25E+00	1.25E+00	2.06E+01	2.06E+01	3.92E+01	5.98E+01	5.98E+01
p-Dichlorobenzene								1.75E+00	1.75E+00
Ethylene dichloride					8.96E-01	8.96E-01	1.60E+00		
Formaldehyde									
Hydrogen sulfide	8.96E-01	3.99E-01	3.99E-01	3.99E-01	2.21E+02	2.21E+02	2.90E+02	2.45E+03	2.45E+03
Methyl chloroform	1.60E+00		1.05E+00	1.05E+00	5.70E+00	5.70E+00	1.07E+01	1.38E+01	1.38E+01
Methylene chloride	7.02E-01		5.49E-01	5.49E-01	9.52E+00	9.52E+00	1.60E+01	2.65E+01	2.65E+01
Perchloroethylene	8.40E+00	8.96E-01	1.94E+00	1.94E+00	4.56E+01	4.56E+01	6.49E+01	1.40E+02	1.40E+02
Styrene								5.90E+00	5.90E+00
Toluene	1.04E+01				1.61E+01	1.61E+01	2.51E+01	3.95E+01	3.95E+01
Trichloroethylene	3.00E-01		5.49E-01	5.49E-01	7.36E+00	7.36E+00	1.00E+01	1.41E+01	1.41E+01
Trichlorofluoromethane									
Vinyl chloride					3.00E-01	3.00E-01			
Xylenes	9.86E+00	3.40E+00	4.90E+00	4.90E+00	1.62E+01	1.62E+01	1.33E+01	1.92E+01	1.92E+01

Southeast Water Pollution Control Plant (Continued)

Substance	lb/hr Source 1 Bar Rack C.U.	Source 2 Grit & Screen Loading C.U.	Source 3 Grit & Screen Trans. C.U. (1)	Source 4 Grit & Screen Trans. C.U. (2)	Source 5 Grit Tank C.U. (1)	Source 6 Grit Tank C.U. (2)	Source 7 Primary Inf. End C.U.	Source 8 Primary Eff. End C.U. (1)	Source 9 Primary Eff. End C.U. (2)
Acetaldehyde									
Acrolein	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Ammonia	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene	4.56E-05	1.48E-04	1.43E-04	1.43E-04	2.00E-04	2.00E-04	5.59E-04	3.36E-04	3.36E-04
Bromomethane	4.90E-04	0.00E+00	0.00E+00	0.00E+00	3.20E-04	3.20E-04	8.80E-04	9.83E-04	9.83E-04
Carbon disulfide	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.84E-05	6.84E-05	0.00E+00	0.00E+00	0.00E+00
Carbon tetrachloride	5.70E-05	0.00E+00	5.70E-05	5.70E-05	4.16E-04	4.16E-04	7.07E-04	1.12E-03	1.12E-03
Chlorine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chlorobenzene	1.14E-05	2.28E-05	1.71E-05	1.71E-05	1.71E-05	1.71E-05	4.56E-05	4.56E-05	4.56E-05
Chloroethane	6.84E-05	4.56E-05	4.56E-05	4.56E-05	9.12E-05	9.12E-05	1.82E-04	1.82E-04	1.82E-04
Chloroform	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-04	1.14E-04	1.94E-04	0.00E+00	0.00E+00
p-Dichlorobenzene	4.68E-04	5.70E-05	1.43E-04	1.43E-04	2.35E-03	2.35E-03	4.47E-03	6.83E-03	6.83E-03
Ethylene dichloride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-04	2.00E-04
Formaldehyde	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-04	1.02E-04	1.82E-04	0.00E+00	0.00E+00
Hydrogen sulfide	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methyl chloroform	1.02E-04	4.56E-05	4.56E-05	4.56E-05	2.52E-02	2.52E-02	3.31E-02	2.80E-01	2.80E-01
Methylene chloride	1.82E-04	0.00E+00	1.20E-04	1.20E-04	6.50E-04	6.50E-04	1.22E-03	1.58E-03	1.58E-03
Perchloroethylene	8.01E-05	0.00E+00	6.27E-05	6.27E-05	1.09E-03	1.09E-03	1.82E-03	3.03E-03	3.03E-03
Styrene	9.59E-04	1.02E-04	2.22E-04	2.22E-04	5.21E-03	5.21E-03	7.41E-03	1.60E-02	1.60E-02
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E-04	6.73E-04
Trichloroethylene	1.19E-03	0.00E+00	0.00E+00	0.00E+00	1.84E-03	1.84E-03	2.87E-03	4.51E-03	4.51E-03
Trichlorofluoromethane	3.43E-05	0.00E+00	6.27E-05	6.27E-05	8.41E-04	8.41E-04	1.14E-03	1.61E-03	1.61E-03
Vinyl chloride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.43E-05	3.43E-05	0.00E+00	0.00E+00	0.00E+00
	1.13E-03	3.88E-04	5.59E-04	5.59E-04	1.85E-03	1.85E-03	1.51E-03	2.20E-03	2.20E-03

Southeast Water Pollution Control Plant (continued)

Substance	Source 10 Aeration Inf Chan. C.U.	Source 11 Aer. Process Vent (1)	Source 12 Aer. Process Vent (2)	Source 13 Sludge Dewater-ing	Source 14 Flare 1	Source 15 Flare 2	Source 16 Boiler 1	Source 17 Boiler 2
Acetaldehyde					4.45E+00	4.45E+00	1.65E+00	1.65E+00
Acrolein					1.85E+00	1.85E+00		
Ammonia	1.40E+00	4.99E-02	4.99E-02		2.50E-01	2.50E-01	4.49E-01	4.49E-01
Benzene	8.89E+00	1.00E-01	1.00E-01	6.00E-02	4.75E+00	4.75E+00		
Bromomethane	1.60E+00	4.99E-02	4.99E-02					
Carbon disulfide	1.57E+01	7.99E-01	7.99E-01	1.00E-01				
Carbon tetrachloride		4.99E-02	4.99E-02					
Chlorine	3.99E-01				1.20E+00	1.20E+00		
Chlorobenzene	2.50E+00			1.00E-01				

Chloroethane	3.90E+00	2.50E-01	2.50E-01					
Chloroform	9.66E+01	7.29E+00	7.29E+00	1.00E-01	1.60E+00	1.60E+00		
p-Dichlorobenzene		1.00E-01	1.00E-01	1.00E-01				
Ethylene dichloride	2.90E+00							
Formaldehyde					3.90E+00	3.90E+00	1.20E+00	1.20E+00
Hydrogen sulfide	1.15E+03	4.99E-02	4.99E-02	1.81E+01	6.18E+01	6.18E+01	9.17E+00	9.17E+00
Methyl chloroform	1.90E+01	3.49E+00	3.49E+00		4.49E-01	4.49E-01		
Methylene chloride	4.36E+01	2.45E+00	2.45E+00		7.99E-01	7.99E-01		
Perchloroethylene	1.70E+02	2.20E+01	2.20E+01					
Styrene		1.50E-01	1.50E-01					
Toluene	5.47E+01	7.02E-01	7.02E-01					
Trichloroethylene	2.33E+01	2.50E+00	2.50E+00					
Trichlorofluoromethane		2.50E-01	2.50E-01					
Vinyl chloride		4.99E-02	4.99E-02					
Xylenes	2.85E+01	1.00E-01	1.00E-01					

Southeast Water Pollution Control Plant (continued)

Substance	Source 10 Aeration Inf Chan. C.U.	Source 11 Aer. Process Vent (1)	Source 12 Aer. Process Vent (2)	Source 13 Sludge Dewater-ing	Source 14 Flare 1	Source 15 Flare 2	Source 16 Boiler 1	Source 17 Boiler 2
Acetaldehyde	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.07E-04	5.07E-04	1.88E-04	1.88E-04
Acrolein	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-04	2.11E-04	0.00E+00	0.00E+00
Ammonia	1.59E-04	5.70E-06	5.70E-06	0.00E+00	2.85E-05	2.85E-05	5.13E-05	5.13E-05
Benzene	1.01E-03	1.14E-05	1.14E-05	6.85E-06	5.42E-04	5.42E-04	0.00E+00	0.00E+00
Bromomethane	1.82E-04	5.70E-06	5.70E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon disulfide	1.79E-03	9.12E-05	9.12E-05	1.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbon tetrachloride	0.00E+00	5.70E-06	5.70E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chlorine	4.56E-05	0.00E+00	0.00E+00	0.00E+00	1.37E-04	1.37E-04	0.00E+00	0.00E+00
Chlorobenzene	2.85E-04	0.00E+00	0.00E+00	1.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroethane	4.45E-04	2.85E-05	2.85E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chloroform	1.10E-02	8.33E-04	8.33E-04	1.14E-05	1.82E-04	1.82E-04	0.00E+00	0.00E+00
p-Dichlorobenzene	0.00E+00	1.14E-05	1.14E-05	1.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylene dichloride	3.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Formaldehyde	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.45E-04	4.45E-04	1.37E-04	1.37E-04
Hydrogen sulfide	1.31E-01	5.70E-06	5.70E-06	2.06E-03	7.06E-03	7.06E-03	1.05E-03	1.05E-03
Methyl chloroform	2.16E-03	3.99E-04	3.99E-04	0.00E+00	5.13E-05	5.13E-05	0.00E+00	0.00E+00
Methylene chloride	4.97E-03	2.79E-04	2.79E-04	0.00E+00	9.12E-05	9.12E-05	0.00E+00	0.00E+00

Perchloroethylene	1.94E-02	2.51E-03	2.51E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	0.00E+00	1.71E-05	1.71E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	6.24E-03	8.01E-05	8.01E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Trichloroethylene	2.66E-03	2.85E-04	2.85E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Trichlorofluoromethane	0.00E+00	2.85E-05	2.85E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl chloride	0.00E+00	5.70E-06	5.70E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xylenes	3.26E-03	1.14E-05	1.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Southeast Water Pollution Control Plant (continued)

Substance	Source 18 Digestor Complex 1	Source 19 Digestor Complex 2	Source 20 DAF (Tank & Weir)	Source 21 2° Clar.	Source 22 Cogen. Engine
Acetaldehyde					1.20E+00
Acrolein					7.00E-01
Ammonia			3.00E-01	3.00E+00	
Benzene	4.99E-02	4.99E-02			2.57E+02
Bromomethane					
Carbon disulfide			3.00E-01	4.10E+00	
Carbon tetrachloride					
Chlorine				2.70E+00	
Chlorobenzene	1.00E-01	1.00E-01			
Chloroethane				1.00E-01	
Chloroform			2.20E+00	5.02E+01	
p-Dichlorobenzene	4.99E-02	4.99E-02	2.00E-01	2.31E+01	8.50E+00
Ethylene dichloride					
Formaldehyde					4.11E+01
Hydrogen sulfide	1.42E+02	1.42E+02	1.98E+01	4.20E+00	
Methyl chloroform			2.00E-01	3.60E+00	

Source 18 Digestor Complex 1	Source 19 Digestor Complex 2	Source 20 DAF (Tank & Weir)	Source 21 2° Clar.	Source 22 Cogen. Engine
				1.37E-04
				7.99E-05
		3.43E-05	3.43E-04	
5.70E-06	5.70E-06			2.93E-02
		3.43E-05	4.68E-04	
			3.08E-04	
1.14E-05	1.14E-05			
			1.14E-05	
		2.51E-04	5.73E-03	
5.70E-06	5.70E-06	2.28E-05	2.63E-03	9.70E-04
				4.69E-03
1.62E-02	1.62E-02	2.26E-03	4.79E-04	
		2.28E-05	4.11E-04	

Methylene chloride			7.02E-01	1.24E+01	3.34E+01			8.01E-05	1.41E-03	3.81E-03
Perchloroethylene			2.80E+00	5.90E+01				3.20E-04	6.73E-03	
Styrene			1.00E-01	6.29E+00	1.49E+01			1.14E-05	7.18E-04	1.70E-03
Toluene	1.50E-01	1.50E-01		1.00E-01	6.94E+01	1.71E-05	1.71E-05		1.14E-05	7.92E-03
Trichloroethylene			3.00E-01	5.29E+00				3.43E-05	6.04E-04	
Trichlorofluoromethane										
Vinyl chloride	4.99E-02	4.99E-02				5.70E-06	5.70E-06			
Xylenes	1.00E-01	1.00E-01			1.75E+01	1.14E-05	1.14E-05			2.00E-03

SOCIOECONOMICS

Testimony of James Adams

SUMMARY OF CONCLUSIONS

Staff has determined that the San Francisco Electric Reliability Project would not cause a significant adverse direct or cumulative socioeconomic impact on the area's housing, schools, police, emergency services, hospitals, and utilities because most of the construction and operation workforce is within the regional or local labor market area, and construction activities are short-term. Additionally, there are benefits from the San Francisco Electric Reliability Project including increases in sales taxes, employment, and income for San Francisco and neighboring counties.

INTRODUCTION

This socioeconomic impact analysis evaluates the project induced changes on community services and/or infrastructure and presents demographic screening data for the area within one and six miles of the proposed project site. The six-mile radius is based on the area considered for air quality cumulative impacts. The one mile-radius is the area with the most potential for significant impact. The analysis identifies the estimated impact of the construction and operation of the San Francisco Electric Reliability Project (SFERP) on local communities, community resources, and public services, including direct, indirect, and cumulative impacts.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

The SFERP would be owned and operated by an agency of the City and County of San Francisco (CCSF) and is exempt from paying school impact fees as required by California Government Code section 65995(d). California Government Revenue and Taxation Code 202(a) exempts city property from taxes. There are no applicable federal, state, or local socioeconomic laws, ordinances, regulations and standards (LORS).

SETTING

The affected area for socioeconomics as defined by the SFERP in the Application for Certification (AFC), and considered by staff, is the greater CCSF area and the San Francisco Metropolitan Statistical Area (MSA). This area includes the counties of San Francisco, San Mateo, and Marin. In addition, San Francisco is also near six other counties including Alameda, Contra Costa, Napa, Santa Clara, Solano, and Sonoma. This is generally referred to as the nine-county Bay Area.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

According to Appendix G of the California Environmental Quality Act (CEQA) Guidelines, a project may have a significant effect on population, housing and public services if the project will:

- induce substantial population growth in an area, either directly or indirectly;
- displace substantial numbers of people and/or existing housing, necessitating the construction of replacement housing elsewhere; or
- adversely impact acceptable levels of service for fire and police protection, schools, parks, and other public facilities.

A socioeconomic analysis is unique in that it looks at beneficial impacts on local finances from property and sales taxes as well as potential adverse impacts on public services. In order to determine if a project would have any significant impacts, staff analyzes the current status of these community services and revenue streams. This is followed by an assessment of whether the existing services and capacities can absorb the project related impacts in each of these areas. If the project's impacts could appreciably strain or degrade these services, staff considers this to be a significant adverse impact and would propose mitigation. Usually, the project's property tax payments provide sufficient funds for local governments to augment public services as needed to meet project needs. In the case of SFERP, the City of San Francisco is a public agency and does not pay property taxes or school impact fees, but the project would result in construction and operation jobs and will provide revenue from sales tax for project expenditures, and for the electricity generated.

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

California statute, section 65040.12 (c) of the Government Code, defines "environmental justice" to mean "fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies." In light of the progress made by federal environmental agencies on environmental justice, the Energy Commission has examined federal guidelines pursuant to its desire to follow environmental justice principles for the environmental review of this project.

The steps recommended by these guidance documents to assure compliance with the Executive Order are: (1) outreach and involvement; (2) a demographic screening to determine the existence of a minority or low-income population; and (3) if warranted, a detailed examination of the distribution of impacts on segments of the population. Though the Federal Executive Order and guidance are not binding on the Energy Commission, staff finds these recommendations helpful for implementing this

environmental justice review. Staff has followed each of the above steps for the following 11 sections in the SFERP Final Staff Assessment: Air Quality, Hazardous Materials, Land Use, Noise, Public Health, Socioeconomics, Soils and Water, Traffic and Transportation, Transmission Line Safety/Nuisance, Visual Resources, and Waste Management.

Staff conducted the demographic screening in accordance with the "Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis" (Guidance Document) dated April 1998. People of color populations, as defined by this Guidance Document, are identified where either:

- the minority population of the affected area is greater than 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.
- one or more census blocks in the affected area have a minority population greater than fifty percent.

The demographic screening considers the population living within six miles of the proposed project site. This information is used to determine if a greater than 50 percent minority or low-income population resides in the area. The one-mile radius provides more focused demographic and population dispersion information for the area with the most potential for environmental impact.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Staff reviewed the SFERP AFC, Vol. I, Socioeconomics section (SFERP 2004a, Subsection 8.8), and subsequent filings and communications. Amendment A (SFPUC 2005a) to the original AFC has the most current information and is the primary document used for this analysis. Based on staff's use of the socioeconomic data provided and referenced from governmental agencies, trade associations and staff's independent analysis, staff completed the following socioeconomic analysis and conclusions.

Population and Employment

The 2000 U.S. Census shows that California had a total population of 33,871,648, with minority (non-white and white-Hispanic) population of 18,054,858 (53.3 percent), and a white population of 15,816,790 or (46.7 percent). The City and County of San Francisco had a total population of 776,733, with a minority population of 437,824 (56.4 percent), and a white population of 338,909 or 43.6 percent (U.S. Census Bureau 2004). By 2010, projections show a California population of 39,246,767, and 816,200 residents in San Francisco City and County (SFPUC 2005a, Table 8.8-2, p. 8.8-3). As discussed below, the majority of construction and operation labor is likely to be local, so there would be little induced population growth from the SFERP. During construction, individual work assignments typically last from several days to weeks which suggests that there will be no permanent relocation of construction workers. Furthermore, there would be no displacement of population by the SFERP.

The unemployment rate for the San Francisco MSA was 4.4 percent in May 2004, not seasonally adjusted. This is close to full employment. For California, the unemployment rate was 5.8 percent (State of California 2004). Given the large number of workers in the trades noted in **Socioeconomics Table 1,** staff accepts the applicant's estimate that the construction workforce would come from within the greater San Francisco Bay area (SFERP 2004a, p. 8.8-11), and the vast majority would commute to the job on a daily or weekly basis.

There were 43,600 construction workers in the San Francisco MSA in 2002. The number of construction workers increased two percent a year from 1999 to 2002 (SFPUC 2005a, Table 8.8-5, p. 8.8-4). Staff believes that most construction workers travel to the job site on a daily basis, which may involve as much as a one or two-hour commute. Construction workers who live in communities at greater distances than a two-hour, one-way commute tend to relocate to the project area for the work week, then return home on the weekend. Operations workers tend to live within a one-hour, one-way commute, and if they live outside this area they would likely relocate. A small percentage of operation workers may live more than a one-hour drive from the SFERP site.

Socioeconomics Table 1 shows that available labor, by skill, in the San Francisco MSA, with annual averages for 2001 and a projection for 2008, is large when compared to the SFERP needs. The San Francisco County MSA has a fairly large construction workforce of 42,200 as of May 2004 (State of California 2004). The peak construction activity (264 workers) for the SFERP represents less than 0.01 percent of the available workforce.

Project construction (power generation facility including the natural gas pipeline, processed water pipeline, and electric power transmission line) is expected to occur over a 12-month period. The greatest number of construction workers (peak) will occur in the sixth and seventh months of construction. The number of construction workers will range from about 50 in the first and last few months of construction to 264 workers at peak construction. There will be an average of 161 workers per month during construction. These workers are expected to come mainly from the local area.

During operation of the project, about 11 workers will be needed to maintain and operate the project. Most of the operational workers are expected to come from San Francisco County, with most of the rest coming from the greater nine-county Bay Area. Staff agrees with the applicant that a small increase in employment will have little effect on employment rates.

SOCIOECONOMICS Table 1
Available Labor in San Francisco MSA by Skill for Construction and Operations

Occupational Title	Annual Averages 2001	2008	Percent Change
Masons & concrete finishers	1,170	1,130	-3.4
Carpenters	8,570	9,020	5.3
Painters, Construction & Maintenance	2,900	3,120	7.6
Sheet Metal Workers	1,230	1,390	13.0
Electricians	3,890	4,360	12.1
Welders, Cutters, Solderers, & Brazers	1,270	1,420	11.8
Industrial Truck & Tractor Drivers	1,690	1,720	1.8
Operating Engineers	1,050	1,080	2.9
Helpers, Laborers	7,770	8,190	5.4
Pipe fitters/plumbers/steam fitters	2,040	2,090	2.5
Mechanical Engineers	810	900	11.1
Electrical and Electronic Engineers (including technicians)	3,750	4,030	7.5
Plant and System Operators	1,000	1,080	8.0

Sources: SFPUC 2005a, Table 8.8-13, p. 8.8-16; CEDD 2004

Fiscal

The SFERP capital costs for construction are estimated to be $140 million (SFPUC 2005a, p. 8.8-17). This amount does not include the cost for combustion turbines that the City acquired from the California Department of Water Resources through a settlement with Williams Energy Marketing and Trading Company. The total construction payroll is $13.4 million and the estimated value of materials and supplies that will be purchased locally (within San Francisco County) during construction is between $2 and $3 million.

Sales tax is paid on material and supply expenditures. The sales tax rate of 8.5 percent in San Francisco County is comprised of the state sales tax rate (six percent), one percent to the place of sale, 0.25 percent to the county, and 1.25 percent to special districts. The total sales tax estimated during construction is expected to be between $170,000 and $255,000. The SFERP, which will be owned by the CCSF, is exempt from property taxes pursuant to California Revenue and Taxation Code section 202(a). The total payroll for the operation phase is estimated to be $0.9 million annually. In addition, there would be $0.25 million in local expenditures per year on materials and supplies during operation. Based on the sales tax rate (8.5 percent minus 0.25 percent to the County), sales tax revenue from locally purchased materials during operation would be between $17,000 and $25,500 (SFERP 2004a, p. 8.8-17).

The Impact Analysis for Planning (IMPLAN) model (an input-output model), used by the applicant to estimate employment impacts from the SFERP on the study area, is widely used and acceptable to staff. The University of California at Berkeley uses the IMPLAN model for regional economic assessment, and it has been used to assess other generating projects in California and the U.S. IMPLAN is a disaggregated type of model that divides the (regional) economy into sectors and provides a multiplier for each sector. Social Accounting Matrix (SAM)[5] multipliers were used for the applicant's economic impact analysis. SAM multipliers are similar to Type II[6] multipliers because they both include the indirect and induced effects (secondary impacts).

IMPLAN employment multipliers between 1.21 and 2.0 were used to calculate direct, indirect, and induced jobs and expenditures in the regional economy. These multipliers are within an acceptable range often cited by many economists (Moss et al. 1994) and staff considers these projected beneficial economic impacts to be reasonable (See **Socioeconomics Table 2**).[7]

---

[15] Type SAM multipliers capture inter-institutional transfers and account for social security and income tax leakages, institutional savings, and commuting.

[6] A Type I multiplier is the ratio of the direct plus indirect change to the direct change resulting from a unit increase in final demand for any given sector. A Type II multiplier is the ratio of the direct, indirect, and induced change to the direct change resulting from a unit increase in final demand. The Type II multiplier takes into account the SFERP repercussionary effects of secondary rounds of consumer spending in addition to the direct and indirect inter-industry effects (Richardson 1972). Both multipliers can be of an income or employment type. Indirect changes are production changes in industries supplying the original industry (backward linkages). Induced changes are changes in regional household spending levels caused by regional employment impacts.

[7] All project construction and operations economic estimates are presented in 2003 dollars (CH2MHill 2004a).

SOCIOECONOMICS Table 2 Data And Information[8]	
Estimated Project Capital Costs	$140 million[9]
Estimate of Locally Purchased Materials	
Construction	$2 - $3 million
Operation	$0.25 million per year
Estimated Annual Property Taxes	Not applicable. SFERP is a public agency.
Estimated School Impact Fees	SFERP is exempt
Estimated Direct Employment	
Construction (average)	161 jobs (average per month)
Operation	11 jobs
Estimated Secondary Employment	
Construction	58 jobs (plus 161 average direct jobs for a total of 219 average construction jobs)
Operation	4 jobs (plus 11 direct jobs for a total of 15 average operation jobs)
Estimated Local Direct Expenditures[10]	
Construction	$11.05 million
Operation	$1.17 million
Estimated Local Secondary Expenditures	
Construction	$2.5 million (plus $11.05 local direct construction expenditures for a total of $13.55 local construction expenditures)
Operation	$1.19 million (plus $1.17 million local direct operation expenditures for a total of $2.36 million local operation expenditures)
Estimated Payroll	
Construction	Total - $13.4 million
Operation	Average: $0.9 million annually
Estimated Sales Taxes	
Construction	$170,000 to $255,000
Operation	$17,000 to $25,500 annually
Existing Unemployment Rates	Existing – 3.8 percent in December 2005, for San Francisco-San Mateo-Redwood City Metropolitan Division
Percent Minority Population (6 mile radius)	57.75 percent
Percent Poverty Population (6 mile radius)	11.36 percent
Percent Minority Population (1 mile radius)	50.56 percent
Percent Poverty Population (1 mile radius)	18.03 percent

Housing

According to federal standards, permanent housing is considered to be in short supply if the vacancy rate is less than five percent (URS 2000). As of January 1, 2004, there

[8] Table 2 uses 2003 dollars, construction is for 12 months, and project life planned for 30 years. Economic (non-fiscal and fiscal) impacts, unemployment, and population information are generally for San Francisco County. The results of IMPLAN/Input-Output modeling are for San Francisco County and show secondary, indirect and induced impacts, as well as direct impacts.

[9] Does not include combustion turbine cost. CTs acquired by City via settlement with Williams Energy.

[10] Includes payroll, materials and supplies.

were approximately 354,490 housing units in San Francisco County with a median home price of $540,000 (CDOF 2004). The vacancy rate for this housing averages approximately 2.9 percent for San Francisco County. There are over 32,000 hotel rooms in the City of San Francisco with an average vacancy rate of 30 percent (San Francisco 2004). The housing units available to non-local construction workers for this project are sufficient for worker needs. Staff believes that a majority of the construction workforce, and most of the operations work force, would be drawn from the local labor force and would not require new lodging. Also, non-local construction workers typically stay in moderately priced hotels/motels, which in this case could be found in the East Bay or San Mateo County. Given the relatively small number of SFERP construction (i.e. 264 at peak) and permanent (i.e. 11) workers, the project is not expected to result in the displacement of housing.

Schools

There are over a dozen elementary, middle or high schools within two miles of the proposed SFERP. Starr King and Daniel Webster Elementary Schools, and Enola Maxwell Middle School are the closest to the project site and are administered by the San Francisco Unified School District. Current enrollment for the District as a whole has declined slightly (0.76 percent) from the 2003 school year (SFERP 2004a, p. 8.8-6).

Staff believes that most construction workers would commute to the worksite on a daily or weekly basis. Since non-local workers and their families are not anticipated for the construction period, there would not be a significant impact on local school enrollment. During the operations phase, even if all of the 11 operating employees were to relocate and live in San Francisco, which is not likely to be the case, it would not result in a significant adverse impact. Assuming an average family size of 3.03 (US 2000 Census) this would result in about 11 children added to the local schools. This would result in an insignificant increase in enrollment for the base year of 2005-2006 for the City of San Francisco. Overall, staff expects no significant socioeconomic impact on study area schools.

Education Code section 17620 states that public agencies may not impose fees, charges or other financial requirements to offset the cost for “school facilities.” School facilities are defined as “any school-related consideration relating to a school district’s ability to accommodate enrollment.” Local and state agencies are precluded from imposing (additional) fees or other required payments on development projects for the purpose of mitigating possible enrollment impacts to schools.

Police Protection

The Supplement A filing (Section 8..8.3.6.1 Law Enforcement) notes that the proposed SFERP will be served by the San Francisco Police Department (SFPD), and the Bayview station in particular. The Bayview station has about 100 sworn officers and five patrol cars. The response time to an emergency at the proposed project site is two minutes (SFPUC 2005a, p. 8.8-9). The California Highway Patrol provides law enforcement services on state highways and has jurisdiction over hazardous materials transportation. The SFERP would not significantly increase the existing demand for police service or adversely affect police protection in and around the SFERP area

(SFERP 2004a, Appendix 8.8, Telephone Record with Lt. Juarez, SFPD, and Fatuma Yusuf, CH2MHill, on January 5, 2004).

Medical Services/Utilities

The San Francisco General Hospital is the closest (1.5 miles) full-service medical facility to the proposed site. It is licensed for 550 beds and is the designated trauma center for the west bay counties (i.e. San Mateo, San Francisco, Marin). Emergency services are available 24 hours a day. In addition, St. Luke's Hospital is approximately two miles west of the SFERP and is a full-service 260 bed-licensed acute care facility.

Emergency response would be handled by police and fire personnel as needed. In addition. The nearest emergency medical response facility is San Francisco Fire Department Fire Station No. 25 located at 3305 Third Street. Response time to the SFERP site is approximately three to four minutes. Additional support could come from the San Francisco Bureau of Fire Prevention, the Department of Public Health, and the U. S. Coast Guard[11]. The Coast Guard has stations on Alameda and Yerba Buena Islands (SFERP 2005a, p. 8.8-10; Port of San Francisco 2005). Given the existing medical facilities and emergency services, staff believes that the medical facilities in the local area would be adequate to meet the needs of construction and operation workers.

Water and wastewater discharge are discussed in the **Water Resources** section of the Final Staff Assessment (FSA). The SFERP will connect to Pacific Gas and Electric's (PG&E) electrical transmission lines and PG&E will also deliver natural gas. Adequate supplies of electricity are available for SFERP's construction, and as discussed in the **Reliability** section, gas is available for SFERP's operation. Fire protection and solid waste removal are discussed in the **Worker Safety, and Fire Protection and Waste Management** sections of this FSA, respectively.

Finally, the SFERP would not displace significant numbers of people or directly or indirectly induce substantial population growth. Hence, there are no significant socioeconomic impacts that might trigger adverse physical impacts in the provision of public services.

CUMULATIVE IMPACTS

Cumulative impacts could occur when more than one project has an overlapping construction schedule that creates a demand for workers that cannot be met by local labor, resulting in an influx of non-local workers and their dependents.

There are several projects planned for the SFERP area including residential and commercial developments, and various public works projects. For example, the combined public and private PIER 70 development project would involve new commercial and industrial activities just north of the SFERP site. However, there is no time line for the construction to begin. The San Francisco Municipal Railway (MUNI) has begun construction of a new storage and maintenance facility adjacent to the SFERP(San Francisco MUNI 2006). The MUNI is constructing a Third Street light-rail transit line about a block west of the SFERP site with completion scheduled for spring of

[11] A mutual aid agreement is in affect in most Bay Area counties (CCSF Fire Department 2006).

2006 (SFPUC 2005a, p.8.10-26). The SFERP will begin construction in fall 2006 with commercial operation scheduled for spring 2007, so there is some potential overlap with the MUNI storage and maintenance facility project. The 30-month construction period commenced in September 2005 (see the **Land Use** section for more details).

Staff believes that the size of the available workforce in the San Francisco Bay area would ensure that the SFERP construction, in conjunction with other projects planned or in process, would not put a strain on the types of workers needed to complete all the anticipated projects. Finally, because the SFERP would not result in any significant adverse socioeconomic impacts to population, housing, or public services due to the small size and temporary nature of construction, it is unlikely that it would contribute significantly to cumulative socioeconomic impacts. The SFERP's impact on socioeconomics, when combined with the existing impact of other projects, is not cumulatively considerable, and thus does not result in a significant adverse cumulative impact to socioeconomics.

DEMOGRAPHIC SCREENING

The purpose of the demographic screening is to determine whether a low-income and/or minority population exists within the potentially affected area of the proposed site. Staff conducted the screening in accordance with the "Final Guidance for Incorporating Environmental Justice Concerns in [the Environmental Protection Agencies'] EPA's [National Environmental Policy Act] NEPA Compliance Analysis," Guidance Document (EPA 1998). Minority 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; or
- one or more census blocks in the affected area have a minority population greater than fifty percent.

In 1997, the President's Council on Environmental Quality issued Environmental Justice Guidance that defines minority as individuals who are members of the following population groups: American Indian or Alaskan Native, Asian or Pacific Islander; Black not of Hispanic origin; or Hispanic. Low-income populations are identified with the annual statistical poverty thresholds from the Bureau of the Census's Current Population Reports, Series P-60 on Income and Poverty (OMB 1978).

Staff has reviewed Census 2000 information that shows minority population by census block is 57.75 percent within a six-mile radius, and 50.56 percent within one-mile of the proposed SFERP project (See **Socioeconomics Figure 1**). In addition, there are pockets (census blocks) with greater than 75 percent minority population within the six-mile radius. Census 2000 data by census block group shows that the low-income population is 11.36 percent within the six-mile radius and 18.03 percent within a one-mile radius (See **Socioeconomics Figure 2**). Poverty status excludes institutionalized

people, people in military quarters, people in college dormitories, and unrelated individuals under 15 years old.

Staff has not identified significant direct or cumulative, adverse socioeconomic impacts resulting from the construction or operation of the project. The SFERP project is proposed to be built in an urban area, would not physically alter the community, and would largely utilize a local labor force that would not create any new significant demands on community infrastructure and services.

Although staff has identified minority and low-income residents within a one-mile and six-mile radius of the SFERP, there are no significant adverse direct or cumulative socioeconomic impacts and therefore no socioeconomic environmental justice issues related to this project.

NOTEWORTHY PUBLIC BENEFITS

As noted in this analysis, the SFERP will provide benefits in employment, purchase of materials, sales taxes and income for San Francisco. As discussed earlier in the **Direct/Indirect Impacts and Mitigation** section and displayed in **Socioeconomics Table 2** in detail, estimated benefits from the SFERP include increases in sales taxes, employment, and income for San Francisco and neighboring counties. For example, there are estimated to be an average of 161 direct project-related jobs and 58 secondary (indirect and induced) jobs for 12 months of demolition/construction, resulting in an estimated 219 total jobs. Secondary (indirect and induced) construction local income based on an estimated $11.05 million for local construction expenditures results in another $2.5 million, for an estimated total local income of $13.55 million from the construction of the SFERP. For operations, 11 direct jobs will be created plus 4 secondary jobs for a projected total of 15 operation jobs. Direct operation expenditures is estimated to be $1.17 million plus secondary operation expenditures of $1.19 million for an estimated total local annual operation expenditure of $2.36 million. The total sales tax during construction is estimated to be $170,000 to $255,000 and $17,000 to $25,000 annually during operation.

AGENCY AND PUBLIC COMMENTS

There were no agency or public comments on the Preliminary Staff Assessment.

CONCLUSIONS

Staff concludes that the SFERP would not cause a significant adverse socioeconomic impact on the study area's housing, schools, police, emergency services, hospitals, and utilities. Staff has determined that there would be no significant adverse socioeconomic impacts since most of the construction and operation workforce resides in the regional or local labor market area. Staff has determined that there would be no significant adverse direct or cumulative socioeconomic impacts, and therefore no socioeconomic environmental justice issues.

Staff does not propose any conditions of certification.

REFERENCES

CDOF 2004. California Department of Finance, Population and Housing Statistics by County as of January 1, 2004, www.dof.ca.gov.

CH2MHill, Sacramento, California (CH2MHill) 2004a. E-mail from Fatuma Yusuf, Economist, CH2MHill, to James Adams, California Energy Commission, regarding Occupational Employment Projections, dated June 18, 2004.

CH2MHill, Sacramento, California (CH2MHill) 2004b. E-mail from John Carrier, Project Manager, CH2MHill, to Bill Pfanner, California Energy Commission, regarding Year of Cost Estimates, dated May 4, 2004.

City and County of San Francisco 2004a. Application for Certification, Volumes 1 & 2, for the San Francisco Electric Reliability Project, submitted to the California Energy Commission on March 18, 2004.

City and County of San Francisco 2005a. Supplement A, for the San Francisco Electric Reliability Project, submitted to the California Energy Commission on March 25, 2005.

City and County of San Francisco 2006a. Supplement B: Process Water Supply, In support of the San Francisco Electric Reliability Project. Submitted to the California Energy Commission on January 11, 2006.

City and County of San Francisco 2006b. Personal communication between John Barcojo, Fire Department Station No.25, and James Adams on February 9, 2006.

EPA (U. S. Environmental Protection Agency). 1998. Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis. April, 1998.

Moss, Steven J. Richard J. McCann, and Marvin Feldman. *A Guide for Reviewing Environmental Policy Studies*. Spring, 1994.

Pier 70 San Francisco 2004. *The Planning Process for Pier 70*, http//pier70sf.org/future/planning.html.

Port of San Francisco 2005. Personal communication between David Beaupre, Senior Waterfront Planner, and James Adams on August 23, 2005.

Saint Luke's Hospital 2004. Accessed website on October 22, 2004.

San Francisco General Hospital 2004. Accessed website on October 21, 2004.

San Francisco Municipal Railway (MUNI) 2004b. About MUNI: Construction Projects, Third Street Light Rail Project, www.sfmuni.com/aboutmun/3rdover.htm.

San Francisco MUNI 2006. Personal communication between Drew Howard, SF MUNI, and James Adams on February 9, 2006.

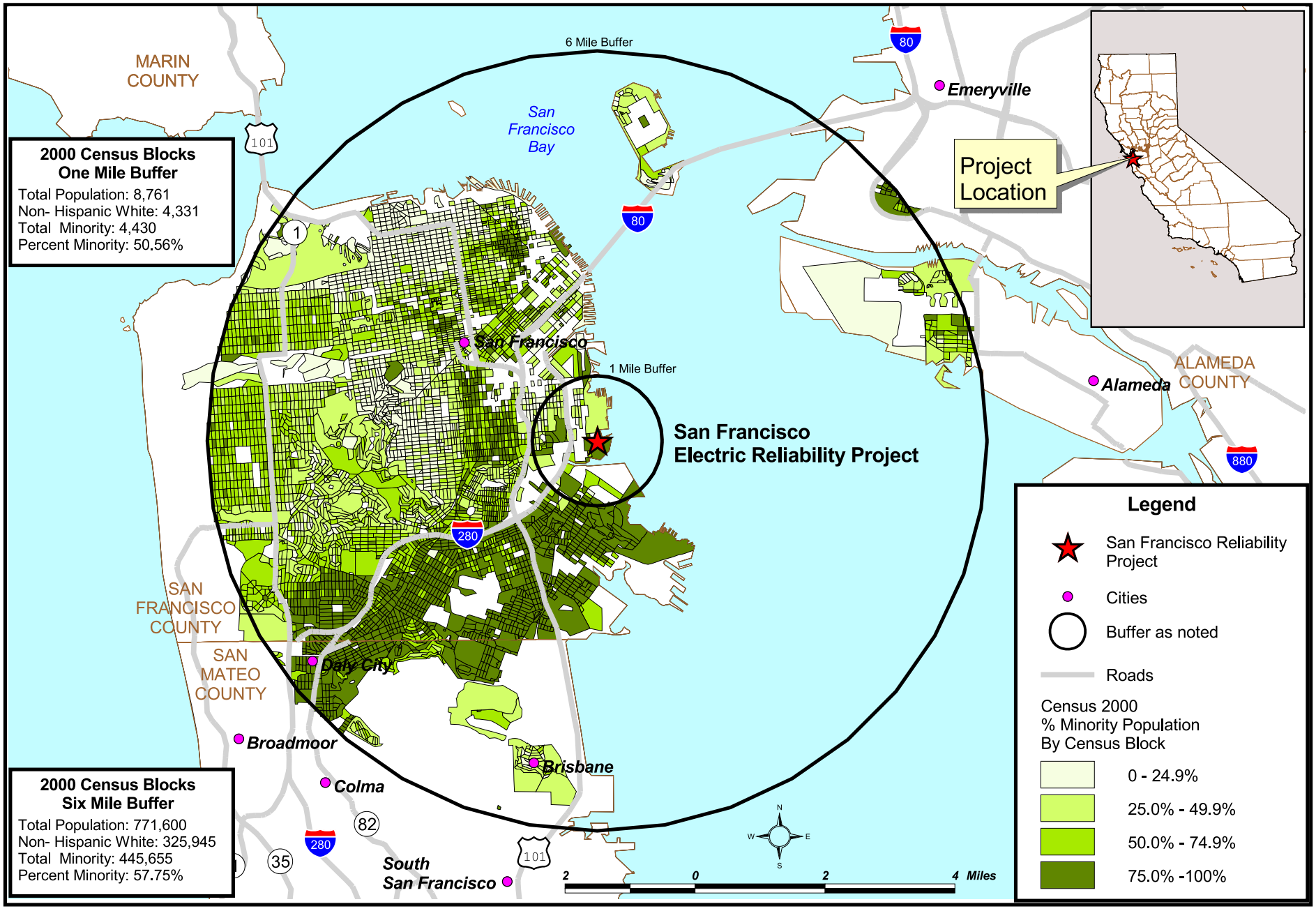
San Francisco Visitors Bureau 2004. E-mail from David Bratton, Statistics Branch, to James Adams, California Energy Commission, on August 26, 2004.

State of California, Employment Development Department 2004, Labor Market Information, San Francisco Metropolitan Statistical Area, updated on June 6, 2004, wwwedd.cahwnet.gov/.

U.S. Census Bureau 2004. Population, Housing Units, Area, and Density: 2000, Counties in California, www.census.gov.

SOCIOECONOMICS - FIGURE 1

San Francisco Electric Reliability Project - Supplement A - Census 2000 Minority Population by Census Block - One and Six Mile Buffer

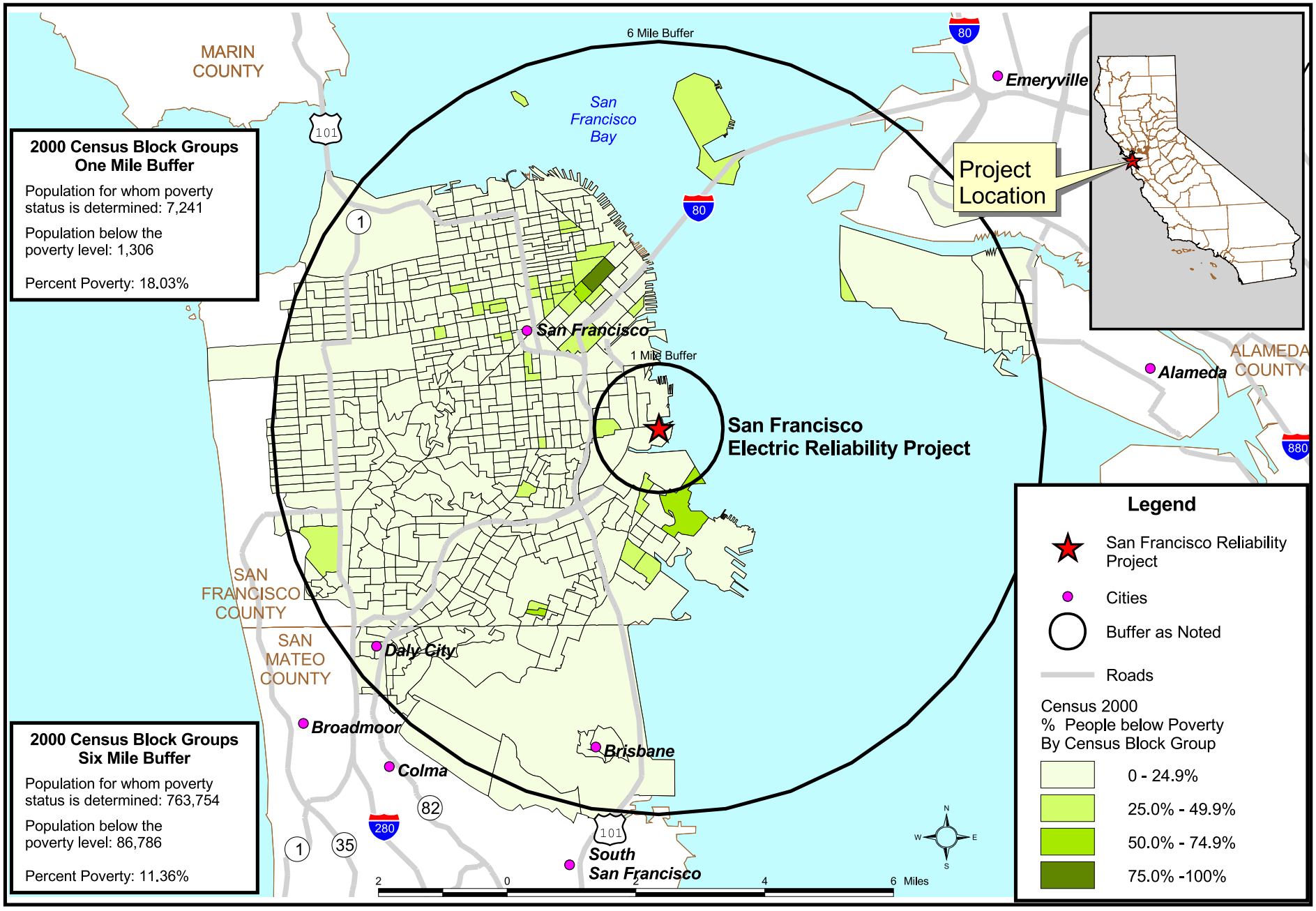


CALIFORNIA ENERGY COMMISSION, SYSTEMS ASSESSMENT & FACILITIES SITING DIVISION, FEBRUARY 2006

SOURCE: California Energy Commission Statewide Transmission & Power Plant Maps 2006, Census 2000 PL 94-171 Data - Matrix PL2

SOCIOECONOMICS - FIGURE 2

San Francisco Electric Reliability Project - Supplement A - Census 2000 Percentage of People below Poverty by Census Block Group - One and Six Mile Buffers



CALIFORNIA ENERGY COMMISSION, SYSTEMS ASSESSMENT & FACILITIES SITING DIVISION, FEBRUARY 2006

SOURCE: California Energy Commission Statewide Transmission & Power Plant Maps 2006, Census 2000 SF3

SOIL AND WATER RESOURCES

Testimony of Mark Lindley, Vince Geronimo, and Philip Luecking

SUMMARY OF CONCLUSIONS

The proposed project would result in a less than significant impact to soil and water resources. The San Francisco Electric Reliability Project would comply with all applicable soil and water resource laws, ordinances, regulations, and standards. Potentially significant impacts would be mitigated through the preparation of various construction and operating plans that would detect and correct any problems relating to soil erosion, contamination to surface and groundwater, use of potable water supplies, or non-compliance with wastewater treatment and discharge requirements.

INTRODUCTION

This section analyzes potential impacts to soil and water resources by the San Francisco Electric Reliability Project (SFERP) proposed by the City and County of San Francisco (applicant). This analysis incorporates information available to staff as of January 29, 2006, and focuses on the following areas of concern:

- whether the project's demand for water could affect surface or groundwater supplies or local groundwater quality;
- whether the existing soil and groundwater contamination at the SFERP site will be adequately accounted for in construction and operational plans to prevent adverse water quality impacts to San Francisco Bay;
- whether construction or operation could lead to accelerated wind or water erosion and sedimentation;
- whether the project's wastewater management practices will lead to degradation of surface or ground water quality;
- whether project construction or operation could lead to degradation of surface water quality or drainage;
- whether the project has taken precautions to avoid adverse surface water impacts during operations, i.e. from flooding; and
- whether the project will comply with all applicable laws, ordinances, regulations and standards.

Where the potential for impacts is identified, mitigation and Conditions of Certification have been proposed.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

SOIL and WATER Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Federal LORS	
Clean Water Act (33 U.S.C. Section 1257 et seq.)	The Clean Water Act (33 USC § 1257 et seq.) requires states to set standards to protect water quality, which includes regulation of stormwater discharges during construction and operation of a facility. These are normally addressed through a general National Pollutant Discharge Elimination System (NPDES) permit. For SFERP, regulation of water quality is administered by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB).
Resource Conservation and Recovery Act	The Resource Conservation and Recovery Act (RCRA) of 1976 (40 CFR Part 260 et seq.) seeks to prevent surface and groundwater contamination, sets guidelines for determining hazardous wastes, and identifies proper methods for handling and disposing of those wastes.
40 Code of Federal Regulations, Part 423	The provisions of this part of the CFR are applicable to discharges resulting from the operation of a generating unit by an establishment primarily engaged in the generation of electricity for distribution and sale which results primarily from a process utilizing fossil-type fuel (coal, oil, or gas) or nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium.
State LORS	
Water Code Section 13260	Requires filing with the appropriate Regional Board a report of waste discharge that could affect the water quality of the state, unless the requirement is waived pursuant to Water Code section 13269.
Water Code Section 13524	Requires that no person shall recycle water or use recycled water for any purpose until water recycling requirements have been established pursuant to this article or a regional board determines that no requirements are necessary.
Water Code Section 13552.6	Specifically identifies the use of potable domestic water for cooling towers, if suitable reclaimed water is available, as a waste or unreasonable use of water. The availability of reclaimed water is determined based on criteria listed in Section 13550 by the State Water Resources Control Board. (SWRCB). Those criteria include provisions that the quality and quantity of the reclaimed water are suitable for the use, the cost is reasonable, the use is not detrimental to public health, and the use will not impact downstream users or biological resources.
Local LORS	
San Francisco Public Health Code, Article 22A	Pursuant to Section 1001 of the San Francisco Public Works Code, the applicant must comply with **Article 22A** of the City and County of San Francisco Public Health Code, formerly known as the Maher Ordinance, which governs development of properties on fill that is known to or is suspected of containing contaminated soils. Under the San Francisco Building Code provisions, applicants for any building or grading permit which involves the disturbance of at least 50 cubic yards of soil shall comply with the requirement for soil sampling and analysis of **Article 22A** of the Public Health Code. This ordinance provides that no building permit application subject to the requirements of this section shall be approved until the Department receives written notification from the Director of Public Health that the applicant has complied with all applicable provisions of **Article 22A** of the Public Health Code, or verification that the requirements have been waived.

San Francisco Building Code, Chapter 3	The San Francisco Building Code (SFBC) adopts Chapter 33 of the Uniform Building Code (UBC) and the California Building Code (CBC), which establishes excavation, grading and erosion control standards. The standards include specifications pertaining to excavation of fills for buildings or structures, grading associated with construction of utilities, and stormwater drainage.
San Francisco Public Works Code, Article 4.1	The discharge of any industrial wastewater to the sewer would normally require approval by the City and County of San Francisco Public Utilities Commission, Bureau of Environmental Regulation and Management for a batch wastewater permit. The permit is issued pursuant to provisions of Sections 120, 124, and 125 of Chapter X (Public Works Code) of Part II of the San Francisco Municipal Code, **Article 4.1**. The purpose of this Article and the City's industrial waste pretreatment program is to protect human health and the environment by preventing the discharge of pollutants into the sewerage system that would: (i) obstruct or damage the system; (ii) interfere with, inhibit or disrupt treatment facilities and processes, or the processing, use or disposal of sludge; (iii) pass through the sewerage system and contribute to violations of regulatory requirements imposed on the City; or (iv) otherwise harm, or threaten to harm human health or the environment. The permit would limit pollutants in the wastewater to acceptable levels and require periodic sampling of the discharge. Permit applications would apply to both normal plant waste discharges and to the disposal for dewatering should the applicant select discharge to the sewer as the method for disposal.
San Francisco Public Works Code, Article 22	**Article 22** requires the installation of dual plumbing and use of recycled water, when it is available, for projects over 40,000 square feet within the reclaimed water area.
San Francisco Public Works Order No. 158170	The Order specifies industrial waste discharge limits on wastewater discharges into the City's sewer system.
San Francisco Bay Plan	The San Francisco Bay Conservation and Development Commission (BCDC) is charged with determining how the future development of the Bay should proceed and with protecting the beneficial uses and preserving San Francisco Bay. The policies, recommendations, decisions, advice, and authority of the SWRCB and SFRWQCB are the basis for carrying out BCDC's water quality responsibilities. The San Francisco Bay Plan was adopted by the Commission in 1968 and forwarded to the California Legislature and the Governor in 1969. Part 3, Water Quality, Policy 3 maintains that soil erosion reduction methods should be incorporated into the design and construction of shoreline projects in order for the Bay to be protected from increased sedimentation.
State Policies and Guidance	
California Constitution, Article X, Section 2	This section requires that the water resources of the State be put to beneficial use to the fullest extent possible and states that the waste, unreasonable use, or unreasonable method of use of water is prohibited.
Title 23, California Code of Regulations, Chapter 15, Division 3	These regulations require that the Regional Water Quality Control Board (Regional Board) issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable.
California Code of Regulations, Title 17	Title 17, Division 1, Chapter 5, addresses the requirements for backflow prevention and cross connections of potable and non-potable water lines.
California Code of Regulations, Title 22	Title 22, Division 4, Chapter 15, requires the California Department of Health Services (DHS) review and approve the wastewater treatment systems to ensure they meet tertiary treatment standards allowing use of reclaimed water for industrial processes such as steam production and cooling water.
California Code of Regulations, Title 23	Title 23, Division 3, Chapter 15, requires the Regional Board issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable. And also Chapter 26, Wastewater Treatment Plant Classification, Operator Certification, and Contract Operator Registration Program which protects public health and the environment by providing for the effective

	operation of wastewater and water recycling treatment plants through the certification of wastewater treatment plant operators.
Resolution 75-58	The SWRCB has adopted policies that provide guidelines for water quality protection. The principal policy of the SWRCB that specifically addresses the siting of energy facilities is the Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling (adopted by the Board on June 19, 1975 as Resolution 75-58). This policy states that fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound. This SWRCB policy requires that power plant cooling water should come from, in order of priority: wastewater being discharged to the ocean, ocean water, brackish water from natural sources or irrigation return flow, inland waste waters of low total dissolved solids, and other inland waters. This policy also includes cooling water discharge prohibitions such as land application.
SWRCB Resolution 77-1	State Water Resources Control Board Resolution 77-1 encourages and promotes reclaimed water use for non-potable purposes.
SWRCB Water Quality Order 92-08	Requires the SWRCB to regulate industrial stormwater discharge from construction projects affecting areas greater than 1 acre to protect state waters. Under Order 92-08 the RWQCB will issue NPDES permits for construction activities based upon an acceptable Storm Water Pollution Prevention Plan (SWPPP) submitted by the applicant.
California Water Code Section 100	Requires the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such water is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare.
California Water Code Section 100.5	Declares to be the established policy of the State that conformity of a use, method of use, or method of diversion of water with local custom shall not be solely determinative of its reasonableness, but shall be considered as one factor to be weighed in the determination of the reasonableness of the use, method of use, or method of diversion of water, within the meaning of Article X, Section 2 of the California Constitution.
California Water Code Section 1254	Specifies that the SWRCB in acting upon applications to appropriate water, shall be guided by the policy that domestic use is the highest use and irrigation is the next highest use of water.
California Water Code Section 13146	Requires that state offices, departments and boards in carrying out activities which affect water quality, shall comply with state policy for water quality control unless otherwise directed or authorized by statute, in which case they shall indicate to the State Water Resources Control Board in writing their authority for not complying with such policy.
California Water Code Section 13247	Requires that state offices, departments, and boards, in carrying out activities which may affect water quality, shall comply with water quality control plans (i.e., Basin Plans) approved or adopted by the State Water Resources Control Board unless otherwise directed or authorized by statute, in which case they shall indicate to the appropriate Regional Water Quality Control Boards in writing their authority for not complying with such plans.
California Water Code Section 13523	Requires that a Regional Board, shall prescribe water reuse requirements for water, which is to be used or proposed to be used as recycled water after consultation with and upon receipt of recommendations from the State Department of Health Services, and if it determines such action to be necessary to protect the public health, safety, or welfare.
California Water Code Section 13550	Requires the use of reclaimed water for industrial purposes subject to reclaimed water being available and upon a number of criteria including: provisions that the quality and quantity of the reclaimed water are suitable for the use, the cost is reasonable, the use is not detrimental to public health, and the use will not

	impact downstream users or biological resources.
California Water Code Section 13552.8	States that any public agency may require the use of reclaimed water in cooling towers if reclaimed water is available, meets the requirements set forth in Section 13550, that there will be no adverse impacts to any existing water right, and that if public exposure to cooling tower mist is possible, appropriate mitigation or control is provided.
SWRCB Resolution 88-63	The Regional Water Quality Control Boards (Regional Boards) shall assure that the beneficial uses of municipal and domestic supply (MUN) are designated for protection wherever those uses are presently being attained, and assure that any changes in beneficial use designations for waters of the State are consistent with all applicable regulations adopted by the Environmental Protection Agency. Where a body of water is not currently designated as MUN but, in the opinion of a Regional Board, is presently or potentially suitable for MUN, the Regional Board shall include MUN in the beneficial use designation. All surface and groundwater of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the Regional Boards with the exception of certain defined surface and groundwater suitable for exception as a source of drinking water.
SWRCB Resolution 68-16	This resolution (the "Anti-Degradation Policy") declares that it is the State's policy for maintaining existing high quality waters to the maximum extent possible. The existing high water quality must be maintained until demonstrated to the State that any proposed change will be consistent with the maximum benefit to the people of the state and will not unreasonably affect present or future beneficial uses.
The California Safe Drinking Water and Toxic Enforcement Act	This Act (California Health & Safety Code Section 25249.5 et seq.) prohibits actions contaminating drinking water with chemicals known to cause cancer or possessing reproductive toxicity. The Regional Water Quality Control Board administers the requirements of the Act.
Recycling Act of 1991 (Water Code 13575 et. seq)	States that retail water suppliers, reclaimed water producers, and wholesalers should promote the substitution of reclaimed water for potable and imported water in order to maximize the appropriate cost-effective use of reclaimed water in California.
Integrated Energy Policy Report (Public Resources Code, Div. 15, Section 25300 et seq)	In the 2003 IEPR, consistent with State Water Resources Control Board Policy 75-58 and the Warren-Alquist Act, the Energy Commission adopted a policy stating they will approve the use of fresh water for cooling purposes by power plants it licenses only where alternative water supply sources and alternative cooling technologies are shown to be "environmentally undesirable" or "economically unsound."

SETTING

The proposed SFERP site is a previously disturbed industrial property. The area immediately surrounding the SFERP site is predominantly industrial. The primary source of cooling and process water for the SFERP will be secondary effluent from the Southeast Waste Water Treatment Plant (SEWWTP) that is treated and disinfected in a wastewater tertiary treatment facility, located on the SFERP site. Potable water will be supplied by the City of San Francisco. City potable water is also proposed to be used as emergency back-up water for the plant when secondary effluent water is temporarily unavailable. Wastewater from the SFERP power plant and tertiary wastewater treatment plant will be discharged to the existing combined sewer system. Stormwater runoff will sheet flow across the SFERP site to a vegetated swale that drains into the San Francisco Bay.

The SFERP site is located near the western edge of San Francisco Bay (Bay), in the Potrero District of the southeastern area of the City of San Francisco (City). The project is to be located on a 4.0 acre site owned by the City with an 8.5 acre construction laydown area immediately to the east of the SFERP site. The construction laydown area is under the jurisdiction of the Port of San Francisco and will be leased by the City. The land uses in the surrounding area are primarily industrial and commercial. The SFERP site is bounded by 25th Street to the north, developed property along the north side of Cesar Chavez Street to the south, undeveloped Maryland Street and the construction laydown area to the east, and the proposed MUNI Metro East Light Rail Vehicle Maintenance and Operations Facility (MUNI site) to the west.

The SFERP site is currently occupied by a portable concrete batch plant and other temporary buildings. All permanent structures have been removed from the SFERP site and all temporary structures will be removed prior to construction. The construction laydown area is currently vacant. The SFERP site and construction laydown areas were historically part of a railway switchyard operated by Western Pacific Railroad (SFPUC 2005a).

The average annual precipitation for San Francisco is 21 inches, with the majority of the rainfall occurring between November and April. Average monthly temperatures range from lows in the mid-40s (°F) to highs in the mid-60s.

Soil

The entire SFERP site, the adjacent construction laydown area, and the proposed linear facilities, are located in soil mapping unit 134 which is described as areas that were formerly part of San Francisco Bay and its adjacent tidal flats. The soil mapping unit is defined as Urban Land-Orthents, Reclaimed Complex, 0 to 2 percent slopes, in the Soil Survey of San Mateo County, published by the Natural Resources Conservation Service (NRCS). The majority of this soil unit is urban land with a smaller portion being Orthents, which are soils consisting of highly variable fill material. The fill material may consist of any combination of soil, gravel, concrete, solid waste and Bay Mud. This soil has a soil capability class of VIII and is not suitable for crop production and there is low erosion potential (SFPUC 2005a). There are no agricultural land uses within the SFERP site or vicinity.

The gas, domestic water, and electrical connections will be made to existing facilities near the SFERP site. The proposed secondary effluent pipeline supplying process water will follow existing roadways and rights-of-way to a connection point 80 feet east of Third Street on Tulare Street (SFERP 2006c).

Soil characteristics of concern at the SFERP site are the potential for a high water table and the potential for subsidence. The high water table could affect excavation activities, requiring dewatering. Subsidence is possible in areas containing mostly fill material and could impact the foundation of the structures at the SFERP site. Given the industrial history of the SFERP site and surrounding properties, soil materials impacted by heavy metals, polynuclear aromatic hydrocarbons and residues from a former manufactured gas plant will be encountered during drilling and excavation activities (SFERP2004a).

Surface Water

There are no surface waters located within the boundaries of the SFERP site or construction laydown area. The two surface bodies of water located in the vicinity of the SFERP site include San Francisco Bay and Islais Creek. The SFERP site is approximately 500 feet from the western shore of San Francisco Bay.

Islais Creek Channel is located less than 1,000 feet to the south of the SFERP site. Islais Creek formerly carried the runoff of several small drainages in the southeast portion of San Francisco to San Francisco Bay including Islais Creek Estuary. Following urban development of the area, Islais Creek and Estuary were filled and the creek was piped such that natural flows were diverted to the combined sewer system. Presently, surface runoff to Islais Creek results mostly from direct runoff from areas adjacent to the creek. The Islais North, Marin Street, and Selby Street combined sewer system overflow structures also openly discharge, or daylight, at Islais Creek. SEWWTP also pipes its treated effluent across Islais Creek to the Bay off of Pier 80.

Flooding and Tsunami

Both the SFERP site and laydown area are relatively flat with surface elevations ranging from approximately 10 feet to North American Vertical Datum 1988 (14 feet NAVD) . The construction elevations of the SFERP site will range from 12 to 14 feet NAVD. The highest recorded tide in the project area is 9.25 feet (SFPUC 2005a), which does not account for wave run-up. The 100-year tide elevation, including the effect of wind-generated wave run-up at MHHW (MHHW = mean higher high water, or the average level of the higher of the two daily high tides) is 13.0 feet above mean sea level. Flooding along the City's San Francisco Bay waterfront has the potential to impact the current SFERP site. The SFERP site may also be impacted by an increase in Bay water levels caused by a tsunami, although the probability of occurrence is low. The San Francisco Community Safety Element indicates that there are no areas prone to surface flooding in San Francisco (SFERP 2004a).

Groundwater

The SFERP site is located within the Islais Creek groundwater basin, which extends from Twin Peaks, approximately 3.5 miles west of the SFERP site to the Bay. The material located beneath the SFERP site is generally fill material placed on top of Bay Mud. The fill material consists of loose sand and gravel locally excavated and man made materials including but not limited to concrete, asphalt, wood, ceramics, and other construction debris. The fill material ranges in depth from approximately 8 to 31 feet below existing grade. The fill is underlain by Bay Mud extending to depths of approximately 50 feet. Stiff sandy silty clay and silty clayey sand extend below the Bay Mud to Franciscan bedrock at a depth of over 200 feet (SFERP 2005p).

Groundwater elevation measurements were taken near the SFERP site during a site characterization of the adjacent MUNI site in 1999. Results of these measurements indicate that the water table is shallow with a depth to groundwater of approximately 6.3 to 7.6 feet below the ground surface. Groundwater generally flows to the east/northeast through the SFERP site with a relatively flat gradient (0.001 to 0.00001 feet/foot)

(SFERP 2005p). It is likely that groundwater will be encountered during some construction activities, which will necessitate dewatering in most cases.

Soil & Groundwater Contamination

Soil and groundwater contamination was found during investigations performed by AGS Inc. in 1999 at the adjacent MUNI site. Because this investigation was not directly applicable to the SFERP site, no direct comparison of soil and groundwater contamination concentrations can be made. However, given the shared industrial history of the area, similar soil contamination is present, and groundwater contamination is probably present at the SFERP site. Results of the sampling found the presence of soil and groundwater contamination at the adjacent MUNI site, (SFERP 2005n). Total petroleum hydrocarbon (TPH) as diesel/motor oil/bunker oil, arsenic, lead, other metals and semi-volatile organic compounds were found in the soil and groundwater at the adjacent MUNI site (SFPUC 2005p).

Groundwater sampling at monitoring wells located west (up gradient) of the SFERP site and near the northeast corner (down gradient) of the SFERP site was conducted as part of the MUNI site investigation. Results of the sampling found low concentrations of TPH compounds, lead, and arsenic to be present in the groundwater both up gradient and down gradient of the SFERP site. These sample results indicate a high likelihood that the SFERP site may have areas of significant soil and groundwater contamination.

A Human Health and Ecological Risk Assessment was conducted for the Western Pacific Property – Port Site in September 2000. This assessment, which included the SFERP Site, suggested that the threat to human health and the environment were within acceptable levels. However, insufficient data was collected from the currently proposed Site to provide an adequate risk characterization.

Geotechnical and environmental samples were collected by SFERP at the subject property in August, 2005. In addition to geotechnical analyses, selected samples were composited and environmental analyses were subsequently conducted on them. Elevated concentrations of contaminants, including arsenic up to a concentration of 460 mg/kg, lead at a concentration up to 2,100 mg/kg, PAHS (that exceed industrial standards) at concentrations up to 17 mg/kg, Bunker C range petroleum hydrocarbons up to 20,000 mg/kg.

SFERP has agreed to conduct further assessment of soil, soil gas and groundwater at the subject property. In addition, SFERP will be required to conduct a Human Health and Ecological Risk Assessment. Only data obtained from the specific subject property will be used for risk assessment and site characterization purposes.

An ecological risk assessment will be required because of:

- Close proximity of the SFERP Site to San Francisco Bay
- Known high concentrations of soil contaminants at the SFERP Site
- Groundwater flow direction; which flows from the SFERP site towards San Francisco Bay

- The high potential for groundwater contamination at the SFERP site

The ecological risk assessment will focus attention on the potential threat of groundwater contamination flowing from the subsurface of the SFERP site to San Francisco Bay. Groundwater samples will be collected at the subject property and analyses conducted for a variety of potential contaminants. From the contaminants identified, the concentrations and chemical properties of these identified contaminants and the soil matrix the groundwater is flowing through, the estimated attenuation and concentration of identified contaminants (once they reach San Francisco Bay) will be calculated. This calculated concentration will be compared with Table F, Environmental Screening Levels, Surface Bodies, "Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater, Volume 1: Summary Tier 1 Lookup Tables"(SFRWQCB, February 2005). If the attenuated concentration is above the contaminant screening value, then further analyses will be required.

Project Description

The SFERP facility operations require water for cooling towers, nitrogen oxide (NO_x) emission control and compressor evaporative cooling. Water is also necessary for equipment washing, potable water, and fire protection.

Staff has received a copy of a will-serve letter from the City of San Francisco Public Utilities Commission, stating up to 500 gallons per minute (0.72 mgd [million gallons per day]) of wastewater can be withdrawn from the City's Combined Sewer System. (SFERP 2006d). The will-serve letter does not describe the SFERP intent to draw secondary treated effluent specifically from the SEWWTP deep-water outfall at Pier 80. The effluent force main supplies water from the treatment plant at varying rates of flow (30–110 mgd) during dry weather conditions.

Staff also has received a will-serve letter from the City of San Francisco Public Utilities Commission stating that an existing 12-inch water main in Cesar Chavez Street is available for potable water (SFERP 2005pp). Potable water demand will meet the Water Department rules and regulations governing water service to customers. Water for fire protection will be served from the City's potable water supply with additional backup from the City's Auxiliary Water Supply System (AWSS). The source of water for the AWSS is City water, but the system is considered to be nonpotable (SFERP 2005n). Fire protection needs would be reviewed by the Department of Building Inspection.

Project Water Treatment

The on-site tertiary water treatment facility would be a fully automated facility, housed in a pre-engineered building at the southeast corner of the SFERP site, adjacent to the power plant. The SFERP tertiary water treatment facility would include ultra-filtration, disinfection, and a single-stage reverse osmosis system. The resultant water will meet Title 22 water quality requirements.

The expected full flow capacity of the tertiary water treatment facility would be 0.6 mgd or 408 gallons per minute. The tertiary water treatment facility would operate continuously, however, the output would vary from zero to 100 percent of capacity depending on current plant demand (SFERP2004g). The applicant proposes the use of

a storage tank for treated water with a capacity of approximately 600,000 gallons. The tank would be sufficient to allow approximately 48 hours of plant operation if the tertiary water treatment facility is temporarily off-line with no new influent water (SFERP2004r and SFERP 2006d). When the treated water storage tank is full, treated wastewater would bypass the storage tank for discharge directly to the combined sewer system (SFERP2004r). Potable water would be used as process water back-up if service from the SEWWTP is interrupted after the stored water is depleted.

The recycled water will primarily be used for cooling towers and air emission control using Oxides of Nitrogen (NO_x) suppression injection and compressor evaporative cooling. The NO_x suppression injection and compressor water will require additional chemical treatment. The NO_x suppression injection and compressor evaporative cooling water will be treated with a second pass of the reverse osmosis system. Wastewater generated by the tertiary water treatment process, reject water from the reverse osmosis system and plant domestic wastewater will be delivered to the City's combined sewer system where it will flow back to the SEWWTP for primary and secondary water treatment.

A certified recycled water operator or a qualified site supervisor shall be assigned to the SFERP tertiary water treatment facility to ensure proper operation in accordance with Title 23 of the California Code of Regulations.

Wastewater and Stormwater

The City of San Francisco (City) is the only major municipality in California with a combined sewer system. This means that throughout the City, domestic sewage, industrial wastewater, and stormwater runoff are collected in the same set of pipes where they are combined and transported to the same wastewater treatment facilities for treatment and disposal. The City combined sewer system is subject to the regulations of, and permitted under, the National Pollutant Discharge Elimination System (NPDES) program of the Clean Water Act for the treatment and disposal of the combined wastewater. However, during wet weather, the NPDES permit indicates that the City's combined sewer system facilities are regulated under the Federal Combined Sewer Overflow Control Policy, and not the same regulations for publicly-owned treatment works or for stormwater as other California municipalities with separate systems.

Wastewater from the SFERP will be discharged to the combined sewer system and treated at the SEWWTP. The combined sewer system is already regulated under the NPDES program for the treatment and disposal of the combined wastewater.

Stormwater runoff from the SFERP site will be regulated under the Port of San Francisco's existing Municipal NPDES permit (SFERP 2005mm and 2005nn). Under the new Port of San Francisco stormwater best management practices, the stormwater generated on the SFERP site will be discharged into the bay through the use of vegetated swales. Stormwater from the SFERP site will sheet flow easterly to a vegetated swale that will flow northward into the bay (SFERP 2005rr).

Water Quality

The quality of the wastewater proposed for discharge from the SFERP into the City's combined sewer system compared to the City of San Francisco's industrial discharge limits is summarized in **Soil & Water Table 2** as follows:

SOIL & WATER TABLE 2
Comparison of SFERP's Wastewater Discharge Quality vs. City Discharge Limits

Constituent	SFERP's Maximum Wastewater Discharge Quality	City Discharge Limits
4,4 DDE	0.006 µg/L	N/A
Arsenic	24.0 µg/L	4.0 mg/L
Cadmium	12.5 µg/L	0.5 mg/L
Chromium	22.1 µg/L	5.0 mg/L
Copper	79.9 µg/L	4.0 mg/L
Cyanide	16.6 µg/L	1.0 mg/L
Dieldrin	5.8 µg/L	N/A
Dissolved sulfides	not available	0.5 mg/L
Hydrocarbon oil and grease	not available	100 mg/L
Lead	5.8 µg/L	1.5 mg/L
Mercury	0.41 µg/L	0.05 mg/L
Nickel	40.8 µg/L	2.0 mg/L
pH, pH units	6.92 – 7.93	6.0 – 9.5
Phenols	N/A	23.0 mg/L
Polynuclear aromatic Hydrocarbons (PAHs)	0.386 µg/L	N/A
Polychlorinated biphenyls	not provided	N/A
Selenium	4.6 µg/L	N/A
Silver	8.6 µg/L	0.6 mg/L
Temperature	80.6°F	125°F
Total recoverable oil and grease	not available	300 mg/L
Total Suspended Solids	not provided	N/A
Zinc	875.5 µg/L	7.0 mg/L

Sources: SFERP 2004a, Tables 8.14-2 and 8.14-8; SFERP 2006e

Additionally the SFERP shall meet the requirements set forth in 40 CFR Part 423 for copper and Polychlorinated biphenyls (PWA 2005b). There shall be no discharge of polychlorinated biphenyl compounds. The federal discharge limits are more strictly regulated than the City's discharge limits with the following effluent limitations cited in 40 CFR Part 423:

Constituent	Effluent Limit (mg/L)
Copper	1.0
Polychlorinated biphenyls (PCB)	0.0

The quality of the disinfected tertiary recycled water supply proposed after tertiary treatment of the SEWWTP reclaimed water is characterized in **Soil & Water Table 3**.

Project Backup Water Supply

Potable water supplied by the City of San Francisco is proposed as emergency back-up water for the plant when reclaimed water is temporarily unavailable. Potable water delivered to San Francisco is from the Hetch-Hetchy water supply system and provided by the San Francisco Public Utilities Commission. The raw water source originates outside the City, with about 85 percent originating from the Tuolumne River watershed in the Sierra Nevada and about 15 percent from local Bay Area watersheds.

SOIL & WATER TABLE 3
Estimated Recycled Water Quality

Constituent	Recycled Water (mg/L except as noted)
4,4 DDE	0.003 µg/L
Alkalinity-Bicarbonate	-
Alkalinity-Total	185
Aluminum	-
Ammonia	<5
Arsenic	2.0 µg/L
Barium	-
Biological Oxygen Demand	<10
Boron	-
Cadmium	0.3 µg/L
Chemical Oxygen Demand	<50
Chloride	150
Chromium	1.3 µg/L
Copper	14.6 µg/L
Dieldrin	0.002 µg/L
Dissolved sulfides	-
Fluoride	-
Hardness-Calcium	-
Hardness-Magnesium	-
Hardness-Total	-
Hydrocarbon oil and grease	<5
Iron	-
Lead	2.5 µg/L
Manganese	-
Mercury	0.02 µg/L
Molybdenum	-
Nickel	3.9 µg/L
Nitrate Nitrogen	15.0
pH, pH units	6.0 - 9.0
Polynuclear aromatic Hydrocarbons (PAHs)	0.16 µg/L
Polychlorinated biphenyls	0.10 µg/L
Potassium	-
Selenium	0.5 µg/L
Silica	13.0
Silver	1.0 µg/L
Sodium	-
Specific conductance, umhos/cm	-
Sulfate	120
Total Dissolved Solids	400
Total recoverable oil and grease	<5
Total Suspended Solids	<3
Turbidity, NTU	0.2
Zinc	61.8 µg/L
Temperature	20 °C

Source: SFERP 2004g, Table 8.14-10

SFERP Site Construction

Construction of the SFERP facility will include soil excavation, grading, and installation of necessary utility connectors to the SFERP site. During site excavation and site construction, it is possible that groundwater will be encountered and dewatering activities may be required. The dewatering water would be discharged to the City's combined sewer system (SFERP 2005n). All excavation and handling of excavated materials at the SFERP site and along the linear connectors would be conducted in accordance with a Site Mitigation and Implementation Plan (SMIP), as required in Soil & Water 7.. A draft SMIP was not available for staff review as of January 30, 2006.

Construction of Associated Linear Features

The construction methods planned for the projects linear features will expose soils and create the potential for erosion resulting from wind and runoff. Natural gas would be supplied to the SFERP via a new connection to an existing PG&E undergound line. The new connector pipeline would be constructed using open trench excavation methods along the proposed alignment (SFERP 2005a, SFERP 2006e). An underground electric transmission line would be constructed from the switchyard in the northwest corner of the SFERP site to the eastern portion of PG&E's Potrero 115 kV Substation switchyard, north of the SFERP site. Trenchless methods would also be used in lieu of open trenching, as feasible. A new potable water supply line would be constructed to connect the SFERP facilities to an existing 12-inch potable water supply line located in Cesar Chavez Street.

A new water supply pipeline would be constructed to deliver treated secondary effluent from the SEWWTP deep water outfall at Pier 80. The waterline will be an 8- to 10-inch pipeline buried along an alignment from the SFERP site that follows: east 70 feet to Maryland Street; 200 feet south to Cesar Chavez Street; west 850 feet to Michigan Street; south 450 feet to Marin Street; west 550 feet to Third Street; then south on Third Street for 400 feet. The water line will tap into a SEWWTP manhole (Manhole #2) 80 feet east of Third Street on Tulare Street. The total linear length of the pipeline is about 2,600 feet. The line will be buried with a minimum cover of 3.0 feet.

The sanitary sewer discharge line and tie-in location were identified in response to informal data request S&W6-8 (SFERP 2005w). A new wastewater discharge pipeline will be installed along Maryland and Cesar Chavez Streets and will tie in to a new 30-inch combined sewer stub out location. A 66-inch combined sewer main on Illinois Street carries wastewater and collected stormwater to the SEWWTP (SFERP 2005hh). This line will likely have capacity for the SFERP waste discharge volume requirements. As planned, no surface water features would be crossed and construction would not result in disturbance to water supplies for these linear features.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

This project was analyzed to determine if it complies with LORS and meet the standards found in relevant documents such as CEQA Guidelines. The threshold of significance is based upon the ability of the project to be built and operated without violating erosion, sedimentation, flood, surface or groundwater quality, water use (supply) or wastewater discharge standards.

The Federal and State LORS and State and Local Policies presented in **Soil & Water Table 1** were used to determine the threshold of significance for this proceeding. The following LORS and State and Local Policies are of particular relevance for determining the significance of a potential impact. For those impacts that exceed the published standards, or do not conform to the established practices, mitigation will be proposed by staff to reduce or eliminate the impact.

- The Clean Water Act requires states to set standards to protect water quality through the regulation of point source and certain non-point source discharges to surface water.
- The Resource Conservation Recovery Act of 1976 seeks to prevent surface and groundwater contamination.
- Under Title 22 of the California Code of Regulations, the Department of Health Services reviews and approves wastewater treatment systems to ensure they meet tertiary treatment standards allowing use of reclaimed water for industrial processes such as steam production and cooling water.
- San Francisco Public Health Code Article 22A governs development of properties located in the filled lands adjacent to San Francisco Bay with respect to hazardous waste materials that could be encountered during construction.
- San Francisco Building Code establishes excavation, grading and erosion control standards.
- San Francisco Public Works Code, Article 4.1 regulates all discharges to the City's combined sewer system.
- San Francisco Public Works Order No. 158170 specifies industrial waste discharge limits on wastewater discharges into the City's sewer system.
- San Francisco Public Works Code, Article 22 requires the installation of dual plumbing and use of recycled water, when available, for projects over 40,000 square feet within a reclaimed water area of the City.

DIRECT/INDIRECT IMPACTS AND MITIGATION

The direct and indirect impact and mitigation discussion presented below is divided into a discussion of impacts related to construction and operation. For each potential impact discussed, the applicant's proposed mitigation is presented and staff's determination of the adequacy of the proposed mitigation is discussed. If necessary, staff presets

additional mitigation measures and refers to specific Conditions of Certification related to a potential impact and the required mitigation measures.

Construction Impacts and Mitigation

Construction of the SFERP facility will include soil excavation, grading, and installation of necessary utility connectors to the SFERP site. Potential impacts to soils related to increased erosion or release of hazardous materials are possible during construction. Potential stormwater impacts could result if increased runoff flow rates and volumes discharged from SFERP increase flooding downstream of the SFERP site. Water quality could be impacted by discharge of eroded sediments from the SFERP site, discharge of hazardous materials released during construction, or migration of existing hazardous materials present in the subsurface soils and groundwater. Potential construction related impacts to soil, stormwater, and water quality including the applicant's proposed mitigation measures and staff's proposed mitigation measures to mitigate those potential impacts are discussed below. Trenchless methods may inadvertently impact existing underground utilities. Care shall be taken by the linear utility construction contractor to locate all underground utilities.

Erosion Potential

Construction activities can lead to adverse impacts to soil resources including increased soil erosion, soil compaction, loss of soil productivity, and disturbance of saturated soils. Activities that expose and disturb the soil leave soil particles vulnerable to detachment by wind and water. Soil erosion results in the loss of topsoil and increased sedimentation of surface waters downstream of the SFERP site or increased sediment load to the sewer system. The magnitude, extent and duration of these impacts would depend on several factors, including the proximity of the SFERP site to surface water, the soils affected, and the method, duration, and time of year of activities. Prolonged periods of precipitation, or high intensity and short duration runoff events coupled with earth disturbance activities can result in on-site erosion, eventually increasing the sediment load within nearby receiving waters. In addition, high winds during grading and excavation activities can result in wind borne erosion leading to increased particulate emissions that adversely impact air quality. With the existing onsite soils significantly impacted by TPH, PAH, and metals, potential impacts related to soil loss could be exacerbated. Therefore, implementing appropriate erosion control measures will help conserve soil resources, maintain water quality, protect property from erosion damage, prevent accelerated soil loss, and protect air quality.

The SFERP site would be constructed on 4.0 acres. An additional 8.5 acres would be disturbed for the construction laydown area. Less than 1.0 acre of soil would be disturbed for installation of linear facilities. During construction activities the SFERP site surface would be stripped of vegetation, gravel or pavement and would have an increased potential for erosion. The laydown area is flat exposed soil that would not require grading and would be covered with gravel. The gravel layer would protect the exposed soil from wind and water and would serve as a mitigation measure to reduce erosion.

The applicant believes that the relatively flat site and surrounding developed areas, and the use of construction best management practices (BMPs) will reduce the potential for

soil loss and erosion to a negligible level. BMPs for SFERP identified by the applicant could include mulching, physical stabilization, dust suppression, berms, ditches, and sediment barriers (SFERP 2005b).

The applicant estimated that between 12.6 to 13.6 tons of soil could be eroded during 10 months construction and between 4.0 and 4.6 tons of soil could be eroded during 2 months of active grading at the SFERP site, the laydown area, and associated linears. With the implementation of BMPs to limit erosion and trap eroded sediments, the applicant estimated that the soil loss from the SFERP site as a result of water erosion could be reduced to existing levels of approximately 0.5 to 0.6 tons per year. However, given the existing TPH, PAH, and metals soil impacts, offsite transport of eroded sediments could lead to significant water quality impacts to the San Francisco Bay.

The Draft Construction Drainage Erosion and Sediment Control Plan/Stormwater Pollution Prevention Plan (DESCP/SWPPP) submitted by the applicant provided erosion control BMPs for addressing soil erosion and treatment control BMPs for trapping eroded sediments eroded during construction. Erosion control BMPs identified by the applicant include:

- Scheduling grading activities during dry weather
- Silt Fences and Fiber Rolls
- Gravel Bag Berms and Sand Bag Barriers
- Straw Mulch
- Street Sweeping
- Stock Pile Management
- Dust Control

Staff agrees that proper application of BMPs can reduce the impact to soil resources from water erosion to a level that is less than significant. Conformance with the procedures in an approved DESCP will limit erosion and migration of impacted soils from the SFERP site into the San Francisco Bay and/or the City's combined sewer system. Staff has reviewed the revised draft SWPPP for Construction Activity and the requirements of San Francisco Public Health Code Article 22A and San Francisco Public Works Code Article 4.1. These documents and codes require the applicant to mitigate for, test and monitor soil and runoff from the SFERP site. Sedimentation control measures such as barriers or fiber rolls will be installed at locations where offsite drainage is possible, however, barriers will not surround the entire SFERP site. The BMPs to mitigate soil erosion including silt fence, sand bags, hay bales, geotextiles, fiber rolls, dust control, and stockpile management. The applicant shall also use care when identifying the vehicle wash locations to ensure that the runoff from the wash process does not impact adjacent properties or the Bay. In addition, scheduling grading activities during the dry months between May and September would limit potential erosion related impacts to negligible levels.

Because adequate steps will be taken as part of the design review process (specifically, the development of a DESCP) consistent with **SOIL & WATER-1**, staff believes that soil

loss and erosion will not cause a significant impact for the proposed SFERP during construction.

Wind erosion can also lead to adverse soil impacts through the loss of topsoil, and fugitive dust from SFERP site grading can lead to adverse impacts to air quality due to increased suspended particulate matter. The applicant proposes to employ BMPs including watering the SFERP site at least twice daily and enclose, cover, water, or treat soil stock piles to limit soil loss due to wind erosion (SFERP 2005a). The applicant estimated that soil loss due to wind erosion during grading and construction would result in approximately 6.7 tons of PM10 emissions (PM10 refers to suspended particulate matter less than 10 microns in diameter) without the proposed BMPs. With the proposed BMPs, the applicant estimated that PM10 emissions would drop to approximately 2.6 tons.

The mitigated soil loss would reduce adverse soil impacts to less than significant level. However, given the proximity of the SFERP site to surrounding industrial and commercial properties that currently experience impaired air quality, the increase in PM10 emissions from wind erosion could lead to adverse cumulative air quality impacts. These air quality impacts could be further exacerbated by hazardous materials contained in soils, including TPH, PAH, and metals. To limit the potential for impacts related to wind erosion, the applicant will need to adhere to the requirements of Conditions of Certifications **AIR QUALITY AQ-SC 2, AQ-SC 3, and AQ-SC 4** including:

- Preparation of an Air Quality Construction Mitigation Plan (AQCMP),
- Continuously monitoring for dust emissions and implementing more intensive and additional measures of dust suppression when necessary during construction, and
- Submission of a monthly compliance report during construction.

If the requirements of Condition of Certification **AIR QUALITY AQ-SC 2, AQ-SC 3, and AQ-SC 4 are** met, staff believes that the impact to soil resources and air quality from wind erosion would be reduced to a level that is less than significant.

Soil Contamination

The SFERP will have to meet the requirements of Article 22A of the San Francisco Public Health Code. This is because the SFERP site is located on filled land adjacent to the San Francisco Bay, with known contaminated soils on site, and potentially contaminated groundwater. The requirements of Article 22A are summarized in Supplement A, Section 8.9.4.2.1 (SFPUC 2005a). The status of activities the applicant will undertake to comply with Article 22A are summarized as follows:

- The applicant plans to utilize existing SFERP site history reports prepared for the MUNI site located adjacent and west of the SFERP site and plans to prepare a site history for the project site and portions of the wastewater line that are bayward of the historic high tide line (SFERP 2005a).
- The applicant plans to utilize previous reports on existing soil investigations conducted at the MUNI site located adjacent and west of the project site, and plans

to conduct a site-specific soil, soil gas, and groundwater analyses and provide related reports for the SFERP site and along the linear alignments (SFERP 2005a).

- Once the SFERP site-specific soil, soil gas, and groundwater analyses have been completed and reported; and the human health and ecological risk assessment(s) have been completed and reported, the applicant will complete a SMP.
- The Certification Report will be submitted to the San Francisco Department of Public Health (SFDPH) and the SFBRWQCB (SFERP 2004g).

The applicant stated in the AFC and the Draft SWPPP that it will manage excavated material in accordance with the Site Mitigation and Implementation Plan (SMIP) (SFERP 2005a and 2005m). The SMIP should be prepared consistent with **SOIL & WATER-6** and **WASTE-7.** A deed restriction currently in place for the MUNI property that requires compliance with a SFERP site specific Risk Management Plan and Safety Management Plan (RMP/SMP) will need to be extended to the SFERP site (**WASTE-7**). The RMP/SMP will include the following items: 1) an assessment of potential environmental and health and safety risks; 2) recommendations for mitigation measures, if any are necessary, that would be protective of workers and visitors to the SFERP facility; 3) recommendations for mitigating the risks identified; 4) identification of appropriate waste disposal and handling requirements; and 5) criteria for on-site reuse of soil. The recommended measures will prevent the spread of any contaminated soil or groundwater if encountered during construction (SFERP 2005a).

Upon completion of earth-disturbing activities, the applicant would prepare a Certification Report consistent with **SOIL & WATER-7** stating whether all mitigation measures recommended in the SMIP have been completed and how completion of the mitigation measures were verified through follow-up soil sampling and analysis, if required. Also see **WASTE-7** for more information on SMIP Condition of Certification, and **WASTE-1, 2, and 5** for requirements related to the potential for hazardous materials to be encountered during construction grading and earthmoving activities.

In addition to Condition of Certification **SOIL & WATER-1, 6 and 7** described above, **SOIL & WATER-2 and 3** have also been included to ensure impacts to soil resources are mitigated. **SOIL& WATER-2** requires the project owner to prepare a Storm Water Pollution Prevention Plan (SWPPP) for all project features including the SFERP site, laydown area and linear features, and to file notice to the Regional Water Resources Control Board that it intends to support construction activities at the laydown area under a General NPDES Permit for Stormwater Discharges Associated with Construction Activity. Implementation of the SWPPP would prevent dispersion of any pollutants from stormwater runoff to soils, San Francisco Bay and to the City's combined sewer system. **SOIL & WATER-3** requires the project owner to comply with the requirements found in San Francisco Public Works Code, Article 4.1, which is overseen by the City Bureau of Environmental Regulation and Management. The project owner must ensure any discharges are in accordance with San Francisco Public Works Code, Article 4.1 for discharge of non-hazardous wastewater during construction.

With the implementation of these Conditions of Certification**,** staff concludes that the project will mitigate the construction impacts to soil resources.

Stormwater Runoff and Surface Water Quality

Potentially significant water quality impacts could occur during construction excavation and grading activities if contaminated or hazardous soil or groundwater, or other hazardous materials used during construction were to contact stormwater runoff and drain offsite into San Francisco Bay or to the City's combined sewer system. Water quality could also potentially be diminished if the stormwater drainage pattern concentrates runoff in areas that are not properly protected with best management practices causing erosion of soils into the City's combined sewer system or San Francisco Bay.

The SFERP site is currently unpaved and partially covered by vegetation and gravel so that stormwater runoff either percolates into the soil or flows overland offsite where it drains to the Bay.

Prior to construction, the applicant would be required to develop and submit for review to the City, a Drainage, Erosion and Sediment Control Plan (DESCP) outlining a strategy to prevent the off-site migration of sediment and other pollutants and to manage runoff from the construction site to the combined sewer system.

During construction, the City would conduct periodic inspections to ensure compliance with the DESCP. The City's pollution prevention program requires best management practices to minimize the amount of pollutants carried by stormwater to the combined sewer system.

Staff believes that the volume of stormwater runoff will increase as a result of construction activities. The 4.0-acre SFERP site is currently unpaved. SFERP site construction would alter the existing drainage patterns and ultimately result in 100 percent impervious surface resulting in increased runoff volumes. No significant change would occur to the 8.5-acre laydown area, as it will be covered by gravel that may be removed or left in place following construction, to reduce erosion. Stormwater runoff from the 8.5-acre project laydown area, which currently drains into San Francisco Bay, is not expected to cause an adverse effect to water quality because there is no excavation or grading proposed for the laydown area that could encounter contaminated soils or groundwater.

Because the SFERP site would discharge stormwater runoff to the Bay, the project owner must comply with the General NPDES Permit and the Stormwater Management Plan held by the Port of San Francisco. The NPDES Permit regulates stormwater effluent limitations, specifies monitoring and reporting requirements, and requires preparation and implementation of a SWPPP for construction activities. In the draft DESCP/SWPPP, the applicant indicates that stormwater runoff will be discharged to the Bay following an unidentified filtration BMP. The applicant indicates that the details of the specific drainage and treatment control BMPs will be addressed in more detailed DESCP/SWPPP prepared in compliance with **SOIL & WATER 1 & 2**.

Because of existing significantly impacted SFERP site soils, additional treatment of runoff may be required to limit discharge of soils from the SFERP site. Staff believes that treatment control BMPs, possibly including multiple tank media filtration prior to

discharge to the San Francisco Bay, may be required to limit potential erosion related water quality impacts. The final treatment control BMP should allow for the collection of stormwater runoff and testing prior to discharge to the Bay to determine if runoff contains elevated levels of pollutants including metals, TPH, and PAHs. In the DESCP/SWPPP, the applicant shall identify additional treatment measures that may be utilized if the final treatment control BMP does not prove to be adequate to protect water quality in San Francisco Bay. Preparation and implementation of the DESCP/SWPPP for Construction Activities in compliance with **SOIL & WATER-1 & 2** for all project elements, including the SFERP site, laydown area, and linear facilities, would assure that stormwater runoff would not affect water quality to either San Francisco Bay or the City's combined sewer system.

Groundwater data from the SFERP site is limited, with groundwater characteristics such as depth, flow, and direction, limited to studies conducted for adjacent sites, or that included the specific 4-acre SFERP site in a broader groundwater study. It is known that groundwater below the SFERP site is currently impacted by TPH, PAH, and metals. Staff's concern is that these and possibly other contaminants in groundwater below the SFERP site could be discharged to San Francisco Bay. The discharge of these contaminants to San Francisco Bay could potentially impact surface water quality and consequentially marine life. The ecological risk assessment for the adjacent MUNI Site calculated a risk threshold value of 0.75. A risk threshold of 1.0 is considered significant. The Muni ecological risk assessment was conducted on a site located at a considerable distance further than the current subject SFERP site. In addition, contaminant concentrations located at the MUNI site were considerably lower than those identified at the current SFERP subject site. The SFERP site is approximately 220 feet from San Francisco Bay. The applicant will prepare an ecological risk assessment. If a significant risk is identified from the ecological risk assessment to marine habitat in San Francisco Bay, from groundwater and soils located at the SFERP site, then mitigation measures will be required to lower the risk to less than significant. Mitigation measures will be presented in the SMIP.

Construction Wastewater

Construction wastewater generated onsite may include stormwater runoff, groundwater from dewatering, equipment washdown water, and water from pressure testing the service utilities. Improper handling or containment of construction wastewater could cause a broader dispersion of contaminants to soil, groundwater or surface water. A potential significant impact to water quality during the course of construction could result from stormwater runoff encountering contaminated soil or groundwater during excavation and grading activities. Stormwater runoff from contaminated areas may diminish the quality of stormwater entering the City's combined sewer system or San Francisco Bay. This discharge could contain increased pollutant levels over the current conditions, and could include constituents considered hazardous.

SFERP has proposed to comply with the Risk Management Plan/Site Management Plan (RMP/SMP), which is approved by the San Francisco Bay RWQCB for the adjacent MUNI property under San Francisco Public Health Code, Article 22A. Staff recommends the project owner be required to provide evidence to the CPM that the City and the SFBRWQCB have agreed to extend the MUNI RMP/SMP to the SFERP site prior to site

mobilization as specified in condition of certification **WASTE-7**. No significant impacts to water resources are expected from the discharge of construction water provided Conditions of Certification **SOIL & WATER-7** and **WASTE-7** have been met.

During construction, construction wastewater and stormwater runoff will be managed to maintain compliance with the required Drainage, Erosion and Sediment Control Plan and Construction SWPPP, consistent with Conditions of Certification **SOIL & WATER-1** and **SOIL & WATER-2**, respectively in addition to compliance with the requirements of the RMP/SMP. The RMP/SMP requires sediment and erosion controls to prevent soil runoff, using best management practices. Groundwater construction dewatering and other construction wastewater such as equipment washdown water are required to be controlled for subsequent offsite disposal under the RMP/SMP (SFERP 2005a). The discharge of any non-hazardous or hazardous wastewater during construction other than stormwater must be in compliance with City regulations for discharge to the combined sewer system. Hazardous wastes generated during construction will be contained and moved daily to the 90-day hazardous waste storage area, located on-site.

The following Condition of Certification will assure that there is no significant degradation to water quality resulting from stormwater and construction dewatering flows. **SOIL & WATER-1** requires planning and implementation of best management practices for grading and erosion control during construction and will be further described in the applicant's SFERP site specific Drainage, Erosion and Sediment Control Plan. **SOIL & WATER-2** requires the project owner to prepare a Storm Water Pollution Prevention Plan (SWPPP) for all project features including the SFERP site, laydown area and linear features, and to file notice to the State Water Resources Control Board that it intends to support construction activities at the laydown area under a General NPDES Permit for Stormwater Discharges Associated with Construction Activity.

SOIL & WATER-6 requires the project owner to submit for comment to the San Francisco Department of Public Health and SFBRWQCB its Site Mitigation and Implementation Plan (SMIP) for treating contaminated soil and water should it be encountered during project construction. The SMIP is to be prepared in accordance with San Francisco Public Health Code Article 22A. **SOIL & WATER-7** requires the project owner to prepare a Certification Report stating that all mitigation measures recommended in the SMIP have been completed and that completion of the mitigation measures has been verified through follow-up soil sampling and analysis, if required.

Approval and implementation of these plans consistent with Conditions of Certification **SOIL & WATER-1, 2, 3, 6 and 7** will mitigate potential erosion, sedimentation or contamination impacts to water quality to less than significant levels and will be consistent with the Clean Water Act and the City and County of San Francisco's LORS.

Operation Impacts and Mitigation

Operation of the SFERP could lead to potential impacts to soil, stormwater runoff, water quality, water supply, and wastewater treatment. Soils may be potentially impacted through erosion or the release of hazardous materials used in the operation of the

SFERP. Stormwater runoff from the SFERP site could result in potential impacts if increased runoff flowrates and volumes discharged from the SFERP site increase downstream flooding. Water quality could be impacted by discharge of eroded sediments from the SFERP site, discharge of hazardous materials released during operation, or migration of existing hazardous materials present in the subsurface soils and groundwater. Water supply for plant processes and cooling could lead to potential impacts to existing water sources. Wastewater discharge to the SEWWTP could lead to potential impacts if SFERP discharges wastewater with constituent concentrations beyond the City's discharge limits. Potential impacts to soil, stormwater, water quality, water supply, and waste water related to the operation of the SFERP including the applicant's proposed mitigation measures and staff's proposed mitigation measures to mitigate those potential impacts are discussed below.

Soil

During operation of the SFERP, the entire SFERP site would be covered with impervious material or landscaped so that no soil is exposed. The construction laydown area would be graveled to prevent erosion and returned to the Port of San Francisco. Soil impacts and the potential for soil erosion will not be significant.

Surface water

Stormwater

During operation, the SFERP site will be generally flat, with paved or landscaped surfaces. The SFERP site slopes gently toward the San Francisco Bay. Construction of the facility would redirect all non-contact surface flows to a vegetated swale that discharges to the Bay.

The 4.0-acre SFERP site would be covered by 100-percent impervious surfaces with a small amount of landscaping. The quantity of post-condition runoff from the SFERP site would exceed pre-construction runoff due to the lack of infiltration at the SFERP site. The increased runoff would not be reduced to pre-project conditions before sheet flowing offsite.

The CCSF has proposed a vegetated swale to transport runoff to the San Francisco Bay and provide water quality treatment. The vegetated swale has been designed to meet water quality requirements and allow peak flow conveyance to the Bay resulting from a 100-year event. The vegetated swale sizing calculations meet the flowrate based sizing criteria for water quality treatment as defined in the California Stormwater BMP Handbook. However, the swale must maintain a minimum of 100-feet of vegetated linear alignment downstream of the northwest corner of the SFERP site to achieve the appropriate hydraulic residence time of 10 minutes as defined in the California Stormwater BMP Handbook. The drainage and swale design presented in the DESCP should reflect the minimum 100 feet of vegetated swale length to meet the BMP guidelines.

The CCSF has also provided calculations that show the vegetated swale will convey the 100-year peak event from the onsite and contributing area to the Bay. The riprap portion

of the swale near the existing shoreline protection has been designed to protect the swale from the 100-year peak discharge.

The Bay Conservation and Development Commission (BCDC) has reviewed and accepted the vegetated swale design. However, BCDC has indicated that the proposed riprap in the 100-foot shoreline band could reduce future public access to and along the shoreline of the Bay. BCDC does not currently have any public assess facilities in this area. However BCDC has requested that the project owner implement a crossing over the swale outfall to accommodate public access if BCDC extends access facilities in this area in the future. The project owner, if requested by the BCDC or the Port of San Francisco, shall implement a culvert or bridge, to accommodate continuation of the San Francisco Bay Trail or BCDC-required shoreline access across the outfall without impeding stormwater flow from the SFERP site. The conveyance shall be consistent with all applicable requirements of the BCDC, Port of San Francisco, and the San Francisco Bay Regional Water Quality Control Board (RWQCB). Condition of certification **SOIL & WATER- 12** has been established in the event the BCDC or the Port of San Francisco notifies the project owner that a proposed segment of the San Francisco Bay Trail or BCDC-required shoreline access is to be located across the outfall of the SFERP stormwater swale (BCDC, 2005).

The Port of San Francisco has also reviewed and accepted the vegetated swale design in concept. The Port of San Francisco has also acknowledged the facility's operational compliance would be addressed under various elements of the Port's Municipal NPDES permit, including the requirement for installation of the vegetated swale. Condition of Certification **SOIL & WATER- 9** requires that the SFERP prepare a SWPPP for operational activities, including monitoring and testing requirements to ensure that there are no significant impacts or conveyance of pollutants to the Bay. There are no other surface-drainages on or near the SFERP site that will be impacted by the project.

Plant Drainage

Miscellaneous plant drainage would consist of process water drainage, equipment leakage, and drainage from facility containment areas. Water from those areas would be collected in a system of floor drains, sumps, and pipes within the SFERP and discharged to the future MUNI facility storm drainage collection system which ultimately drains to the San Francisco Combined Sewer System. Oil and water separators have not yet been proposed for discharged water from the facility containment areas. However, discharge from the plant shall meet the limitations for industrial discharges as stated in the San Francisco Public Works Code, Article 4.1, and oil and water separators may be required to meet the limitations. No significant water impacts are expected due to runoff from the plant drainage if the project owner meets condition of certification **SOIL & WATER-8**.

Hazardous materials would be stored within secondary containment to prevent any potential for dispersion of any chemical spills by stormwater (SFERP2004r). Condition of certification **SOIL & WATER-9** requires the project owner to prepare a SWPPP for operational activity, to include monitoring and testing requirements, and ensure there are no significant impacts or conveyance of pollutants to the City's combined sewer system or the San Francisco Bay.

Flooding, and Tsunami

The applicant does not believe the SFERP site is within a flood or tsunami zone. The SFERP site would be established at an elevation of approximately 13 feet above mean sea level and approximately 200 feet from the shoreline. The applicant has stated that the highest tide recorded near the project area is less than 9.5 feet above mean sea level (SFPUC 2005a). The highest tide recorded does not take into account wave runup. The 100-year tide elevation, including the effect of wind-generated wave runup at MHHW (MHHW = mean higher high water, or the average level of the higher of the two daily high tides) is 13 feet above mean sea level (Mirant 2000). Under these Bay conditions the SFERP site is effectively at the flood elevation. The SFERP site will sustain some flood protection from the 200 feet distance from the shore to the plant.

A map of the 100-year flood plain is not available from the City of San Francisco or the Federal Emergency Management Agency (FEMA) (PWA 2005c). Information in the AFC regarding potential flooding was developed based on studies performed for a previous application, at the previous project site, and cited in the Potrero Power Plant, Unit 7 AFC. The information from the Potrero Power Plant, Unit 7 site is applicable and appropriate for use at the SFERP site. A review of the FEMA records indicates that San Francisco is not listed as a Special Flood Hazard Area. Additionally, the City and County of San Francisco are not part of FEMA's National Flood Insurance Program. The San Francisco Community Safety Element indicates that there are no areas prone to surface flooding in San Francisco (SFERP 2004a).

The restriction to San Francisco Bay formed at its entrance at the Golden Gate as well as the size of the Bay, serve to dampen and minimize effects from tsunami that could occur from incoming ocean waves. Based on this, the potential for flooding from adverse Bay conditions at the SFERP site is low. If the 100-year tsunami event occurred at the same time as the 100-year tide, the total run-up would be 18.5 feet, which would present a problem at the proposed SFERP site (SFERP 2004g).

Groundwater

Depth to groundwater was described at approximately 6.3 to 7.6 feet below ground surface (SFERP 2005p). The project will not use ground water as a source. The project would require minimal grading. The project building foundations may slightly impact shallow groundwater flow, since groundwater may have to flow around or beneath the building foundations.

The SFERP site will be paved with asphalt and/or concrete to cap existing soil contamination. This paved cap will minimize groundwater recharge at the SFERP site and limit transport of existing soil contamination via rainfall infiltration and percolation.

Water Quality

Activities at SFERP would have minimal potential to impact groundwater resources in the project area. The entire SFERP site would be covered with impervious surfaces after construction. Stormwater runoff from the hazardous materials containment portions of the plant site will be collected in storm drains and discharged to the City's combined

sewer system. No underground chemical storage tanks are proposed at the project site. No releases of contaminated stormwater from the plant site are expected.

Spill Prevention

Solid wastes and small amounts of hazardous waste that are generated would be properly accounted for, tracked, handled, and disposed of off-site using licensed transporters and disposal facilities. No significant impacts to groundwater resources are expected from the operation of the SFERP project.

Water Supply

SFERP will use both potable and non-potable water resources for plant operations. The primary process water for the SFERP would be disinfected tertiary treated recycled water produced onsite from secondary effluent reclaimed from the City's SEWWTP. The SEWWTP effluent force main located at Pier 80 would provide sufficient capacity for the process water according to a Will-Serve letter from the City of San Francisco Public Utilities Commission, Water Pollution Control Plant that states up to 500 gallons per minute can safely be withdrawn (SFERP 20064d). Use of reclaimed water satisfies State and Local Policies related to conserving potable water supplies.

Reclaimed Water

The City and County of San Francisco owns and operates the SEWWTP (also known as the Southeast Water Pollution Control Plant) near Third Street and Jerrold Avenue that treats wastewater from the eastern side of the City. This facility treats wastewater generated by two-thirds of the City's citizens. The plant also treats most of the commercial (downtown) wastewater, as well as the bulk of all industrial discharges. SEWWTP can provide primary treatment for up to 250 mgd. The plant can treat roughly 110 mgd of wastewater using secondary treatment facilities. The secondary effluent is discharged to the Bay through a deep water outfall that crosses Islais Creek near Third Street and enters the Bay from Pier 80. Manhole #2 along this effluent line will be tapped to provide reclaimed water to SFERP. The hydraulic pressure in this 60" pipe varies from no pressure up to 20-plus feet of head. The detailed design method for withdrawal has not been determined.

Water use at SFERP is anticipated to average 318 gallons per minute (gpm) with a maximum of 409 gpm required from the City's SEWWTP outfall system (Figure 8.14-2 revised 1-11-06, SFERP 2006d) for process water and equipment wash water. Of that drawn from the secondary effluent line, an average of 185 gpm and a maximum of 229 gpm will be discharged to the atmosphere for evaporative cooling and an average of 133 gpm and a maximum of 180 gpm will be discharged to the combined sewer system.

Alternative Water Sources

The applicant discussed alternative water sources in the context of compliance with Policy 75-58 (SFERP 2005a). The applicant considered the following alternative water sources:

- Wastewater being discharged to the ocean. Treated wastewater from the Oceanside Water Treatment Plant, which discharges to the ocean, was dismissed as an impractical alternative water source because the plant is seven miles away from the

SFERP site. Wastewater being discharged from the SEWWTP at Pier 80 was dismissed as an alternative water source due to the high salinity levels. The high saline content results from infiltration into the sanitary sewers near the Bay.

- Wastewater stored in the City's Combined Sewer System. The initially proposed SFERP source water was to be collected from the City's combined sewers located at higher elevations that are not subject to bay water infiltration (SFERP Data Response 6a). After an economical refinement of the treatment process it was determined by SFERP to reclaim water from the City's SEWWTP secondary effluent outfall to the San Francisco Bay.
- Ocean. Ocean water was also dismissed as a not practical alternative water source because the Pacific Ocean is seven miles away from the SFERP site.
- Brackish water from natural sources or irrigation return flow. Bay water was dismissed as a potential alternative water source because of potential thermal impacts of discharges of process water to the San Francisco Bay and the complication of construction of shoreline infrastructure. In addition, use of Bay water would require an individual NPDES permit and approval from the Bay Conservation and Development Commission (BCDC). The alternative of using wastewater and the preferred alternative of using reclaimed secondary effluent were determined to have fewer potential impacts and fewer permitting requirements than using Bay water.
- Other inland waters. No other inland water sources, including groundwater, were available in sufficient quantities to provide a reliable water supply for the SFERP.

Potable Water

SFERP would use potable water delivered to San Francisco from the Hetch Hetchy Water Supply System. One domestic use tap would connect into the existing SFPUC 12 inch waterline in Cesar Chavez Street (SFERP 2005pp). The SFERP anticipates 1,440 gallons per day for potable plant service water (SFPUC 2005a). In addition SFERP is anticipated to use an average of 2 gpm and a maximum of 4 gpm of potable water for domestic uses (Figure 8.14-2 revised 1-11-06, SFERP 2006d). Potable water would also be used to perform the hydrostatic testing for each pipeline. SFERP estimates that 30,000 gallons would be used to pressure test the facilities (SFPUC 2005n).

Scheduled disruptions in the Title-22 recycled water delivery or production processes are not anticipated but unscheduled disruptions could occur. The tertiary water treatment process may be disrupted by power failure, maintenance requirements, interruptions in the supply of secondary effluent, or catastrophic events. These unplanned/unscheduled situations are unlikely but may require the use of emergency backup water supply provided from the City's potable service 8-inch main in 23rd Street (SFERP 2004u, SFERP 2006d) while reclaimed water production is disrupted. The potable water is subject to availability from the distribution facilities. The project owner shall use the capacity of the storage facilities to draw water from the City's potable supply only during hours of low demand. The July 7, 2005 will-serve letter from SFPUC does not state the capacity of the local water main to meet peak emergency, potable-backup-water use, nor does the letter state limits to potable water resources.

Given existing potable supply limitations, the reasonableness of using potable water as a back-up supply was evaluated. The use of emergency backup water by the power plant results in competing resources as power is supplied to the City at the same time the City's potable water resources are being exploited. Reasonable costs for emergency backup water supply were evaluated based on the demand for reliable power, total project water requirements, and the evaluation of emergency backup compared to alternatives.

- Energy conservation efforts will help to reduce the demand for power generation and conserve the amount of potable water being used as backup, during planned and unplanned reclaimed water supply outages. The project owner, working with the SFPUC shall employ any reasonable conservation methods to reduce the energy demand when the supply of reclaimed water will be interrupted for more than one week.
- The average annual recycled water use is estimated at 132 acre-feet. Over a three-year period the average water use would be roughly 400 acre-feet. Condition of certification **SOIL & WATER-11** requires that the SFERP monitor the use of potable water throughout a three-year term and limit their potable backup use to 50 acre-feet. This volume will extend the average daily operation time by 47 days based on the average daily use (Table 8.14-6 SFPUC 2005a). This recommendation establishes approximately 90% reliability criteria for the power plant's tertiary water treatment facility and reclaimed water source to function properly over any three-year period. This recommendation is an adaptive limit that should be reevaluated annually for potential alternative water sources that would reduce this limit over the life of the SFERP.
- Several alternative water sources have been identified in the AFC, Supplement A, and in response to staff data requests (SFERP 2004a, SFPUC 2005a, SFERP 2005u). However, the applicant has identified all other local water sources as impractical. Alternative water sources may become available in future years and this could reduce the power plant's reliance on potable water but they are not currently available.

In the exceptional case of a severe drought, the reliability of potable water sources can be affected by the power plant's consumption. The City's energy needs should be compared against a high cost of using potable water as a backup solution.

In abiding by the condition of certification **SOIL & WATER-11**, the applicant is in compliance with LORS and has reduced any potential impact to fresh water to less than significant levels. The annual volume of potable water used by SFERP for plant operations shall not exceed 50 acre-feet over any three-year period. The project owner will notify the CPM in writing if potable water is used for cooling purposes and provide an explanation of why backup supplies are being used.

Recycled Water

Non-potable reclaimed water from the SEWWTP secondary effluent line would be processed on site to create a recycled water source. The recycled water would be used for cooling tower makeup, other process water, and equipment wash water. The recycled water must meet the California Code of Regulations, Title 22, Division 4

requirements for “unrestricted use.” All recycled water pipelines, storage tanks, and ancillary facilities will be constructed in compliance with Titles 17 and 22. Title 17 addresses the requirements for backflow prevention and cross connections, while Title 22 addresses public health and use restrictions.

On an annual basis the applicant indicates that SFERP will use an average of 132 acre-feet and a maximum of 162 acre-feet of recycled water based on 12,000 hours of turbine operation (figure 8.14-2 revised 1-11-06 and table 8.14-6, SFERP 2005a and SFERP 2006d).

The disinfected tertiary recycled water produced from reclaimed water could pose a public health hazard if not treated to adequate standards for water quality during plant operations or if tertiary treatment wastes are not properly handled. The proposed SFERP tertiary water treatment facility for producing disinfected tertiary recycled water will be designed and operated according to Title 22 standards. Condition of certification **SOIL & WATER-5** requires the project owner to prepare an Engineer’s Report for the production, distribution, and use of recycled water at SFERP, and to obtain review and comment from the State Department of Health Services and SFBRWQCB which typically approve wastewater recycling plants (DHS 2004a). The Engineer’s Report will demonstrate the adequacy of the proposed reclaimed water treatment processes and the compatibility of water quality with the proposed uses.

Dual plumbing would be used to substitute reclaimed for potable water for toilet flushing. **SOIL & WATER-4** requires the project owner to file and request review by the San Francisco Department of Public Works its plans for installing dual plumbing at the SFERP utilizing disinfected tertiary recycled water for plant service needs not requiring potable water. The Dual Plumbing plan is to be prepared in accordance with San Francisco’s Public Works Code Article 22, and may be consolidated if practical with the Engineer’s Report for the Production, Distribution and Use of Recycled Water at the SFERP as required under **SOIL & WATER-5**. The project owner shall identify the site supervisor by name and provide their qualifications to the CPM. Also refer to **SOIL & WATER-10** for additional information on non-potable use requirements.

The City’s Auxiliary Water Supply System (AWSS), a non-potable, high-pressurized source may be tapped at the fire hydrants off Third Street for use for fire flows only. In the event that water from the AWSS is needed, the San Francisco Fire Department will run hoses overland and use a pumper truck to deliver water to the facility.

Water Metering Devices

This project is required to submit water use data in condition of certification **SOIL & WATER-10**.

In order to complete this task, the SFERP project owner shall install and maintain metering devices as part of the water supply and distribution system to monitor and record water use from the primary and secondary sources for cooling water, domestic and sanitary water, and other water uses. Also, source flow rate and hours of operation shall be tracked and reported. The metering devices shall be operational for the life of the project. An annual summary of water use by the SFERP, differentiating between

potable and non-potable water, shall be submitted to the CPM in the annual compliance report. This condition of certification is required as part of **SOIL & WATER-10**.

Wastewater Discharge

The SFERP would generate plant wastewater from discharges from cooling tower and process blowdown, backwash water from ultra filters, sanitary wastewater, and reject water from reverse osmosis unit. Disposal of this wastewater would be through a discharge from the plant wastewater sump to the City combined sewer system. The average discharge is expected to be 135 gallons per minute. The annual average is expected to be 39.4 million gallons per year based on 4,000 hours of maximum annual output. The peak discharge rate is estimated to be as much as 265,000 gallons per day. A new 30-inch wastewater discharge pipe will be constructed by way of Maryland Street to the combined sewer stub-out on Cesar Chavez Street (SFERP Data Response 6a, SFERP 2005w). Effluent to the City's combined sewer system is stored before being processed at the Southeast Water Pollution Control Plant (SEWPCP).

Wastewater discharges to the City combined sewer system from the power plant must comply with the limits set forth in Section 123(a) of Article 4.1, Chapter X, Part II of the San Francisco Public Works Code. Each waste stream would be checked as part of the routine maintenance procedures to ensure that the discharge to the existing sewer meets appropriate City of San Francisco discharge limits. Any grab sample of the discharger's wastewater shall not at any time exceed any numerical limitations provided in **Soil & Water Table 2** which staff determined were adequate to protect water quality. Any composite sample of total recoverable oil and grease representative of the total discharge of the wastewater generated over a production week shall not exceed the numerical limitation for total recoverable oil and grease provided in **Soil & Water Table 2**. Limitations for industrial discharges to the San Francisco Combined Sewer System shall also meet the City and County of San Francisco, Department of Public Works Order No. 151870. Limits, shown in **Soil & Water Table 2**, are based on a composite sample taken on a representative 24-hour period.

Reject streams from tertiary treatment of reclaimed water would consist of solids rejected from the ultra filtration process. In addition, the reject streams would consist of liquids that are concentrated constituents of the recycled water, and residues of the chemicals added to the raw water such as to coagulate suspended solids prior to filtration, control pH and eliminate free chlorine (SFERP 2004a).

Estimated wastewater quality data, which combines the overall waste streams summarized above indicate the SFERP should be able to meet the discharge standards imposed on the San Francisco combined sewer system by Article 4.1. This is evident in reviewing **Soil & Water Table 2** - Comparison of SFERP's Wastewater Discharge Quality vs. City Discharge Limits. Staff has reviewed a copy of the Will-Serve letter from the City of San Francisco Public Utilities Commission, Bureau of Environmental Regulation and Management stating the estimated wastewater quality characteristics would comply with the City's discharge limits. Condition of certification **SOIL & WATER-8** requires the project owner to remain within the limits specified in a Class I Industrial Discharge Permit for SFERP operations as required by San Francisco Public Works Code, Article 4.1.

No significant impacts are expected from wastewater discharge after adoption and implementation of staff's Conditions of Certification.

Sanitary Wastewater

Sanitary wastewater generated from sinks, toilets and other sanitary facilities at the SFERP will discharge to the City's combined sewer system. The predicted average daily sanitary wastewater discharge flow is one gpm. The effluent load is within the treatment, conveyance, and disposal capacities of the City's system. No significant water impacts are expected due to sanitary wastewater from the plant if the project owner meets condition of certification **SOIL & WATER-8** for operational wastewater discharges to the City's combined sewer system.

Industrial Wastewater

Circulating (or cooling) water system blowdown would consist of recycled water that has been concentrated by approximately five cycles and will contain the residue of the chemicals added to the circulating water. Cooling water treatment will require the addition of a pH control agent, a mineral scale dispersant, corrosion inhibitors, and biocides. These chemicals control scaling and biological growth in cooling towers and corrosion of the circulating water piping and condenser tubes. The waste stream would be returned to the City's combined sewer system. No impacts to surface or groundwater resources are anticipated as a result of industrial wastewater discharged to the combined sewer system providing the project owner meets condition of certification **SOIL & WATER-8.**

Miscellaneous plant drainage would consist of area washdown, equipment leakage, and drainage from facility equipment areas. Water from these areas would be collected and discharged to the combined sewer system. An average flow of two gpm from the domestic plant wastewater system is projected.

CUMULATIVE IMPACTS AND MITIGATION

Soils

Construction activities related to the SFERP project may cause a temporary, but not a long-term, increase in cumulative wind and water erosion. During construction of the facility the disturbed area would be subject to wind and water erosion until surface cover comprised of pavement is in place. SFERP linear facilities would be installed in existing roadways and utility right-of-ways to the maximum extent possible and could contribute to a significant cumulative impact if existing utilities are impacted and service disrupted. The applicant has provided a Draft SWPPP for construction activity as required in a NPDES permit for construction activity. The SWPPP would include linear facility construction. Implementation of the DESCP and SWPPP for Construction and Operational Activities will avoid significant adverse impacts resulting from erosion of soils.

Surface Hydrology

Disturbed soils could increase the sediment and pollution load downstream, however no significant impacts are expected. BMPs will be employed in accordance with the DESCP to minimize erosion during and after construction. The stormwater and water from dewatering activities will be monitored and disposed of properly.

The SFERP development would redirect surface drainage patterns to a vegetated swale and routed to the Bay. The implementation of a SWPPP, application of best management practices and LORS compliance will mitigate potential cumulative surface hydrology impacts to less than significant levels.

Water Supply

Staff has not identified any cumulative development projects that would diminish the supply of secondary effluent from the City's SEWWTP.

Groundwater

The project will not use ground water. Ground water may be encountered during construction and require dewatering. The water encountered would be shallow ground water and could be contaminated. Groundwater requiring dewatering during construction will be managed according to the SMIP. The entire SFERP site would be covered with impervious material after construction. Chemical storage areas would have secondary containment. All surface flow from the project area would be discharged to the combined sewer system for treatment at the SEWWTP.

Wastewater

The wastewater streams from the SFERP site include cooling tower and process blowdown, sanitary wastewater, plant drainage and reject streams from the tertiary treatment process. The combined wastewater will be monitored to assure that it complies with the City's discharge limits in accordance with the Class I Industrial Discharge Permit.

COMPLIANCE WITH LORS

The project will comply with:

- The Clean Water Act by gaining coverage under the general NPDES permit and preparation of the DESCP and SWPPP;
- The Resource Conservation Recovery Act of 1976 by the proper handling and discharge of wastewater;
- 40 Code of Federal Regulations Part 423 for wastewater effluent, by monitoring that the constituent limitations are met even though they are more strict than the San Francisco Public Works Code, Article 4.1;
- The California Constitution, Article X, Section 2 by using reclaimed water for plant process water;

- The Porter-Cologne Water Quality Control Act by the use of reclaimed water and the implementation of the DESCP and SWPPP, as well as the adherence to the discharge requirements of San Francisco Public Works Code, Article 4.1;
- California Water Code 13550 by using reclaimed water for all non-potable plant uses;
- The California Safe Drinking Water and Toxic Enforcement Act by establishing secondary containment in chemical storage areas, and including dual plumbing for use of recycled water;
- The Water Recycling Act by using reclaimed water for plant process water;
- Title 17 of the California Code of Regulations, by ensuring the Department of Health Services confirms the requirements for backflow prevention and cross connections of potable and non-potable water lines;
- Title 22 of the California Code of Regulations, by ensuring the Department of Health Services reviews the wastewater treatment systems to ensure they meet tertiary treatment standards for protection of public health;
- Title 23 of the California Code of Regulations requiring the Regional Board to issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable. And to ensure the wastewater treatment plant operator or site supervisor is qualified for the effective operation of wastewater and water recycling treatment plants;
- The SWRCB Resolution 75-58 by using reclaimed water for plant process water;
- The SWRCB Resolution 77-1 by using reclaimed water for plant process water;
- The SWRCB Resolution 68-16 by avoiding discharge of wastewater to high quality waters;
- The Integrated Energy Policy Report (CEC 2003) by using reclaimed water for plant process water;
- San Francisco Public Health Code (Article 22A) by testing soils and groundwater at the SFERP site, assessing environmental risks including risks to marine life in San Francisco Bay, implementing mitigation measures if necessary to protect the environment, and reporting the results of the Article 22A investigation and mitigation activities;;
- San Francisco Building Code by adherence to the grading and erosion control standards;
- San Francisco Public Works Code, Article 4.1 by adherence to the City's waste discharge requirements;
- San Francisco Public Works Order No. 158170 by adherence to the City's wastewater discharge requirements;
- San Francisco Public Works Code, Article 22 by installation of dual plumbing for attaining maximum use of recycled water;

NOTEWORTHY PUBLIC BENEFITS

The use of reclaimed water from the SEWWTP will slightly decrease the volume of secondary effluent discharged to San Francisco Bay. The use of recycled water for plant processes reduces the need for other freshwater sources to be used for this project and maintains reliability of local water supplies.

Chapter 7.5 of the California Water Code, the Water Recycling Act of 1991, sets a statewide water recycling goal of recycling a total of one million acre-feet of water per year by the year 2010. The SFERP will use on average 132 acre-feet of the total recycled water produced each year in support of the 2010 goal.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Comment: Department of Toxic Substances Control-4 The Department of Toxic Substances Control sent a letter dated June 18, 2004 to Bill Pfanner at the California Energy Commission, requesting that a paragraph specific to groundwater at the project area be added to the AFC (DOTSC2002a).

Response: The third (final) paragraph of section 8.14.4.4 of the AFC is specific to the project area. Additional information was requested and received during Data Adequacy. This information is located on pages 30 and 31 of the Data Adequacy Supplement referenced as SFERP2004g. Staff has also included a summary and analysis of the potential groundwater contamination in this FSA.

Comment: Department of Toxic Substances Control-5 The Department of Toxic Substances Control sent a letter dated June 18, 2004 to Bill Pfanner at the California Energy Commission, requesting an evaluation of impacts from dewatering activities related to groundwater contamination and disposal. DTSC also recommended that the evaluation be contained in the Site Mitigation and Implementation Plan that would be sent to the RWQCB for approval. DTSC also recommends that a qualified professional should evaluate the potential health and safety issues related to groundwater contamination and the evaluation be included in the Site Health and Safety Plan (DOTSC2002a).

Response: The Impacts from dewatering are being evaluated. Staff has reviewed the draft SWPPP, the requirements of San Francisco Public Health Code Article 22A, and San Francisco Public Works Code Article 4.1. These documents require the applicant to mitigate for, test and monitor soil and runoff from the SFERP site. Condition of certification **SOIL & WATER-2** requires the project owner to obtain coverage under the general NPDES permit administered by the SFBRWQCB which regulated point source and non-point source discharges to surface waters and the preparation of a SWPPP. Condition of certification **SOIL & WATER-3** requires the project owner comply with the requirements found in San Francisco Public Works Code, Article 4.1. Condition of certification **SOIL & WATER-6** requires the project owner to prepare a Site Mitigation and Implementation Plan (SMIP) and provide letters from the San Francisco Department of Public Health and SFBRWQCB stating that the SMIP for treating contaminated soil and water, should it be encountered, is adequate and meets requirements of San Francisco Public Health Code Article 22A. The SMIP will include

assessing potential environmental and health and safety risks, recommending measures to mitigate the risks, identifying appropriate waste disposal and handling requirements, and presenting criteria for on-site reuse of soil. In accordance with condition of certification **SOIL & WATER-7** and after completion of ground disturbance, Article 22A also requires San Francisco Department of Public Health approval of a Certification Report for the SMIP verifying that all mitigation measures have been completed satisfactorily. Staff has required that the Certification Report be reviewed by the SFBRWQCB.

Comment: Bay Conservation Development Commission-1 The San Francisco Bay Conservation Development Commission (BCDC) sent a letter dated November 22, 2005 to Bill Pfanner at the CEC, requesting that the CEC include a requirement that the SFERP accommodate public access across the proposed vegetated swale rip rap outfall that crosses BCDC's jurisdiction within 100 feet of the San Francisco Bay shoreline.

Response: Condition of certification **SOIL & WATER-12** has been proposed to meet BCDC's request. **SOIL & WATER-12** requires the project owner construct a conveyance such as a bridge or culvert to accommodate continuation of the San Francisco Bay Trail or other BCDC-required shoreline access without impeding stormwater flows from the SFERP site. Verification for **SOIL & WATER-12** requires the project owner submit a proposed plan for the conveyance to BCDC, the Port of San Francisco, and the Regional Water Quality Control Board for review and comment and to the CPM for review and approval. Design and construction of the approved conveyance shall meet a schedule approved by BCDC and the Port of San Francisco.

Comment: Bay Conservation Development Commission-2 The San Francisco Bay Conservation Development Commission (BCDC) sent a letter dated November 22, 2005 to Bill Pfanner at the CEC, noting that the proposed vegetated swale is consistent with the applicable water quality polices in the *San Francisco Bay Plan.* Included in the water policies are requirements that new projects be sited, designed, constructed, and maintained to prevent or minimize discharge of pollutants to the Bay by controlling pollutant sources at the SFERP site and applying appropriate, accepted, and effective best management practices.

Response: Conditions of Certification **SOIL & WATER-1** and **SOIL & WATER-2** require the project owner to prepare and implement Drainage, Erosion, and Sediment Control and Storm Water Pollution Prevention Plans. Review and approval of these plans require design and implementation of the vegetated swale best management practice according to state approved guidelines. In addition, Conditions of Certification **SOIL & WATER-6** and **SOIL & WATER-7** require the project owner to assess potential water quality impacts to the San Francisco Bay resulting from migration of TPH, PAH, metals, and other hazardous materials present in soils and groundwater onsite to the San Francisco Bay. The project owner will be required to assess potential ecological risks related to hazardous material transport to the Bay and mitigate those risks to less than significant levels during construction of the proposed project.

CONCLUSIONS

With the information provided to date, staff has not identified any unmitigated significant impacts to Soil and Water Resources provided that all of the Conditions of Certification are met. The SFERP would comply with all applicable soil and water resources LORS, and potentially significant impacts would be mitigated through the preparation and implementation of various construction and operating plans that could have otherwise caused soil erosion, contamination to surface and ground water, or non-compliance with wastewater treatment and discharge requirements.

The existing soil and groundwater impacts from previous land uses at the SFERP site represent the most significant potential threat to soil and water resources at the SFERP site, in the site vicinity, and the San Francisco Bay. Developing and implementing a Site Mitigation and Implementation Plan to prevent existing contamination from migrating to the San Francisco Bay through either groundwater transport, discharge of eroded sediments, or discharge of construction wastewater as required in Conditions of Certification **Soil & Water-1, Soil & Water-2, Soil & Water-3, and Soil & Water-6** will serve to mitigate potentially significant water quality impacts.

PROPOSED CONDITIONS OF CERTIFICATION

SOIL & WATER-1 Prior to site mobilization, the project owner shall obtain CPM approval for a site-specific Drainage, Erosion and Sedimentation Control Plan (DESCP) that ensures protection of water quality and soil resources of the project SFERP site and all linear facilities for both the construction and operational phases of the project. This plan shall address appropriate methods and actions, both temporary and permanent, for the protection of water quality and soil resources, demonstrate no increase in off-site flooding potential, meet local requirements, and identify all monitoring and maintenance activities. The plan shall be consistent with the grading and drainage plan as required by condition of certification **CIVIL-1** and may incorporate by reference any Storm Water Pollution Prevention Plan (SWPPP) developed in conjunction with any NPDES permit. The DESCP shall contain the following elements:

- Vicinity Map – A map shall be provided indicating the location of all project elements with depictions of all significant geographic features including swales, storm drains, and sensitive areas.
- Site Delineation – The San Francisco Electric Reliability Project (SFERP) site, lay down area, all linear facilities, and project elements shall be delineated showing boundary lines of all construction areas and the location of all existing and proposed structures, pipelines, roads, and drainage facilities.
- Watercourses and Critical Areas – The DESCP shall show the location of all nearby watercourses including swales, storm drains, and drainage ditches. Indicate the proximity of those features to the SFERP construction site, lay down area, and all pipeline and transmission line construction corridors.

- Drainage – The DESCP shall provide a topographic site map showing all existing, interim and proposed drainage systems; drainage area boundaries and water shed sizes in acres; the hydraulic analysis to support the selection of Best Management Practices (BMPs) to divert off-site drainage around or through the SFERP site and laydown areas. On the map, spot elevations are required where relatively flat conditions exist. The spot elevations and contours shall be extended off-site for a minimum distance of 100 feet in flat terrain.
- Clearing and Grading – The plan shall provide a delineation of all areas to be cleared of vegetation and areas to be preserved. The plan shall provide elevations, slopes, locations, and extents of all proposed grading as shown by contours, cross sections or other means. The locations of any disposal areas, fills, or other special features will also be shown. Illustrate existing and proposed topography tying in proposed contours with existing topography. The DESCP shall include a statement of the quantities of material excavated or filled for each element of the SFERP (project site, lay down area, transmission corridors, and pipeline corridors), whether such excavations or fill is temporary or permanent, and the amount of such material to be imported or exported.
- Project Schedule – The DESCP shall identify on the topographic site map the location of the site specific BMPs to be employed during each phase of construction (initial grading, project element excavation and construction, and final grading/stabilization). Separate BMP implementation schedules shall be provided for each project element for each phase of construction.
- Best Management Practices – The DESCP shall show the location, timing, and maintenance schedule of all erosion and sediment control BMPs to be used prior to initial grading, during project element excavation and construction, final grading/stabilization, and following construction. BMPs shall include measures designed to control dust and stabilize construction access roads and entrances. BMPs shall include measures designed to prevent wind and water erosion in areas with existing soil contamination. Treatment control BMPs utilized during construction should enable testing of stormwater runoff prior to discharge to San Francisco Bay. If runoff has unacceptable levels of contaminants including metals, TPH, or PAH constituents, the runoff must be treated to acceptable levels prior to discharge to the Bay, which could include multiple tank media filtration or other BMP's. The maintenance schedule should include post-construction maintenance of erosion control BMPs applied to disturbed areas following construction.
- Erosion Control Drawings -- The erosion control drawings and narrative must be designed and sealed by a professional engineer/erosion control specialist.

Verification: No later than 90 days prior to start of site mobilization, the project owner shall submit a copy of the plan to the City and County of San Francisco Public Works Department and San Francisco Public Utilities Commission for review and

comment. No later than 60 days prior to start of site mobilization, the project owner shall submit the plan and City and County of San Francisco Public Works Department and San Francisco Public Utilities Commission comments to the CPM for review and approval. The CPM shall consider comments received from the City and County of San Francisco Public Works Department and San Francisco Public Utilities Commission. During construction, the project owner shall provide an analysis in the monthly compliance report on the effectiveness of the drainage, erosion and sediment control measures and the results of monitoring and maintenance activities. Once operational, the project owner shall provide in the annual compliance report information on the results of monitoring and maintenance activities.

SOIL & WATER-2 The project owner shall comply with the requirements of the General National Pollutant Discharge Elimination System (NPDES) Permit for Discharges of Stormwater Associated with Construction Activity. The project owner shall develop and implement a Storm Water Pollution Prevention Plan (SWPPP) for the construction of the entire SFERP site, Lay Down Area, and all linear facilities (construction SWPPP).

Verification: The project owner shall submit copies to the CPM of all correspondence between the project owner, Port of San Francisco, and the RWQCB about the General NPDES permit for the Discharge of Stormwater Associated with Construction Activities within 10 days of its receipt (when the project owner receives correspondence from the RWQCB) or within 10 days of its mailing (when the project owner sends correspondence to the RWQCB). This information shall include copies of the Notice of Intent and Notice of Termination for the project.

SOIL & WATER-3 The project owner shall comply with the discharge limitations, pretreatment requirements, peak flow restrictions, dewatering discharges, payment of fees, and monitoring and reporting requirements as found in the San Francisco Public Works Code, Article 4.1 during discharge of potentially hazardous wastewater from de-watering of construction sites and discharge of water used for cleaning/hydrostatic testing of pipes or tanks, or during any other activity that generates wastewater, other than from routine commercial and/or industrial processes.

Verification: At least 30 days prior to the start of site mobilization, evidence of how the project owner complies with San Francisco Public Works Code, Article 4.1 shall be submitted to the CPM. The project owner shall submit copies of all correspondence between the project owner and SFPUC Bureau of Environmental Regulation and Management within 10 days of its receipt (when the project owner receives correspondence from the SFPUC) or its mailing (when the project owner sends correspondence to the SFPUC). The CPM shall be notified in writing of any analyzed sample that does not comply with the regulatory limits within 10 days of receiving sample results.

SOIL & WATER-4 Prior to beginning any site mobilization activities, the project owner shall submit a Dual Plumbing Plan utilizing disinfected tertiary recycled water for plant service needs not requiring potable water to the San Francisco Department of Public Works for review and comment and to the CBO for review and approval. The Dual Plumbing Plan shall be prepared in

accordance with San Francisco Public Works Code Article 22, and Title 22 of the State Water Code. This plan may be consolidated with the Engineer's Report for the Production, Distribution and Use of Recycled Water at the SFERP if practical, as specified in **SOIL & WATER-5**. The project owner shall comply with any reporting and inspection requirements set forth by the San Francisco Public Works Department to fulfill statutory requirements.

Verification: At least 30 days prior to the start of any site mobilization activities, the project owner shall submit the Dual Plumbing Plan to the San Francisco Department of Public Works and the CBO. 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.

SOIL & WATER-5 Prior to beginning any site mobilization activities, the project owner shall submit an Engineer's Report for the Production, Distribution and Use of Recycled Water at the SFERP to the State Department of Health Services and the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) for review and comment and to the CPM for review and approval. The Engineer's Report for the Production, Distribution and Use of Recycled Water at the SFERP shall be prepared in accordance with Titles 17 and 22 of the CA Code of Regulations, the Health and Safety Code, and the Water Code. The project owner shall comply with any reporting and inspection requirements set forth by the State Department of Health Services and SFRWQCB to fulfill statutory requirements.

Verification: At least 30 days prior to the start of any site mobilization activities, the project owner shall submit the Engineer's Report for the Production, Distribution and Use of Recycled Water at the SFERP to the State Department of Health Services, the SFBRWQCB, and the CPM. The project owner shall request letters from the State Department of Health Services and the SFBRWQCB with their comments on the Engineer's Report for the Production, Distribution and Use of Recycled Water at the SFERP. The project owner shall submit comments from the State Department of Health Services and any comments or conditions stipulated by the SFBRWQCB on the Engineer's Report or those related to the use and treatment of recycled water to the CPM for consideration in the review and approval of the Engineer's Report. The project owner shall revise the Engineer's Report per the CPM's instructions. The project owner shall provide the CPM a copy of any correspondence between themselves and State Department of Health Services, or the SFRWQCB within 10 days of receipt or submittal.

SOIL & WATER-6 Prior to beginning site mobilization, the project owner shall submit a Site Mitigation and Implementation Plan (SMIP) for the treatment of contaminated soil and water at the project site to the San Francisco Department of Public Health and San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) for review and comment and to the Energy Commission for review and approval. The SMIP shall be prepared in accordance with San Francisco Public Health Code Article 22A and shall identify measures to mitigate water quality impacts and ecological risks to less than significant levels, to address environmental protection goals established in the San Francisco Bay Basin Plan. The project owner shall comply with any reporting and inspection requirements set forth by the San

Francisco Department of Public Health and SFRWQCB to fulfill statutory requirements.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit the SMIP to the San Francisco Department of Public Health and SFBRWQCB. The project owner shall request letters from the San Francisco Department of Public Health and the SFBRWQCB with their comments on the SMIP. The project owner shall submit comments from the San Francisco Department of Public Health and the SFBRWQCB on the SMIP to the CPM for consideration in the review and approval of the SMIP. The project owner shall revise the SMIP per the CPM's instructions until it meets the requirements of San Francisco Public Health Code Article 22A. The project owner shall provide the CPM a copy of any correspondence between themselves and the San Francisco Department of Public Health or the SFRWQCB within 10 days of receipt or submittal.

SOIL & WATER-7 Prior to commercial operations, the project owner shall submit a Certification Report for the Site Mitigation and Implementation Plan (SMIP) for treating contaminated soil and/or water at the project SFERP site to the San Francisco Department of Public Health and San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) for review and comment and to the CPM for review and approval. The SMIP Certification Report shall be prepared in accordance with San Francisco Public Health Code Article 22A and demonstrate that water quality impacts and ecological risks have been mitigated to a less than significant level, to address environmental protection goals established in the San Francisco Bay Basin Plan. The project owner shall comply with the Certification Report stating that all mitigation measures recommended in the SMIP have been completed and that completion of the mitigation measures has been verified through follow-up soil sampling and analysis, if required by the San Francisco Department of Public Health and SFRWQCB.

Verification: At least 30 days prior to the start of commercial operations, the project owner submit the SMIP Certification Report to the San Francisco Department of Public Health and SFBRWQCB. The project owner shall request letters from the San Francisco Department of Public Health and the SFBRWQCB with their comments on the SMIP Certification Report. The project owner shall submit comments from the San Francisco Department of Public Health and the SFBRWQCB on the SMIP Certification Report to the CPM for consideration in the review and approval of the SMIP Certification Report. The project owner shall revise the SMIP Certification Report per the CPM's instructions until it meets the requirements of San Francisco Public Health Code Article 22A. The project owner shall provide the CPM a copy of any correspondence between themselves and San Francisco Department of Public Health or the SFRWQCB within 10 days of receipt or submittal.

SOIL & WATER-8 The project owner shall comply with the discharge limitations, pretreatment requirements, peak flow restrictions, dewatering discharges, payment of fees, and monitoring and reporting requirements as found in the San Francisco Public Works Code, Article 4.1 and in accordance with the discharge requirements specified in San Francisco Department of Public Works Order No. 158170 during commissioning and commercial operation.

Verification: At least 30 days prior to the start of commissioning activities, evidence of how the project owner complies with the San Francisco Public Works Code, Article 4.1 shall be submitted to the CPM. The project owner shall submit copies of all correspondence between the project owner and SFPUC Bureau of Environmental Regulation and Management within 10 days of its receipt (when the project owner receives correspondence from the SFPUC) or its mailing (when the project owner sends correspondence to the SFPUC). The CPM shall be notified in writing of any analyzed wastewater sample that does not comply with the regulatory limits of Article 4.1 within 10 days of receiving sample results. The annual compliance report shall provide evidence of how the project owner has complied with San Francisco Public Works Code, Article 4.1 and provide a summary of the wastewater sampling results.

SOIL & WATER-9 The project owner shall comply with the requirements of the Port of San Francisco Municipal National Pollutant Discharge Elimination System (NPDES) Permit. The project owner shall develop and implement a Storm Water Pollution Prevention Plan for the operation of the SFERP (operational SWPPP).

Verification: The project owner shall submit copies to the CPM of the operational SWPPP for the entire SFERP site prior to commercial operation for review and approval, as well as all correspondence between the project owner and the Port of San Francisco, the City and County of San Francisco Public Works Department, and the City Bureau of Environmental Regulation concerning the Port's Municipal NPDES Permit within 10 days of its receipt (when the project owner receives correspondence from the Port) or within 10 days of its mailing (when the project owner sends correspondence to the Port). This information shall include a copy of the Notice of Intent and Notice of Termination.

SOIL & WATER-10 The project owner shall use disinfected tertiary recycled water supplied from the on-site treatment plant as its primary water supply source for cooling, process, and other approved non-potable uses. Prior to the use of a water source during commercial operation by the San Francisco Electric Reliability Project (SFERP), the project owner shall install and maintain metering devices as part of the water supply and distribution system to monitor and record in gallons per day the total volumes of water supplied to the SFERP from each water source. Those metering devices shall be operational for the life of the project.

The project owner shall prepare an annual Water Use Summary, which will include the monthly range and monthly average of daily non-potable water usage in gallons per day, and total water used by the project on a monthly and annual basis in acre-feet. Potable water use on-site shall be recorded on a monthly basis. For subsequent years, the annual Water Use Summary shall also include the yearly range and yearly average water use by the project. The annual summary shall be submitted to the CPM as part of the annual compliance report.

Verification: At least 60 days prior to use commercial operation of the SFERP, the project owner shall submit to the CPM conclusive proof that metering devices have been installed and are operational on the non-potable and potable water supply and

distribution system. Potable water use may be based on metering or billings from the supplier.

If there is a significant change in the water supply source(s), the new source(s) supply and distribution system shall also have metering devices. Any water used from the new source(s) shall be incorporated into the annual Water Use Summary within 30 days of hook-up.

The project owner shall submit a Water Use Summary to the CPM in the annual compliance. The summary report shall distinguish between recorded water use of recycled and potable water. Included in the summary report of water use, the project owner shall submit copies of meter records from the City of San Francisco documenting the quantities of tertiary treated recycled water provided (in gallons per day) by the SEWPCP. The project owner shall provide a report on the servicing, testing and calibration of the metering devices in the annual compliance report.

SOIL & WATER-11 The SFERP shall not use more than 50 acre-feet of potable water during any consecutive three-year period as an emergency backup to disruptions in the production or distribution of the recycled water from the tertiary water treatment facility. The project owner will monitor the use of emergency backup water and report total usage to the CPM immediately after any occurrence when potable water was used. During severe droughts, the project owner shall work with appropriate local agencies to reduce energy demand during planned and unplanned outages in order to reduce the need for potable water.

Verification: At least 30 days prior to any planned interruption the project owner will notify the CPM in writing of the potential use of potable backup water and with an estimate of the volume required to continue normal power generation. During any unplanned outages the project owner will notify the CPM as soon as it is realized that emergency backup water supply will be necessary. The project owner will document total usage for each planned and unplanned service interruption where potable water was used as an emergency backup. The project owner will report all disruptions to the recycled water tertiary treatment process, the associated volume of potable water used, and the total annual use for the year, and the two years prior, in the annual compliance report. The annual report shall report on the feasibility of alternative water supplies in lieu of potable water for emergency backup. The annual report shall discuss any energy conservation measures taken during planned outages.

SOIL & WATER-12 In the event the project owner is notified by the Bay Conservation and Devlopment Commission (BCDC) or the Port of San Francisco (Port) that a proposed segment of the San Francisco Bay Trail or BCDC-required shoreline access is to be located across the outfall of the SFERP stormwater swale, the project owner shall design and construct a conveyance, such as a culvert or bridge, to accommodate continuation of the San Francisco Bay Trail or BCDC-required shoreline access across the outfall without impeding stormwater flow from the SFERP site. The conveyance shall be consistent with all applicable requirements of the BCDC, Port, and the San Francisco Bay Regional Water Quality Control Board (RWQCB).

Verification: Within 90 days of notification by BCDC or the Port of San Francisco that a San Francisco Bay Trail segment or other form of shoreline access will cross the outfall from the SFERP stormwater swale, the project owner shall submit a proposed plan for a conveyance to accommodate continuation of the San Francisco Bay Trail or BCDC-required shoreline access across the outfall without impeding stormwater flow from the SFERP site. The plan shall be provided to the BCDC, Port and RWQCB for review and comment and to the CPM for review and approval. Upon approval of the plan, the project owner shall commence design and construction of the conveyance on a schedule approved by the BCDC and the Port.

REFERENCES

CEC 2003 - 2003 Integrated Energy Policy Report, Docket No 02-IEP-01, California Energy Commission, October 30, 2003, Sacramento, California.

DHS2004a – Department of Health Services / Robert Holquist. Phone conversation on 9/14/04 between Robert Holquist – DHS, Chief of Drinking Water Technical Operations Section and John Kessler – Consultant to CEC.

DOTSC2004a – Department of Toxic Substance Control/Cook (tn:31791). Comments re: Standardized Permitting and Corrective Action Branch. Submitted to CEC/Pfanner/Dockets on 6/22/04.

Mirant 2000 - Application for Certification for the Potrero Power Plant Unit 7 Project, Mirant California, May 2000.

PWA 2005a – SFPUC/Watanabe and PWA/Geronimo. Phone conversation on 6/21/05 between Mark Watanabe SFPUC Manager and Vince Geronimo – Consultant to CEC.

PWA 2005b – SFPUC-BERM/Seale and PWA/Geronimo. Phone conversation on 6/29/05 between Bruce Seale, Senior Wastewater Control Inspector and Vince Geronimo – Consultant to CEC.

PWA 2005c – DPW/Beck and PWA/Geronimo. Phone conversation on 7/01/05 between Robert Beck, Deputy Director SF Department of Public Works and Vince Geronimo – Consultant to CEC.

PWA 2005d – Port of SF/Bach and PWA/Geronimo. Phone conversation on 7/05/05 between Carol Bach, Assistant Deputy Director Port of San FRancisco and Vince Geronimo – Consultant to CEC.

PWA 2005e – SFBRWQCB/Condit and PWA/Geronimo. Phone conversation on 7/05/05 between Richard Condit, SFBRWQCB and Vince Geronimo – Consultant to CEC.

PWA 2005f – SFPUC-BERM/Medbery and PWA/Geronimo. Phone conversation on 7/05/05 between Steve Medbery, SF BERM Director and Vince Geronimo – Consultant to CEC.

PWA 2005g – CADHS/Graham and PWA/Geronimo. Phone conversation on 7/12/05 between Betty Graham, California Department of Health Services, District Engineer for San Francisco and Vince Geronimo – Consultant to CEC.

SFBRWQCB2004a – San Francisco Bay Regional Water Quality Control Board / Will Bruhns. Phone conversation on 9/14/04 between Will Bruhns – SFBRWQCB, Acting Division Chief and John Kessler – Consultant to CEC.

SFERP2004a - City and County of San Francisco/Blout (tn: 31130). Application for Certification San Francisco Electric Reliability Project - 145-megawatt natural gas-fired peaking power plant located in San Francisco. Submitted to CEC/Therkelsen/Dockets on 3/18/04.

SFERP2004d - CH2MHill/Carrier (tn: 31128). Sets of 7.5 Minute U.S. Geological Survey (USGS) Quad Maps Submitted to CEC/Pfanner/Dockets on 3/18/04.

SFERP2004g - CH2MHill/Carrier (tn: 31268). Data Adequacy Supplement. Submitted to CEC/Pfanner/Dockets on 4/16/04.

SFERP2004h - CH2MHill/Carrier (tn: 31274). Attachment to the Data Adequacy Supplement: Attachment WM-DA-1, the Phase I Environmental Site Assessment. Submitted to CEC/Pfanner/Dockets on 4/16/04.

SFERP2004i - CH2MHill/Carrier (tn: 31275). Attachment to the Data Adequacy Supplement: Attachment WR-DA-1. Submitted to CEC/Pfanner/Dockets on 4/16/04.

SFERP2004m – CH2MHill/Carrier (tn: 31857). Data Responses Set 1A. Attachment S&W-52, Construction Storm Water Pollution Prevention Plan. Submitted to CEC/Pfanner/Dockets on 7/6/04.

SFERP2004n – CH2MHill/Carrier (tn: 31855). Data Responses Set 1A. Attachment GEO, Geotechnical Report. Submitted to CEC/Pfanner/Dockets on 7/6/04.

SFERP2004o – CH2MHill/Carrier (tn: 31856). Data Response Set 1A. Attachment S&W-48, Analytical Results for February 2004 Sampling Event. Submitted to CEC/Pfanner/Dockets on 7/6/04.

SFERP2004q – CH2MHill/Carrier (tn: 31854). Data Responses Set 1A. Response to Staff's Data Requests dated 6/4/04. Submitted to CEC/Pfanner/Dockets on 7/6/04.

SFERP2004r – CH2MHill/Carrier (tn: 31880). Data Response Set 1B. Submitted to CEC/Pfanner/Dockets on 7/12/04.

SFERP2004s – CH2MHill/Carrier (tn: 31894). Data Response Set 1C. Submitted to CEC/Pfanner/Dockets on 7/15/04.

SFERP 2004u– CH2MHill/Carrier (tn: 31880). Data Response Set 1B. Submitted to CEC/Pfanner/Dockets on 7/12/04.

SFERP 2004v– CH2MHill/Carrier (tn: 31894). Data Response Set 1C. Submitted to CEC/Pfanner/Dockets on 7/15/04.

SFERP 2005c – San Francisco Electric Reliability Project (tn: 33738). Final Geotechnical Study Report. Submitted to CEC/Pfanner/Dockets on 3/25/05.

SFERP 2005n – CH2MHill/Carrier (tn: 34542). Data Response, Set 3A. Submitted to CEC/Pfanner/Dockets on 6/3/05.

SFERP 2005o – CH2MHill/Carrier (tn: 34543). Data Response, Set 3A: Attachment WS-187. Submitted to CEC/Pfanner/Dockets on 6/2/05.

SFERP 2005p – CH2MHill/Carrier (tn: 34544). Data Response, Set 3A – Attachment WM-184A. Submitted to CEC/Pfanner/Dockets on 6/2/05.

SFERP 2005w – CH2MHill//Carrier (tn: 34871). San Francisco's Informal Data Response, Set 6A. Submitted to CEC/Pfanner/Dockets on 7/11/05.

SFERP 2005dd – CH2MHill/Carrier (tn: 35203). Informal Data Response, Set 6B. Submitted to CEC/Pfanner/Dockets on 8/10/05.

SFERP 2005hh – CH2MHill/Carrier (tn: 35379). Informal Data Response, Set 6C. Submitted to CEC/Pfanner/Dockets on 8/25/05.

SFPUC 2005a – San Francisco Public Utilities Commission/Hale (tn: 34403). Amendment A of the Application for Certification. Submitted to CEC/Therkelsen/Dockets on 3/25/05.

TRAFFIC AND TRANSPORTATION

Testimony of James Adams

SUMMARY OF CONCLUSIONS

With implementation of the recommended conditions of certification, the project would be consistent with the Circulation Element of the City/County of San Francisco General Plan and all other applicable laws, ordinances, regulations, and standards. Additionally, the project would not have a significant adverse impact on the local and regional road/highway network. During the construction phase, local roadway and highway demand resulting from the daily movement of workers and materials would not increase beyond significance thresholds established by the City/County of San Francisco. During the operational phase, increased roadway demand resulting from the daily movement of workers and materials would be insignificant.

INTRODUCTION

In the Traffic and Transportation section, staff addresses the extent to which the San Francisco Electric Reliability Project (SFERP) may impact the transportation system in the local area. This analysis includes the identification of: (1) the roads and routings that are proposed to be used for construction and operation; (2) potential traffic-related problems associated with the use of those routes; (3) the anticipated encroachment upon public rights-of-way during the construction of the proposed project and associated facilities; (4) the frequency of trips and probable routes associated with the delivery of hazardous materials; and (5) the possible effect of project operations on local airport flight traffic.

The influx of large numbers of construction workers can, over the course of the construction phase, increase roadway congestion and also affect traffic flow. In addition, the transportation of large pieces of equipment and facility components can temporarily impact roadway congestion and safety. The laws, ordinances, regulations, and standards (LORS) that govern the project are listed below, followed by discussion of the potential impacts related to traffic operations and safety hazards resulting from the construction and operation of the project.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

TRAFFIC & TRANSPORTATION Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
Title 49, Code of Federal Regulations (CFR), Sections 171-177; Sections 350-399 & Appendices A-G, Federal Motor Carrier Safety Regulations.	Governs the transportation and definition of hazardous materials, the types of materials defined as hazardous; criteria and regulations for the safe transportation of hazardous materials.
State	
California Street and Highways Code (S&HC), Sections 660, 670, 1450, 1460 et seq., 1470, and 1480. California Vehicle Code (CVC) Sections 31303-31309	Regulates right-of-way encroachment and granting of permits for encroachments on state and county roads. The CVC also regulates the highway transportation of hazardous materials, routes used, and restrictions including the mandate that the materials be transported on state or interstate highways that offer the shortest overall transit time possible.
S & HC Sections 13369, 15275,2500-2505 and 15278, 25160 ET SEQ; 31303-31309, 31600-31620; 32000-32053, 32100-32109;3400-3421;34500,34501, 34510-11 S & HC Sec. 117 & 660 &72, California Vehicle Code (CVC) Sec. 35780, ET SEQ; 35550-35559	Addresses licensing of drivers required for operation of particular types of vehicles, including those transporting hazardous, explosive, flammable, and/or combustible material; such as ammonia; safety requirements; hazardous material transport routes. Applicable codes also regulate the transportation of explosive materials, the licensing of carriers of hazardous materials including noticing requirements, and establish special requirements for the transportation of substances presenting inhalation hazards and poisonous gases. CVC Section 32105 requires shippers of inhalation or explosive materials to contact the CHP and apply for a Hazardous Material Transportation License. Upon receiving this license, the shipper will obtain a handbook specifying approved routes. Additional codes establish special requirements for transporting flammable and combustible liquids over public roads and highways, regulate the safe operation of vehicles, including those used to transport hazardous materials, and require permits to transport oversized loads on county roads. The CVC also requires permits for any construction, maintenance, or repair involving encroachment on state highway rights-of way. A permit is required to transport oversized or excessive loads over state highways.
California State Government Code Section 65302 a&b	Requires permits for transport of oversized loads on county roads and state highways; requirements for encroachment permits on state highways; CALTRANS specific weight/load limitations for all state and local roadways. Requires cities and counties to adopt a general plan to guide development, including a mandatory circulation element. All construction in public right-of-way needs to comply with the “Manual of Traffic Controls for Construction and Maintenance of Work Zones” (Caltrans, 1996).
California Department of Transportation (Caltrans)	Weight and load limitations for state highways apply to all state and local roadways. The weight and load limitations are specified in the CVC Sections 35550 to 35559.

Local City/County of San Francisco General Plan Transportation Element	The CCSF Transportation Element of the General Plan is required by State law. The Transportation Element has several objectives and policies pertinent to the proposed power plant such as utilizing public transit whenever possible, designating expeditious routes for trucks to avoid conflicts with automobile traffic, encouraging flexible work schedules to reduce peak period congestion, and providing off-street facilities for freight loading and service vehicles on the site of new buildings sufficient to meet the demands generated by the intended uses.
Chapter 4, San Francisco Congestion Management Plan	The San Francisco County Transportation Authority is the designated Congestion Management Agency for San Francisco, and is responsible for developing and administering the Congestion Management Plan (CMP). If a project degrades intersections operating at a LOS of A, B, C, or D to E or F, or E to F, the CMP requires mitigation.

SETTING

The project site is located in San Francisco between Cesar Chavez (formerly called Army) and 25th Streets, just east of Third Street and approximately 0.38 miles east of State Route (SR) 280, and three miles south of downtown San Francisco. The facility would be located immediately east of the proposed MUNI Metro East Light Rail Vehicle Maintenance and Operations Facility. The San Francisco Bay shoreline lies to the east. **TRAFFIC and TRANSPORTATION Figure 1, Regional Highway System**, shows the region surrounding the project site (the Transportation Figures are at the end of this analysis).

Local transportation routes in the project area include freeways, highways, and local roadways. Plant construction and operation traffic will use the existing area roadways. The project's construction and operation traffic routes connecting to highways are located entirely within the boundaries of the City and County of San Francisco (CCSF). The regional local roadways, bus and train routes, and bicycle lanes in the area that will be most affected by the project are shown in **TRAFFIC AND TRANSPORTATION Figure 2, Local Transportation Network near the Project Site.** Access to the site would be from 25th Street. The critical roads, highways, and transit modes in the area of the project are identified below.

SR-280

SR-280 begins south of San Francisco's Market District and passes approximately five blocks west of the project site. SR-280 runs south to San Jose and is composed of six to eight lanes of mixed-flow traffic with a daily capacity of 288,000 vehicles in the vicinity of the project site. Caltrans placed SR-280 (mile post 6.05) daily average traffic volume at 92,000 vehicles with a peak hour volume of 7,050 vehicles in 2003.

US HIGHWAY 101

US 101 is a north-south freeway located approximately one mile west of the project. It is an eight lane limited access freeway with a capacity of 389,000 vehicles. The Caltrans 2003 traffic counts on US 101 (mile post 2.92) indicate an average daily traffic volume of 249,000 vehicles with a peak hour traffic volume of 15,650 vehicles.

THIRD STREET

Third Street is a major north-south roadway two blocks west of the site. It is a commercial street that provides an access route for industry located along the waterfront area. Third Street is a six-lane arterial with three 10-foot wide traffic lanes in both directions. The street has a center median, with openings for left turns at intersecting streets such as 22nd and 23rd Streets. Left turn lanes are provided at intersections with other major arterial roadways, but are not provided at minor intersections. On-street parking is normally allowed on both sides of the street. Third Street carries approximately 18,800 vehicles per day.

The San Francisco Municipal Railway (MUNI) is currently in the construction phase of its Third Street Light Rail project. The project will offer light rail service between Fourth and King Street to the Bayshore-CalTrain Station. The project will create a 32-foot center median on Third Street that contains two light rail tracks. Third Street will then be a four lane arterial with two 11-foot traffic lanes and eight foot shoulders in each direction. Left turn lanes will remain on Third Street for Evans Avenue, Cesar Chavez Street, 25th Street (northbound), 23rd Street and 20th Street.

The San Francisco General Plan designates Third Street as a major arterial and primary transit route. The plan also designates Third Street as a Neighborhood Commercial Street and a citywide bicycle route.

CESAR CHAVEZ STREET

Cesar Chavez Street is a major arterial carrying approximately 15,500 vehicles per day. It is located five blocks south of the project running in an east-west direction, providing access to the project from both I-280 and US 101. It intersects Third Street. Vehicles can access the site by turning north on Third Street and proceeding to 25th Street. Cesar Chavez Street is also a citywide bicycle route.

PENNSYLVANIA AVENUE

Pennsylvania Avenue is a four-lane north-south arterial carrying approximately 6,700 vehicles per day. It provides access to Cesar Chavez Street and the surrounding industrial areas via a southbound I-280 exit ramp.

23RD STREET

23rd Street is a two-lane collector road running in an east-west direction and carrying approximately 3,000 vehicles per day that provides access to surrounding industrial properties. There are traffic signals at the intersections of Third Street and 22nd and 23rd Streets.

25TH STREET

25th Street is a collector road carrying approximately 2,600 vehicles per day, which provides access directly to SR-280 northbound at either Indiana Street, or via Pennsylvania Avenue to reach SR-280's southbound lanes. It runs in an east-west direction and provides direct access to the SFERP site.

ILLINOIS STREET

Illinois Street is a north-south collector road with two lanes of travel and parking on both sides of the street. Illinois Street carries approximately 3,400 vehicles per day.

AIRPORT

There are two major airports in the vicinity of the project site: San Francisco International Airport is approximately 15 miles south of the SFERP site, and Oakland International Airport is located approximately 10 miles east across San Francisco Bay.

SAN FRANCISCO MUNICIPAL RAILWAY

There is a major MUNI Railway route in the vicinity of the project site that serves north-south travel (See **Traffic and Transportation Figure 2**). The new extension begins at 22nd Street and proceeds south of Davidson and Evans Avenue.

CALTRAIN

Caltrain provides commuter rail service between Santa Clara, San Mateo and San Francisco Counties. The closest station to the SFERP site is the 22nd Street and Pennsylvania Avenue Station, which is six blocks west of the project.

SAN FRANCISCO MUNICIPAL BUSES

There are MUNI bus routes on Third Street that serve the Central Basin and Hunters Point area, and additional service from the Marina District through Pacific Heights and Mission Dolores before turning southeast to Third Street. An additional bus route connects the West Portal community to Potrero via Quintara/24th Street.

BICYCLE LANES

Within the project vicinity, the CCSF Master Plan designates Evans Avenue, Innes Avenue, Cesar Chavez Street, and Third Street as bicycle lanes. Cesar Chavez Street is a Class 2 bicycle lane, and the rest are Class 3 lanes (see **TRAFFIC AND TRANSPORTATION Figure 2**). These bicycle lanes are lightly used in the vicinity of the project (CCSF 2004a).

TRAFFIC CHARACTERISTICS

TRAFFIC AND TRANSPORTATION Figure 3, **Existing Morning and Evening Peak Hour Volumes, Intersection Channelization and Traffic Control**, lists peak hour volume data for the project vicinity prior to the construction of the Third Street light rail project and indicates the intersections with traffic signals. Staff has been advised by the San Francisco Department of Parking and Traffic that the data, though five years old, is more representative of expected traffic patterns when the light rail project is completed, as compared to existing conditions (CCSF 2005c). CCSF expects that when the light rail project construction is complete by the spring of 2006, the area traffic congestion will decrease due to the streets being clear of construction equipment and an assumption that more people will use the light rail instead of private vehicles.

TRAFFIC AND TRANSPORTATION Table 2 explains the Level of Service (LOS) definitions used by CCSF to analyze traffic impacts by peak hour intersection capacity

and operations. Intersection level of service is identified with letters of designation, from LOS A for least congested to LOS F for most congested.

TRAFFIC AND TRANSPORTATION Table 2
Level of Service (LOS) Criteria for Signalized Intersections

Level of Service	Average Delay (seconds per vehicle)	Traffic Flow Characteristics
A	≤ 10	Most vehicles arrive during the green phase and do not stop at all.
B	> 10 to ≤ 20	More vehicles stop, causing higher delay.
C	> 20 to ≤ 35	Vehicle stopping is significant, but many still pass through the intersection without stopping.
D	> 35 to ≤ 55	Many vehicles stop, and the influence of congestion becomes more noticeable.
E	> 55 to ≤ 80	Very few vehicles pass through without stopping.
F	> 80	Considered unacceptable to most drivers; intersection is not necessarily over capacity even though arrivals exceed capacity of lane groups.

Source: CCSF, p. 8.10-9

TRAFFIC AND TRANSPORTATION Table 3 provides LOS information for existing and future conditions for street intersections in the project area. It demonstrates that the LOS for intersections in the project vicinity operate at the C through A level, except for the morning and evening peaks at Third Street/Cesar Chavez and Third Street/Evans Avenue when the LOS is D. The project related traffic will not change the LOS at any intersection beyond what is expected for baseline 2007.

TRAFFIC AND TRANSPORTATION Table 3
Level of Service Summary for Existing, Baseline 2007, and Baseline 2007 Plus Project For Selected Intersections

Intersection	Peak Hour	Existing (2000) LOS	Baseline (2007) LOS	Baseline (2007) Plus Project During Construction LOS
Third Street/16th Street	Morning	B	C	C
	Evening	B	B	B
Third Street/20th Street	Morning	A	A	A
	Evening	A	A	A
Third Street/25th Street	Morning	B	A	A
	Evening	B	B	B
Third Street/Cesar Chavez	Morning	C	D	D

Street	Evening	C	D	D
Third Street/Evans Avenue	Morning	D	D	D
	Evening	C	D	D
Evans Avenue/Cesar Chavez Street	Morning	B	B	B
	Evening	B	C	C

Sources: SFERP, Table 8.10-4, p. 8.10-11, Table 8.10-6, p.10-21, and personal communication with Loren Bloomberg, CH2M HILL.

As noted above, one intersection's LOS will improve from the existing condition to the expected 2007 baseline. CCSF expects that the intersection of Third Street/25th Street should have less congestion during the morning commute due to the operation of the Third Street Light Rail Line. Staff concurs with this conclusion.

Accident rates

The number of reported collisions in the five year period from April 1, 1998 through March 31, 2003 for the following intersections in the project vicinity are (CCSF 2004g):

23rd Street/Illinois Street	3
25th Street/Illinois Street	0
23rd Street/Third Street	18
Third Street/24th Street	5
Third Street/25th Street	8
Third Street/26th Street	2
Third Street/Cesar Chavez Street	16
Cesar Chavez Street/Tennessee Avenue	1
Cesar Chavez Street/Minnesota Avenue	0
Cesar Chavez Street/Indiana Avenue	5
Cesar Chavez Street/Pennsylvania Avenue	6
Cesar Chavez Street/280 NB on ramp	0
Pennsylvania Avenue/280 SB on ramp	0

These accident rates indicate that intersections involving Third Street have the greatest number of accidents, which is consistent with its arterial designation and its higher volume of traffic when compared with the surrounding streets.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

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

- cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the

number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections);

- exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways;
- result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- result in inadequate emergency access;
- result in inadequate parking capacity; or
  conflict with adopted policies, plans, or programs.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Construction Impacts and Mitigation

When evaluating a project's potential impact on the local transportation system, staff uses LOS measurements as the foundation on which to base its analysis. The following discussion identifies potential traffic impacts associated with the construction of the SFERP, and provides an explanation of the impact conclusion.

The AFC provides an analysis of year 2007 projected traffic conditions with and without the addition of SFERP construction traffic trips. Project construction is expected to be completed in 12 months. Even though construction may start in the latter half of 2006, the applicant used a 2007 baseline, with project, to coincide with peak construction activity (CH2MHILL 2005). Staff believes that this is a reasonable baseline for analysis because peak construction traffic should take place in 2007. The average number of construction workers would be approximately 161, while the peak workforce would consist of approximately 264 workers (construction month six), including 250 workers at the plant site and eight workers for water pipeline construction. All plant construction workers would park at the lay-down area on 25th Street, while the pipeline construction crew would park adjacent to the pipeline construction sites.

Construction Workforce Traffic

Staff conservatively assumes an average automobile occupancy (AAO) of 1.0 person per vehicle for commuting. Using the highest number of workers figure of 264 and an AAO rate of 1.0 results in approximately 528 one-way daily worker trips. The 528 daily trips are allotted to 264 a.m. peak hour trips, and 264 p.m. peak hour trips. The applicant has also assumed that there would be approximately ten daily trips during the lunch interval. Peak hours are considered to be between 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m. As shown in **Traffic and Transportation Table 3**, SFERP-related traffic would not cause a deterioration of LOS to the 2007 baseline for any intersections in the local area. Given the experience with previous projects, staff believes that the estimated construction traffic trips and assumptions about peak hour activity are reasonable. The CCSF has indicated that they expect growth rates for traffic to increase one percent per year (SFERP 2006e).

Based on regional demographics, the construction workers would probably come from the City of San Francisco (25 percent), Marin County (15 percent), East Bay area (40 percent), and San Mateo County (20 percent). Construction workers would park at the laydown site on 25th Street adjacent to the project site. Some workers may be able to use public transit (i.e. bus, light rail).

To reach the laydown site, workers traveling from Marin County would exit onto Cesar Chavez Street, proceeding to Third or Illinois Streets. Workers from the East Bay would use I-80 to US 101, and exit on Cesar Chavez Street proceeding to Third or Illinois Streets. The traffic would then proceed north for two blocks turning right on 25th Street to reach the laydown site. Workers from within the City would use 16th Street and Third Street, while workers coming from San Mateo County would use SR-280, exit at Evans Avenue and proceed to Third Street. The traffic would then proceed north on Third Street to 25th Street. Proposed Condition of Certification **TRANS-5** would require a construction period parking and staging plan to ensure that the project construction worker-related traffic does not result in significant degradation of intersection LOS.

Construction Truck Traffic

Construction of the generating plant would require the use and installation of heavy equipment and associated systems and structures. Heavy equipment would be used throughout the construction period, including trenching and earthmoving equipment, forklifts, cranes, cement mixers and drilling equipment. Project construction is expected to require 40 truck trips per day. Proposed Condition of Certification **TRANS-1** would ensure that trips would occur during off-peak traffic hours.

In-bound truck traffic would reach the project site by traveling on U.S. 101 northbound to SR-280 northbound, exiting on Evans Avenue, traveling east on Evans Avenue to Third Street, north on Third Street to 25th Street, and east on 25th Street to the project site.

Trucks leaving the project site would travel from 25th Street to Third Street southbound, to Cesar Chavez Street westbound, to Pennsylvania Avenue northbound, to I-80 southbound, and then to U.S. 101 southbound. Under proposed Condition of Certification **TRANS-1**, construction truck traffic would be minimized during the morning or evening peak commute periods and would not significantly degrade the expected LOS on the local streets.

TRAFFIC AND TRANSPORTATION Table 4 provides data on project construction worker and truck trip generation.

TRAFFIC AND TRANSPORTATION Table 4
Peak Construction Trip Generation for the Proposed Project

Vehicle Type	ADT	AM Peak Hour In	AM Peak Hour Out	PM Peak Hour In	PM Peak Hour Out
Construction Personnel [a]	528	264	0	0	264
Delivery Trucks [b]	10	0	0	0	0
Heavy Vehicles and Trucks [c]	30	0	0	0	0
Total	**568**	**264**	**0**	**0**	**264**

. Source: CCSF, Table 8.10-5, p. 8.10-20

[a] Approximately 10 construction personnel trips (5 inbound and 5 outbound) associated with lunch and other business-related trips would occur from 9:00 a.m. to 4:00 p.m. (outside of peak hours).
[b] Delivery and other truck trips would occur on weekdays, from 9:00 a.m. to 4:00 p.m. (outside of peak hours).
[c] Heavy Vehicles and trucks trips would be scheduled outside of peak hours pursuant to proposed Condition of Certification **TRANS-1**.

Construction Phase Transport of Hazardous Materials and Waste

Deliveries would include small quantities of hazardous materials to be used during project construction, and during the preconstruction period, contamination solids from cleanup operations would be removed. The applicant has stated that the deliveries of hazardous materials to and from the site would be conducted in accordance with federal and state code. Staff has traveled the preferred route for transporting hazardous materials which involves the SR-280 off-and-on ramps, Cesar Chavez, Third and 25th Streets. The relatively short route goes through a commercial/industrial area with no residences, schools, hospitals, or other sensitive areas. Therefore, staff believes the route is appropriate.

Oversize and Overweight Load

Transportation of equipment that would exceed the load size and limits of certain roadways would require special permits from Caltrans. California Streets and Highways Code sections 117 and 660-672, and California Vehicle Code section 35780 et seq., require permits for the transportation of oversized loads on state and CCSF roads. Staff proposes Conditions of Certification **TRANS-2** and **TRANS-3** which would require the applicant to secure permits from Caltrans and/or CCSF for oversized loads, encroachment and activities within road rights-of-way. There are no height/weight restrictions for CCSF streets and highways in the project construction truck route (CCSF 2004a). Proposed Condition of Certification **TRANS-6** would require a road mitigation plan for any roads damaged by oversize or overweight vehicles.

Hazards Due to Project Design Features

The Pennsylvania Avenue I-280 off-ramp may be a safety consideration for project construction trucks due to this ramp's steep curve. Staff noted this item in a June 4, 2004 data request to the applicant. The applicant's July 6, 2004 response noted Caltrans' responsibility for safety items and related improvements on this freeway off-ramp. The applicant's response acknowledged that the project would temporarily add

more truck traffic to this ramp, but stated that it would not affect the safety of individual trucks. Potential safety hazards and any mitigation measures needed for this off-ramp should be part of the proposed Condition of Certification **TRANS-1** traffic control plan coordination and review process that the applicant would be required to initiate with Caltrans.

There are existing housing developments near some of the project truck routes, and more housing is proposed in the area, with the possibility of children traveling to school on school district or Municipal Railway buses. Similar to the requirement above for coordination with Caltrans, proposed Condition of Certification **TRANS-1** requires the applicant to discuss its truck travel routes with the San Francisco School District.

Linear Facilities

The water, gas, and transmission lines would affect the following streets: 25th, Illinois, Maryland, Cesar Chavez, Michigan, Main, Marin, Third, and Tulare (see **Project Description** for more detail**)**. Pipeline and transmission line construction personnel would park adjacent to their work sites. Water lines, gas pipeline and transmission line construction would require excavation in local roadways, and could temporarily interfere with vehicle and pedestrian use. Staff believes that the LOS for the affected streets will not deteriorate. Proposed Condition of Certification **TRANS-1** would require mitigation of any linear construction impact by ensuring that the construction traffic plan addresses minimizing traffic disruption and maintaining access to residential and commercial properties.

Operation Impacts and Mitigation

Employee and Truck Traffic

Operation of the generating plant would require a labor force of 11 full-time employees who would generate 22 daily one-way trips. Other project-related trips (i.e., delivery trucks, visitors, and other business-related trips) are expected to generate 60 one-way trips, for a total of 82 one-way trips. These trips would generate 11 morning peak hour and 11 evening peak hour trips. Staff assumes that operational trips would follow the same routes as for construction trips, and expects that these minor additions to surrounding local streets and highways would not significantly affect the LOS of these roads.

Transport of Hazardous Materials and Waste

The transportation and handling of hazardous substances associated with the project can increase roadway hazard potential. Impacts associated with hazardous material transport to the facility can be mitigated to a level of insignificance by compliance with existing federal and state standards established to regulate the transportation of Hazardous Substances. Proposed Condition of Certification **TRANS-4** requires adherence to federal and state regulations for hazardous materials transport.

The California Department of Motor Vehicles specifically licenses all drivers who transport hazardous materials. 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. Drivers transporting hazardous waste are required to carry a manifest, which is available for review in the event of a spill, and is reviewed by the California Highway Patrol at inspection stations along major highways and interstates.

The California Vehicle Code and the Streets and Highways Code (Sections 31600 through 34510) 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.

Project operation would require use of hazardous substances including herbicides, pesticides, and water treatment chemicals. Operation would also require 14 deliveries per year of aqueous ammonia. Proposed Condition of Certification **TRANS-1** would require that hazardous substance deliveries occur during off-peak hours to minimize the potential for collisions and other traffic accidents.

A licensed hazardous waste transporter would haul any hazardous project waste from the SFERP site to one of three Class 1 hazardous waste landfills in Southern California. Waste haulers would access the project site by traveling on Illinois Street to 23rd Street. Specific inbound and outbound hazardous materials and waste routes would be the same as for construction trucks. These routes would not involve truck travel through sensitive residential neighborhood areas. Hazardous wastes would be transported on SR-280 and U.S.101 south to I-5 or SR-99 for permanent disposal at a Class 1 hazardous waste facility.

The handling and disposal of hazardous substances are also addressed in the **WASTE MANAGEMENT, WORKER SAFETY AND FIRE PROTECTION** and **HAZARDOUS MATERIALS** sections of this report.

Emergency Response

The project would be equidistant from two San Francisco Fire Department stations: No. 37 at Wisconsin Street and 22nd Street, and No. 25 at 3rd and Marin Streets. Station No. 25 would typically be the first to respond to the project. The emergency vehicle route from Station No. 25 to the project site would be Third Street to 25th Street to the site. The response time would be two minutes from both stations (CCSF 2004c).

CCSF operates all city medical units in conjunction with the Fire Department. The two closest medical units with ambulance/paramedic service are Fire Station No. 17 at Shakespeare and Ingalls Streets, and Fire Station No. 9 at Jerrold and Toland Streets. Response time to the site for both would be four minutes. Station No. 9 would typically respond to any medical emergency at the project site (CCSF 2004c).

Airport Operations

Because the nearest active airport, Oakland International Airport, is about 10 miles from the project site, staff does not expect that the project would have any impact on aviation safety.

Plume Analysis

The facility's turbines would not produce water vapor plumes. The cooling tower has the potential for producing occasional small water vapor plumes, primarily in the morning hours or during cooler weather periods. Staff does not expect project-related water vapor plumes to reach any of the adjacent public roads.

CUMULATIVE IMPACTS AND MITIGATION

Four projects have been identified with construction periods that could coincide with SFERP construction:

- Segment C (23rd Street to Cesar Chavez Street) of the MUNI Light Rail Transit extension along Third Street;
- Proposed 71 unit residential condominium and retail project at 1275 and 1301 Indiana Street; this project would be a 183,000 sq. ft. planned unit development (CCSF 2004d).
- Proposed 141 residential unit and retail (restaurant and warehouse) project at 2235 3rd Street (20th and 3rd/Illinois Streets); this project would be a 167,500 sq. ft. planned unit development (CCSF 2004d).
- The Port of San Francisco is constructing a bridge across the Islais Creek channel along the line of Illinois Street. The 60-foot long bridge would provide direct rail service to the Port's Pier 80 cargo facility. Vehicles and bicyclists could also use the bridge when trains are not present (Port of San Francisco 2005a).

The applicant contacted MUNI staff in February 2005 to determine the status of the Segment C project. Construction is expected to be complete by the spring of 2006, with the number of construction trips tapering off once the light rail route is operational (Port of San Francisco 2005b). Based on this information, staff understands that the Third Street Rail extension will be completed prior to construction of SFERP and therefore, there would be no overlapping traffic impacts.

The proposed 71 unit residential/retail project has received a conditional use permit but has not submitted the application for a building permit. It is unclear when the application for the permit will be submitted though it must occur within the next two years (CCSF 2005a). The proposed 141 unit residential/retail project is on hold and undergoing design changes (CCSF 2005b). Staff notes the uncertain construction schedules for both of these projects, and the LOS of C or better in the vicinity, although the intersections of Third Street/Cesar Chavez and Third Street/Evans Avenue is projected to have LOS D in 2007 with or without the SFERP construction traffic. The possibility of cumulative traffic impacts in the Third Street area related to the residential/retail projects provides further justification for staff's recommendation that proposed Condition of Certification **TRANS-1** be adopted, with its requirement that construction worker commute trips be shifted to off-peak times.

The Illinois Street Bridge construction project over Islais Creek has begun and is expected to last for approximately 16 months. The bridge would be located about 0.25 miles south of the SFERP near Third Street and Tulare Avenue. Approximately 20 workers will be involved on a daily basis. Truck deliveries will average five to six per day

(Port of San Francisco 2005b). Staff has been advised that bridge construction should be completed by December 2006 (Port of San Francisco 2006). Staff believes that implementation of proposed Condition of Certification **TRANS-1** will mitigate any adverse cumulative traffic impact related to the Illinois Street Bridge construction project.

COMPLIANCE WITH LORS

The applicant has stated its intention to comply with all applicable LORS. With adoption of the proposed conditions of certification, staff has concluded that the project would comply with relevant LORS.

AGENCY AND PUBLIC COMMENTS

There were no agency or public comments received on the Preliminary Staff Assessment.

CONCLUSIONS

1. With implementation of the proposed conditions of certification, the project would be consistent with the Circulation Element of the CCSF General Plan and all other applicable LORS. Staff is recommending that the applicant shift construction worker arrival/departure times to off-peak traffic periods to prevent significant LOS deterioration on the local road network, as noted in proposed Condition of Certification **TRANS-1**. This shift would ensure that local road and highway demand resulting from the daily movement of workers and materials would not increase beyond significance thresholds established by CCSF. During the operational phase, increased roadway demand resulting from the daily movement of workers and materials would be minimal.
2. Staff proposes that the applicant prepare a Traffic Control Plan as proposed in Condition of Certification **TRANS-1,** with review and coordination with Caltrans, including a discussion of any safety issues resulting from the project adding more truck traffic on the SR-280 off-ramp to Pennsylvania Avenue. Similarly, as proposed in Condition of Certification **TRANS-1**, the applicant would be required to initiate review and coordination with the San Francisco School District regarding any school bus routes affected by project-related traffic.
3. Because of the distance of the project from airports, the project would not impact aviation safety.
4. There would be transportation of hazardous materials and waste during project construction and operation. There is good road access for the transportation of hazardous materials. With the implementation of the proposed conditions of certification, hazardous material delivery and waste removal will occur in a safe manner.
5. CCSF's Transportation Element contains a policy to reduce peak period congestion through the promotion of flexible work schedules at worksites throughout the city,

which is consistent with proposed Condition of Certification **TRANS-1** requirement to have workers travel during off-peak times.

6. Staff has not identified any unmitigated adverse direct or cumulative impact on the local transportation system related to the construction and operation of the SFERP. Therefore, there is no adverse and/or disproportionate traffic and transportation impact on the minority or low-income population identified in **SOCIOECONOMICS Figure 1**.

PROPOSED CONDITIONS OF CERTIFICATION

TRANS-1 The project owner shall develop a construction traffic control plan that limits peak hour construction-period truck and commute traffic in coordination with the City and County of San Francisco (CCSF) Public Works Department. The project owner shall also consult with Caltrans regarding any freeway access and on/off-ramps, the San Francisco Unified School District regarding school bus routes, and the CCSF staff dealing with traffic regulation enforcement. Specifically, the overall traffic control plan shall include the following:

- Require the primary contractor and major subcontractors to develop and implement a construction employee carpool program;
- Through worker education and shift scheduling, maximize worker commute trips during off-peak hours (off-peak hours are (1) before 7:00 AM; (2) between 9:00 AM and 4:00 PM; and (3) after 6:00 PM or other hours as agreed to by the CPM;
- Schedule heavy vehicle equipment, building material, and hazardous materials and equipment to the site and adjacent lay-down area to occur during off-peak hours; and
- Coordinate with CCSF and other applicable agency staff to mitigate any potential adverse traffic impacts from other proposed construction projects that may occur during the SFERP construction phase (i.e. Illinois Street Bridge).

The construction traffic control plan shall also address the following issues to control construction traffic for linear facilities:

- Water and gas pipeline construction affecting local roads should take place outside the peak traffic periods to avoid traffic flow disruptions, or other hours as agreed to by the CPM;
- Signing, lighting, and traffic control device placement;
- Temporary travel lane closures and potential need for flaggers;
- Maintaining access to adjacent residential and commercial properties; and
- Emergency access.

Verification: At least 60 days prior to start of site mobilization, the project owner shall provide to the CCSF Department of Parking and Transportation and the Public Works Department, the California Highway Patrol for review and comment, and to the CPM for review and approval, a copy of the construction traffic control plan. The plan must document consultation with Caltrans and the San Francisco Unified School District.

TRANS-2 The project owner shall comply with Caltrans and other affected jurisdictions' limitations on vehicle sizes and weights. In addition, the project owner or their contractor shall obtain necessary transportation permits from Caltrans and all relevant jurisdictions for roadway use.

Verification: In the Monthly Compliance Reports to the CPM, the project owner shall submit copies of any oversize and overweight transportation permits received during that reporting period. In addition, the project owner shall retain copies of these permits and supporting documentation in the on-site compliance file for at least six months after the start of commercial operation.

TRANS-3 The project owner shall ensure compliance with Caltrans and other relevant jurisdiction's limitations for encroachment into public rights-of-way, and shall obtain necessary encroachment permits from Caltrans and all relevant jurisdictions.

Verification: In the Monthly Compliance Reports to the CPM, the project owner shall submit copies of any encroachment permits received during that reporting period. In addition, the project owner shall retain copies of these permits and supporting documentation in the on-site compliance file for at least six months after the start of commercial operation.

TRANS-4 The project owner shall ensure that permits and/or licenses are secured from the California Highway Patrol and Caltrans for the transport of all hazardous materials, and that all federal and state regulations for the transport of hazardous materials are observed.

Verification: In the Monthly Compliance Reports to the CPM, the project owner shall provide copies of all permits and licenses acquired by the project owner concerning the transport of hazardous materials during that period. In addition, the project owner shall retain copies of these permits and licenses in the on-site compliance file for at least six months during construction and operation of the power plant.

TRANS-5 Prior to the construction of the power plant and all related facilities, the project owner shall develop a parking and staging plan for all phases of project construction to ensure that all project related parking occurs on-site.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit the plan to the CCSF Public Works Department for review and comment, and to the CPM for review and approval. The material submitted to the CPM shall include documentation of the Public Works Department's review and comments. Monthly Compliance Reports submitted to the CPM shall describe the project owner's actions pursuant to the parking and staging plan.

TRANS-6 Prior to the beginning of site mobilization activities, the project owner shall prepare a mitigation plan for any identified street that has the potential to be damaged by oversize or overweight vehicles and underground utility construction to the CCSF Public Works Department, and the CPM. The intent of this plan is to ensure that any streets that has the potential to be damaged by oversize or overweight vehicles serving the project and underground utility construction will be repaired and reconstructed to original or as near original condition as possible. This plan shall include:

- Documentation of the pre-construction condition of the surface streets in the vicinity of the site and those along the underground utility routes. Prior to the start of site mobilization, the project owner shall provide to the CPM photographs or videotape of the affected streets.
- Documentation of any portions of streets that may be inadequate to accommodate oversize or large construction vehicles, and identify necessary remediation measures;
- Provide for appropriate bonding or other assurances to ensure that any damage to a street due to construction activity will be remedied by the project owner;
- Relocation of utility poles, if necessary, to insure that adequate clear zones are established along the property frontage; and
- Reconstruction of portions of streets that are damaged by project construction including the use of oversize or overweight construction vehicles, and the installation of underground utilities.

Verification: At least 90 days prior to the start of site mobilization, the project owner shall submit a mitigation plan focused on restoring identified streets to their pre-project condition to the CCSF Public Works Department for review and comment, and to the CPM for review and approval.

At least 90 days prior to the start of any underground utility construction, the project owner shall submit a separate street damage mitigation plan to the CCSF Public Works Department for review and comment and to the CPM for review and approval.

Within 90 days following the completion of construction, the project owner shall provide photo/videotape documentation to the CCSF Public Works Department, and the CPM that the damaged streets have been restored to their pre-project condition.

REFERENCES

CCSF Planning Department. General Plan Transportation Element. July 6,1995.

CCSF 2004a. Phone conversation between Jerry Robbins, Transportation Planner, CCSF Department of Parking and Traffic with Ken Peterson, Energy Commission staff. May 10, 2004.

CCSF 2004b. E-mail from Jerry Robbins to Ken Peterson on May 11, 2004.

CCSF 2004c. Phone conversation between Eric Chow, Intern, CCSF Fire Department, Chief's Office, and Ken Peterson on May 12, 2004.

CCSF 2004d. E-mail from Tim Blomgren, Planner, to Ken Peterson on May 12, 2004.

CCSF 2004e. E-mail from Bill Wyco, CCSF Planning Department to Ken Peterson regarding transportation impact significance criteria, sent on May 18, 2004.

CCSF 2004f. E-mail from Bill Wyco to Ken Peterson regarding transportation study criteria, sent on May 18, 2004.

CCSF 2004g. E-mail from Jerry Robbins to James Adams, Energy Commission staff, regarding vehicle collisions at local intersections near the SFERP site, sent on June 14, 2005.

CCSF 2005a. Personal communication between Matt Snyder, Planning Department, and James Adams on June 13, 2005.

CCSF 2005b. Personal communication between Tamy Chan, Planning Department, and James Adams on June 13, 2005.

CCSF 2005c. Personal communication with Jerry Robbins, Department of Parking and Traffic, James Adams on June 16, 2005.

CH2MHILL 2005. Personal communication between John Carrier, Program Manager, and James Adams on August 25, 2005.

CH2M HILL 2006. E-mail exchange between Loren Bloomberg, CH2M HILL, and James Adams, on February 6, 2006.

Port of San Francisco 2005a. E-mail from David Beaupre, Senior Waterfront Planner, to James Adams on May 23, 2005.

Port of San Francisco 2005b. Personal communication between David Beaupre and James Adams on August 25, 2005.

Port of San Francisco 2006. Personal communication between David Beaupre and James Adams on February 6, 2006.

SFCMP 2003. San Francisco County Congestion Management Plan. San Francisco County Transportation Authority. Dated November 2003.

SFERP 2004a (City and County of San Francisco/Blout) 2004a (tn: 31130). Application for Certification , San Francisco Electric Reliability Project (04-AFC-1). Submitted to the California Energy Commission March 18, 2004.

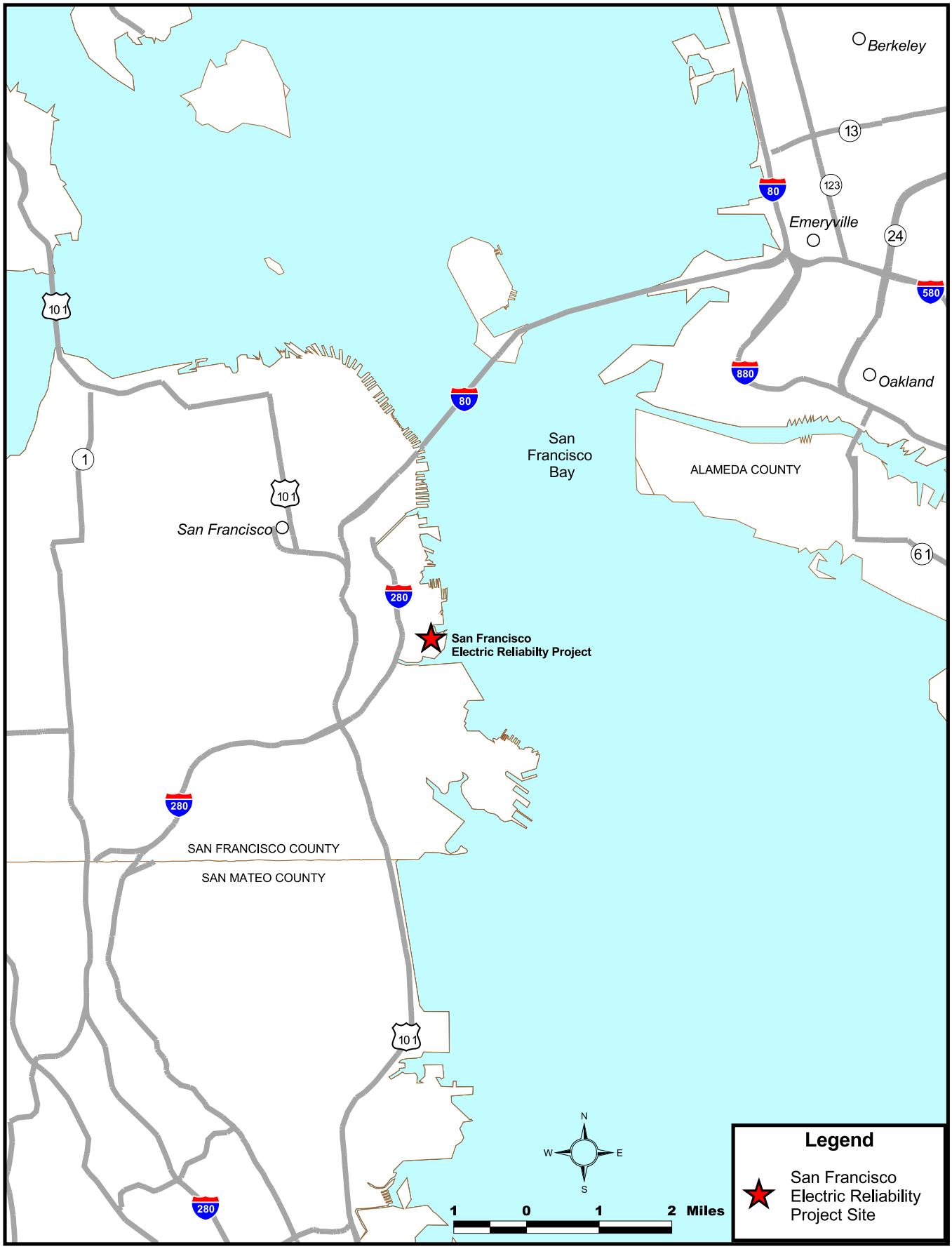
SFERP 2005pp. SFPUC Preliminary Staff Assessment Comments, Set 2, p.7, October 31, 2005.

SFERP 2006c. SFERP AFC Supplement B: Process Water Supply. POS. 1/11/06.

SFERP 2006e. Personal communication between Jerry Robbins and James Adams on February 6, 2006.

TRAFFIC AND TRANSPORTATION - FIGURE 1

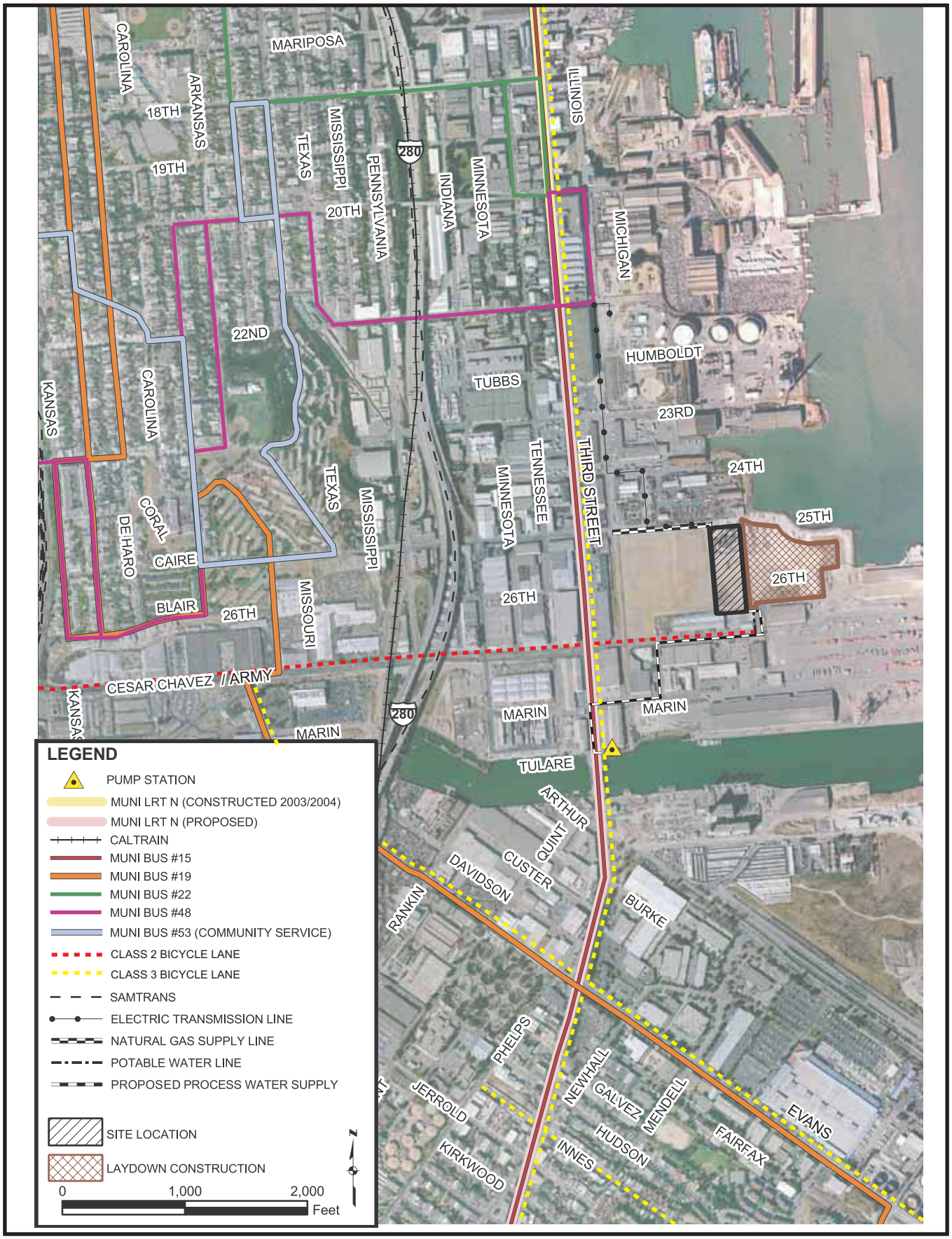
San Francisco Electric Reliability Project Supplement A - Regional Highway System



CALIFORNIA ENERGY COMMISSION, SYSTEMS ASSESSMENT & FACILITIES SITING DIVISION, FEBRUARY 2006

SOURCE: California Energy Commission Statewide Transmission & Power Plant Maps 2006

TRAFFIC AND TRANSPORTATION - FIGURE 2
San Francisco Electric Reliability Project Supplement A -
Local Transportation Network near the Project Site

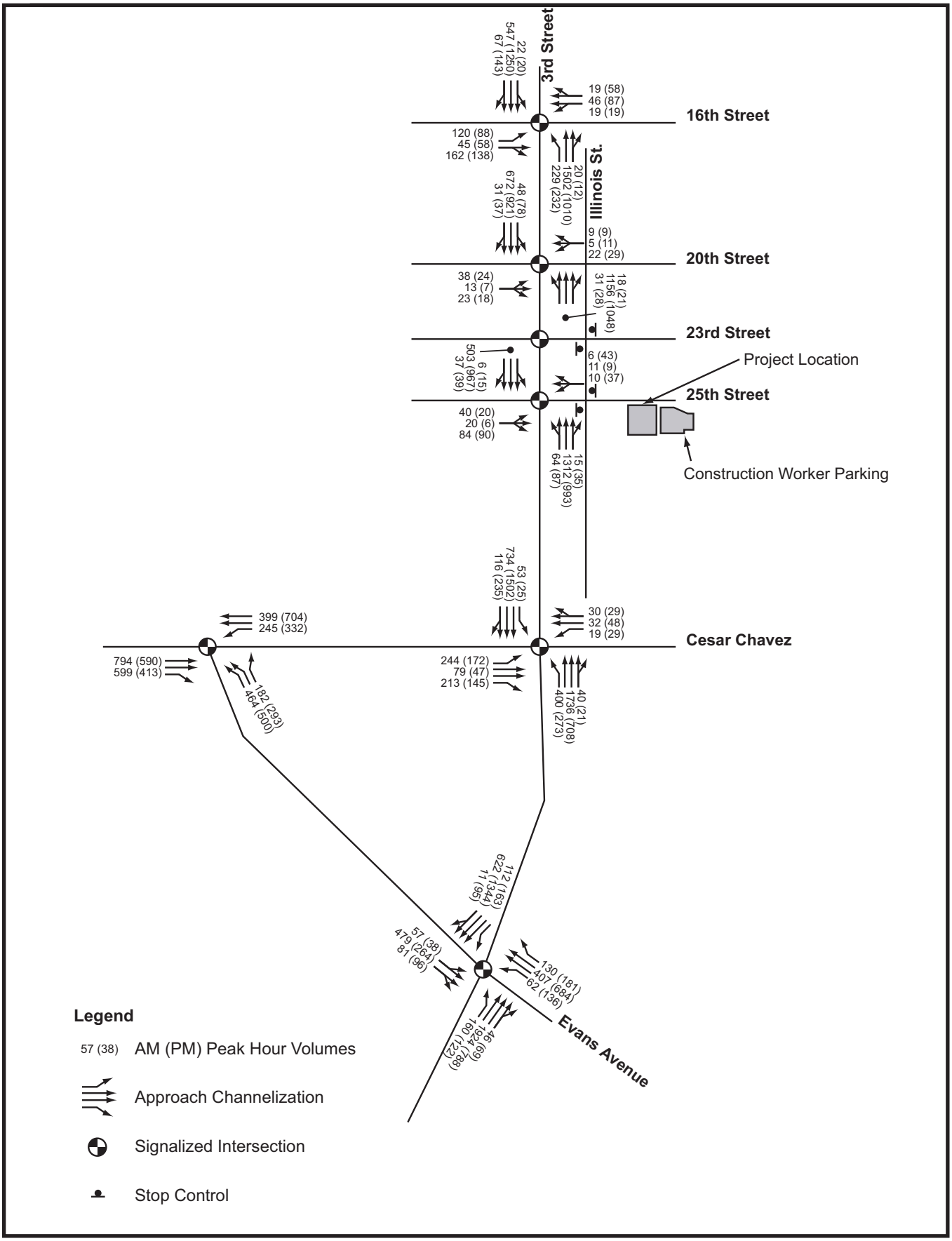


CALIFORNIA ENERGY COMMISSION, SYSTEMS ASSESSMENT & FACILITIES SITING DIVISION, FEBRUARY 2006
SOURCE: AFC - Supplement A - Figure 8.10-2

TRAFFIC AND TRANSPORTATION - FIGURE 3

San Francisco Electric Reliability Project - Supplement A -

Existing (2000) Morning and Evening Peak Hour Volumes, Intersection Channelization and Traffic Control



CALIFORNIA ENERGY COMMISSION, SYSTEMS ASSESSMENT & FACILITIES SITING DIVISION, FEBRUARY 2006

SOURCE: AFC - Supplement A - Figure 8.10-3

TRANSMISSION LINE SAFETY AND NUISANCE

Testimony of Obed Odoemelam, Ph.D.

SUMMARY OF CONCLUSIONS

The applicant, the City and County of San Francisco, proposes to transmit the power from the San Francisco Electric Reliability Project to the Pacific Gas and Electric transmission grid through a new 3,000-ft, underground115-kilovolt transmission line connecting the facility with Pacific Gas and Electric's existing Potrero Substation. Undergrounding is the most effective method of safely minimizing the intensity of fields from the conductors of a given line while also reducing the area of the potential long-term magnetic field exposure, which is the present health concern. The proposed line would traverse a mostly industrial area with no nearby residences, thereby eliminating the potential for such residential exposure. However, there would still be the potential for insignificant exposure to people who traverse the area. The proposed underground placement, operating, and maintenance plan would be according to standard Pacific Gas and Electric practices, which conform with applicable laws, ordinances, regulations and standards. Staff recommends approval of the line as proposed and without requirements for further mitigation.

INTRODUCTION

The electrical energy from the proposed San Francisco Electric Reliability Project (SFERP) would be delivered to the Pacific Gas and Electric (PG&E) transmission power grid through a new underground 115-kilovolt (kV) transmission line extending 3,000 feet to connect the project's on-site switchyard to PG&E's existing 115-kV Potrero Electrical Substation to the northeast. The proposed line would be owned and operated by the applicant, the City and County of San Francisco (CCSF). Since the line would be located within the PG&E service area, it would be designed, built, and operated according to PG&E's standards and practices for underground lines and related structures (SFPUC 2005a pp. 5-1 through 5-8).

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

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

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

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

Applicable LORS	Description
Aviation Safety	
Federal	
Title 14, Part 77 of the Code of Federal Regulations (CFR),"Objects Affecting the Navigable Space"	Describes the criteria used to determine the need for a Federal Aviation Administration (FAA) "Notice of Proposed Construction or Alteration" in cases of potential obstruction hazards.
FAA Advisory Circular No. 70/7460-1G, " Proposed Construction and/or Alteration of Objects that May Affect the Navigation Space"	Addresses the need to file the "Notice of Proposed Construction or Alteration" (Form 7640) with the FAA in cases of potential for an obstruction hazard.
FAA Advisory Circular 70/460-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.
Interference with Radio Frequency Communication	
Federal	
Title 47, CFR, Section 15.2524, Federal Communications Communication (FCC)	Prohibits operation of devices that can interfere with radio-frequency communication.
State	
California Public utilities Commission (CPUC) General Order 52 (GO-52)	Governs the construction and operation of power and communications lines to prevent or mitigate interference.
Audible Noise	Not to exceed applicable local noise ordinances – (no design-specific federal or state regulations for noise from transmission lines).
Hazardous and Nuisance Shocks	
State	
CPUC GO-95, "Rules for Overhead Electric Line Construction"	Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.
Title 8, California Code of regulations (CCR) Section 2700 et seq, "High Voltage Safety Orders"	Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.

Applicable LORS	Description
National Electrical Safety Code	Specifies grounding procedures to limit nuisance shocks. Also specifies minimum conductor ground clearances.
Industry Standards	
Institute of Electrical and Electronics Engineers (IEEE) 1119, "IEEE Guide for Fence Safety Clearances in Electric-Supply Stations"	Specifies the guidelines for grounding-related practices within the right-of-way and substations.
Electric and Magnetic Fields	
State	
GO-131-D, CPUC "Rules for Planning, and Construction of Electric Generation Line and Substation Facilities in California"	Specifies application and noticing requirements for new line construction including EMF reduction.
CPUC Decision 93-11-013	Specifies CPUC requirements for reducing power frequency electric and magnetic fields.
Industry Standards	
American national Standards Institute (ANSI/IEEE) 644-1944 Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines	Specifies standard procedures for measuring electric and magnetic fields from an operating electric line.
Fire Hazards	
State	
14 CCR Sections 1250-1258, "Fire Prevention Standards for Electric Utilities"	Provides specific exemptions from electric pole and tower firebreak and conductor clearance standards and specifies when and where standards apply.
GO-128, CPUC, "Rules for Underground Electric Line Construction.	Covers required clearances, grounding techniques, maintenance, and inspection requirements.

SETTING

As noted in the **Project Description** section, the site for the proposed SFERP is a 4-acre parcel owned by the CCSF and located south of 25th Street approximately 900 feet east of Illinois Street. The site was chosen in part for its proximity to PG&E's Potrero Substation to which it would be connected. Such proximity would reduce the length of the connecting transmission line to be used (SFPUC 2005a, p.5-1). The project site and the proposed line route are within an industrial area, with the nearest residential neighborhood located approximately 1,600 feet to the west (SFPUC 2005a, pp. 8.4-2 through 8.4-6). This distance to residences would minimize the potential for any of the

residential field exposure mostly responsible for the present health concerns. The only project-related EMF exposures of potential significance are the short-term exposures of plant workers, regulatory inspectors, maintenance personnel, visitors, or individuals in the immediate vicinity of the buried line. These types of exposures are short term and well understood as not significantly related to the present health concerns discussed below.

PROJECT DESCRIPTION

The proposed SFERP transmission project will consist of the segments listed below:

- Two underground 115-kV circuts extending approximately 3,000 feet from the project's 115-kV switchyard to the connection point at PG&E's Potrero Substation to the northeast ; and
- The project's on-site 115-kV switchyard and two related underground-to-aboveground transition structures at the project site and the PG&E Potrero Substation connection point.

The line's conductors would be encased in specific shields within a concrete casing buried according to PG&E practices (and in compliance with GO-128), which ensure safety, efficiency, and maintainability. Placing line conductors in burial casings brings them closer together than with similar overhead lines. Since such closeness enhances the cancellation effects of fields from the individual conductors, the intensity of lines from underground lines is usually lower at the same distance, than for similar overhead lines. The proposed underground-to-aboveground transition structures at the Potrero Substation would be of dimensions typical of similar PG&E lines.

As more fully discussed by the applicant (SFPUC 2005a, p. 5-1), the proposed route would begin from the project's switchyard and exit north from the project site into 25th Street, proceeding west along 25th Street until turning north into Michigan Street. It would then turn west from Michigan Street into 24th Street and proceed further to intersect Illinois Street. From there, it would continue northward to the point of connection at the PG&E Potrero Switchyard. The applicant specified two alternative routes for entry from Illinois Street into the Potrero Switchyard. None would significantly change the presently low potential for long-term residential field exposures of concern.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

DIRECT IMPACTS AND MITIGATION

The potential magnitude of the line impacts of concern in this analysis depends on compliance with the listed LORS whose related mitigation measures have been established as adequate to maintain such impacts below levels of potential significance. The nature of these individual impacts is discussed below together with the potential for compliance with the applicable LORS.

Aviation Safety

Any potential hazard to area aircraft would relate to the potential for collision with the line or its support structures when they intrude into the navigable air space. Compliance with the regulations in TLS&N Table 1 is usually necessary to minimize the collision hazard related to this intrusion and also ensure the adequacy of identifying markings when necessary.

Since the proposed is an underground line, its presence would be insignificant regarding these collision-related aviation hazards. The only related overhead structures would be the two underground-to-aboveground structures to be located at the project site and Potrero Substation. As noted by the applicant (SFPUC 2005a, p. 5-4), the height of this transition-related structure would not be more than those of the existing structures at the Substation, all of which are much shorter than the 200 feet regarded by the FAA as triggering the concern about aviation safety. Furthermore, the line would be in an energy production and transmission area with existing lines of similar voltage and structural dimensions. The nearest airport is the Oakland International Airport, which, at about 6.5 miles (34,000 feet) to the east, is further away than the 20,000 feet that triggers FAA notification. Given these conditions, staff considers the proposed underground line and related structures as not posing an obstruction-related aviation hazard to area aircraft as defined using current FAA criteria. Therefore, no FAA "Notice of Construction or Alteration" would be required.

Field Effects

The electric fields from power lines and similar sources produce two types of perceivable effects known as corona effects or field effects. Corona effects result from air ionization by electric fields at the surface of energized conductor or suspension hardware. The noted interference with radio-frequency communication and audible noise result from these corona effects. Since electric fields are unable to penetrate most materials, including the soil, such electric field effects are not associated with underground lines and would therefore, not be experienced along the route of the proposed line.

Fire Hazards and Nuisance and Hazardous Shocks

The fire prevention regulations in TLS&N Table 1 are aimed at fires 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. Those regulations do not apply to this and most underground lines. The only overhead structures would be the underground-to-aboveground transition structures to be located at the project site and Potrero Substation where there are no nearby combustible objects.

The hazardous shocks that are addressed by the regulations and standards in TLS&N Table 1 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. The applicable regulation for

underground lines is GO-128, with which the applicant intends to comply (SFPUC 2005a, p. 5-5). This requirement is also specified in Condition of Certification **TLSN-1.**

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. It is because both fields occur together whenever current flows that exposure to them is generally described as EMF exposure. The available evidence as evaluated by the California Public Utilities Commission (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 reduction of such fields to the extent feasible without affecting safety, efficiency, reliability and maintainability.

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

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

The related rules and regulations in TLS&N Table 1 are intended to minimize such fields while ensuring the necessary safety and reliability.

In California, the CPUC (which regulates the installation and operation of investor-owned utility high-voltage lines) has determined that only no-cost or low-cost measures are presently justified in any effort to comply with the listed rules and regulations as necessary to reduce power line fields beyond levels existing before the present health concern arose. The CPUC has further determined that such reduction should be made only in connection with new or modified lines. It requires each investor-owned 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. Utilities, which are not within the jurisdiction of the CPUC, voluntarily comply with these CPUC requirements. This CPUC policy resulted from assessments made to implement CPUC Decision 93-11-013. The CPUC is currently reassessing the EMF health issues to consider the need for any changes to present policy. Since electric fields are not encountered around underground lines as previously noted, humans would not be exposed along the proposed route.

Not only does undergrounding produce the lowest magnetic fields possible from a given line, the related close conductor placement also causes the intensity to diminish more rapidly with distance from the buried line than with the overhead counterpart at the same current flow rates. However, since the distance to the underground conductors would be less than from the exposed individual to the overhead counterpart, the individual's exposure level would be greater, although only within the smaller impact zone for the underground line. Such exposures are more likely to be short-term in the aggregate given the narrowness of the underground line's field impacts zone. Such short-term exposures are well known and understood as not significantly related to the modern health concern.

Field intensities are estimated or measured for a height of one meter above the ground, in units of kilovolts per meter (kV/m), for the electric field, and milligauss (mG) for the companion magnetic field. Their magnitude depends on line voltage (in the case of electric fields), the geometry of the support structures, degree of cancellation from nearby conductors, distance between conductors and, in the case of magnetic fields, amount of current in the line.

Given the shorter impact zone of underground line magnetic fields, the extent of their related long-term residential exposures is much less than for similar overhead lines. Therefore, staff regards the proposed undergrounding as the most effective field strength reduction method and does not recommend any further mitigation in this regard.

Industrial Standards

As reflected in TLS&N Table 1, there are no health-based federal regulations or industry codes specifying environmental 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 (Florida, Minnesota, New Jersey, and New York, 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. They also believe 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 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 to much stronger fields while using some common household appliances

(National Institute of Environmental Health Services and the U.S. Department of Energy, 1995). The difference between these types of field exposures is that the higher-level, appliance-related exposures are short-term, while the exposure from power lines are lower level, but long-term. Scientists have not established which of these types of exposures would be more biologically meaningful in the individual. Staff notes such exposure differences only to show that high-level magnetic field exposures regularly occur in areas other than around high-voltage power lines.

As noted by the applicant (SFERP 2004a, pp. 5-7 and 5-8.), specific field strength-reducing measures are incorporated into power line designs in general to ensure the field strength minimization currently required by CPUC in light of the concern over EMF exposure and health.

These reduction measures may include the following:

1. Increasing the distance between the conductors and the ground;
2. Reducing the spacing between the conductors;
3. Minimizing the current in the line; and
4. Arranging current flow to maximize the cancellation effects from interacting of conductor fields.

Undergrounding achieves the close conductor placement listed above. Since this would be implemented according to PG&E's standards and practices (which comply with GO-128), staff does not recommend additional mitigation before construction or mitigation-driven field strength measurements after the line is energized.

CUMULATIVE IMPACTS AND MITIGATION

Since the proposed undergrounding would yield magnetic fields of the lowest intensity possible for lines of the proposed voltage and current-carrying capacity, any contribution to cumulative area exposures would be at the lowest levels currently possible for such lines without affecting safety, reliability, efficiency, and maintainability. Staff regards the proposed impact minimization as constituting compliance with current CPUC requirements for managing the fields from new sources.

AGENCY AND PUBLIC COMMENTS

Staff received no public or agency comments regarding Transmission Line Safety and Nuisance.

COMPLIANCE WITH LORS

As previously noted, current CPUC policy on safe EMF management requires that any high-voltage line within a given area be designed to minimize the potential for electric shocks and aviation hazards while producing fields of the lowest intensity possible without impacts on line safety, efficiency, reliability and maintainability. Since the proposed undergrounding would achieve these goals, staff considers the presented design and operational plan as complying with the health and safety LORS of concern

in this analysis. The project also complies with all applicable aviation safety, radio frequency interference, audible noise, hazardous and nuisance shock, fire hazard and industrial standard LORS.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The proposed undergrounding of the SFERP line would produce fields of the lowest intensity possible for lines of the same voltage and current-carrying capacity. Since the route would traverse an area without nearby residences, the field and non-field impacts of concern in this analysis would be insignificant for area residents. Such design and routing for impact minimization is in keeping with present CPUC requirements for management of fields from such lines (see **Transmission System Engineering**). The line's only overhead structures would be located too far from the nearest area airport to pose an aviation hazard

RECOMMENDATIONS

Since the proposed underground line would produce field and non-field impacts of the lowest magnitude possible without affecting line operations and safety, staff does not recommend further mitigation and recommends approval of the proposed design and operational plan. The only recommendation is for affirmation of the applicant's intention to design, operate and route it as proposed.

PROPOSED CONDITIONS OF CERTIFICATION

TLSN-1 The project owner shall provide specific evidence that the proposed interconnection transmission line will be designed and constructed by the City and County of San Francisco according to the requirements of CPUC's GO-95, GO-128, 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: At least 30 days before starting construction of transmission lines or related structures and facilities, the project owner shall submit to the Compliance Project Manager (CPM) a letter affirming that the proposed SFERP line will be constructed according to the requirements of GO-128, 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.

REFERENCES

California Public Utilities Commission 1989. Potential Health Effects of Electric and Magnetic Field from Electric Power Facilities. A Report to the California Legislature by the California Public Utilities Commission in Cooperation with the California Department of Health Services. California Department of Health Services, Berkeley, California.

Carpenter DO and Ayraptan S 1994. Biological Effects of Electric and Magnetic Fields. Vol. 2. Academic Press New York.

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

Energy Commission Staff 1992. High Voltage Transmission Lines: Summary of Health Effects Studies. California Energy Commission Publication, P700-92-002.

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

SFPUC-San Francisco Public utilities Commission 2005a. Amendment A to the Application for Certification for the San Francisco Electric Reliability Project. Submitted to the California Energy Commission on March 25, 2005.

SFERP-San Francisco Electric Reliability Project 2004a. Application for Certification. Volumes II and I. Submitted to the California Energy Commission on March 18, 2004.

VISUAL RESOURCES

Testimony of Mark R. Hamblin

SUMMARY OF CONCLUSIONS

Energy Commission staff analyzed the potential visual impacts of the proposed San Francisco Electric Reliability Project in accordance with the California Environmental Quality Act, and the project's compliance with applicable laws, ordinances, regulations, and standards pertaining to visual resources. Staff concludes that the proposed project would not cause significant adverse visual impacts. Effective implementation of the applicant's proposed mitigation measures and staff's recommended conditions of certification would reduce adverse visual impacts from the project to a less than significant level and ensure that the project complies with applicable laws, ordinances, regulations, and standards regarding visual resources.

INTRODUCTION

Visual resources are the natural and man-made features of the environment that can be viewed. This analysis focuses on whether construction and operation of the San Francisco Electric Reliability Project (SFERP) would cause visual impact(s) under the California Environmental Quality Act (CEQA) and whether the project would be in compliance with applicable laws, ordinances, regulations, and standards (LORS).

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Staff has provided, in **VISUAL RESOURCES Table 1,** a general listing of applicable LORS that staff has evaluated to determine the proposed project's compliance. The project's consistency with specific LORS is discussed in **VISUAL RESOURCES Table 2** in this analysis.

VISUAL RESOURCES Table 1
Laws, Ordinances, Regulations, and Standards

Jurisdiction & Applicable LORS	LORS Description
Federal	The proposed project is not located on federally administered public lands and is not subject to federal regulations pertaining to visual resources.
State	There are no officially designated State Scenic Highways or Scenic Routes within the project viewshed. There are no state regulations pertaining to scenic resources applicable to the project.
Local	
City and County of San Francisco General Plan	
Recreation and Open Space Element – Shoreline (Objective 3)	- Assure that new development adjacent to the shoreline capitalizes on its unique waterfront location, considers shoreline land use provisions, improves visual and physical access to the water and conforms to urban design policies.
Urban Design Element	- The Urban Design Element is concerned both with development and with preservation. It is a concerted effort to recognize the positive attributes of the city, to enhance and conserve those attributes, and to improve the living environment where it is less than satisfactory.
Central Waterfront Area Plan - Urban Design (Objective 10)	- The overall goal of this Plan is to create a physical and economic environment conducive to the retention and expansion of San Francisco's industrial and maritime activities. The purpose of this Area Plan is to guide the future development of the Central Waterfront in a manner serving the varying needs and interests of San Francisco.
San Francisco Planning Code	
M-2 (Heavy Industrial) District	- This district is the least restricted as to use, and is located at the eastern edge of the City, separated from residential and commercial areas. The heavier industries are permitted, with fewer requirements as to screening and enclosure than in M-1 Districts, but many of these uses are permitted only as conditional uses or at a considerable distance from Residential Districts. (Amended by Ord. 443-78, App. 10/6/78)

SETTING

REGIONAL SETTING

The SFERP is proposed to be constructed in an industrial setting near the City of San Francisco's eastern waterfront. The project site consists of approximately four acres owned by the City/County of San Francisco, adjacent to the Port of San Francisco North Container Terminal. The site has a concrete batch plant on its north end that will be removed prior to development of the SFERP. The remainder of the site is vacant.

Within the project vicinity, foreground to middle-ground views (generally one mile or less) of the proposed project site are primarily limited to the upper elevations of the surrounding terrain, or to the upper floors of multi-storied buildings. Views toward the site are either open, or disrupted by the roof tops of structures.

Surrounding views from the project site include the following; to the north of the site is the Central Basin, an industrial area. The view consists of many masonry and concrete type structures. To the south are the Port of San Francisco North Container Terminal, the India Basin industrial/business park area, and Hunters Point, a prominent ridge and residential neighborhood. The existing Hunters Point Power Plant is visually prominent in this area (SECAL 2000a, AFC p. 8.11-6). To the east of the project site is the Port of San Francisco's truck terminal and beyond it the open panoramic waterscape of San Francisco Bay. To the west of the project site, along Third Street are masonry and corrugated steel industrial type rectangular structures, and scattered residential units. West of Third Street (west of Interstate-280) single-family and multi-family residential units become more prominent, with dense residential areas at higher elevations on Potrero Hill.

The Mirant owned Potrero Power Plant is approximately 1,000 feet north of the proposed project site. The Potrero Power Plant has several tall vertical structures on its site which include: a 305-foot tall exhaust stack, a 125-foot tall Unit #3 structure, the 70-foot tall masonry Station "A" complex, a 56-foot tall control room, three large fuel oil storage tanks (140 feet in diameter x 50 feet tall, 157 feet in diameter by 48 feet tall, and 167 feet in diameter by 65 feet tall); and several 80-100 foot tall steel lattice structures.

Travelers on Interstate-280 (I-280) looking towards the project site would have a disrupted view caused by various structures, including marine commerce facilities along the waterfront, and a dramatic, panoramic background view of San Francisco Bay.

PROJECT, SITE, AND VICINITY DESCRIPTION

This section describes the aspects of the proposed project that may have the potential to cause adverse impacts to visual resources. Please refer to the **PROJECT DESCRIPTON** section of the Final Staff Assessment (FSA) for a more comprehensive description of the project's details.

Power Plant

The most visible components of the proposed power plant would include: three 85-foot tall exhaust stacks, three 32-foot tall (including the intake air filters) gas combustion

turbine generators (CTGs), a 32-foot tall recycled water treatment building, two 33-foot tall water storage tanks, and a 45-foot tall duplex chiller/coolant tower package.

No landscaping is proposed as part of the project. The exteriors of all project elements would be treated with a neutral gray finish that would optimize visual integration with the surrounding environment.

The facility's perimeter fence will be an eight foot high wrought iron security type with curved pointed tips. This type of security fence is designed with limited horizontal rails to discourage climbing. It would be consistent with the proposed perimeter fence approved for the San Francisco Metro East Light Rail Maintenance and Operations Facility on the adjoining 13 acres to the west of the project site.

Linear Facilities

A proposed underground 115-kilovolt (kV) transmission line would directly connect the SFERP to the power grid through the PG&E Potrero Substation. The total transmission line distance is approximately 3,000 feet (SFPUC 2005a, pg. 5-2). The 115-kV transmission line route would originate from the SFERP switchyard exiting north to 25th Street, west along 25th Street, turning north to Michigan Street. The line will intersect Illinois Street and continue north to the Potrero Switchyard. It is expected the only aboveground structures will be four steel transmission structures; two structures within the new SFERP switchyard to be located on the north end of the project site, and two structures within the Potrero Substation. The steel structures will be approximately 8 feet tall (SFPUC 2005a, pg. 8-11-11).

PG&E is currently performing a Facilities Study to evaluate the feasibility of two alternatives to route the transmission line from Illinois Street to the Potrero switchyard. The two alternatives are to (1) enter the Potrero switchyard underground from Illinois Street or (2) continue north to 22nd Street and enter the switchyard from 22nd Street. If the 22nd Street route is selected, the circuits would then run east in 22nd Street to an underground/overhead transition structure located on the eastern portion of the switchyard. An overhead line would then connect with the switchyard in an overhead arrangement (SFPUC 2005a, pg. 5-2).

Natural gas for the facility is to be supplied by a new underground 900-foot, 12-inch diameter pipeline that is to connect to PG&E's line 101.

The City of San Francisco is to supply recycled water to the SFERP for cooling purposes by means of a proposed 2,600-foot (approximate) underground pipeline.

Potable water is to be supplied to the power plant by a proposed 300-foot underground pipeline that will connect to an existing water main in Cesar Chavez Street.

Construction Laydown Area

An 8.5-acre construction laydown area is to be located on Port of San Francisco property along the east side of the project site. The laydown area will be approximately 125 feet south of Warm Water Cove. The laydown area will use land that is

undeveloped, graded and relatively flat. The site is currently being used to park truck trailers.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Please refer to **Appendix VR-1** for a complete description of staff's Visual Resources evaluation process.

DIRECT/INDIRECT IMPACTS AND MITIGATION

The following discussion of project impacts is organized around the four questions found in the CEQA Guidelines Appendix G Environmental Checklist Form pertaining to Aesthetics.

Scenic Vistas

The first checklist question: "Would the project have a substantial adverse effect on a scenic vista?"

The project site is within the boundary of the City of San Francisco's Central Waterfront Area Plan. The Plan does not identify any scenic vistas within the project view shed.

The nearest public access to an unobstructed view of San Francisco Bay in the vicinity of the project is City's Warm Water Cove Park. This public park is north of the project site. The Bay is east of the park. The SFERP would not visually obstruct the view of San Francisco Bay from the park.

Potrero Hill is considered a vista point. Views from it would be slightly affected. The additional visual contrast, and view blockage caused by new power plant structures is expected to be low.

The view of the project site from Key Observation Point (KOP) 1 on Watchman Way on Potrero Hill (**VISUAL RESOURCES- Figure 2**) will be disrupted by the construction of San Francisco Municipal Railway's Metro East Light Rail Maintenance and Operations Facility on the 13 acres to the west of the project site (between Potrero Hill and the power plant site). The light rail facility is currently under construction, and completion is scheduled for spring of 2008.

The new power plant would appear small when compared to other features in the view, and in particular the Metro East Light Rail Maintenance and Operations Facility with its approximate 40-foot tall, 180,000 square foot main building (**VISUAL RESOURCES – Figure 3**). The proposed project would not have a substantial adverse effect on a scenic vista, and would cause a less than significant visual effect.

Scenic Resources

The second checklist question: “Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway corridor?”

A publicly accessible area that provides a scenic view of San Francisco Bay in the vicinity of the project site is Warm Water Cove Park. The park is surrounded on three sides by industrial type structures.

Views from Warm Water Cove Park to the project site (south) are screened by the Sheedy Drayage Company. An eight-foot tall, graffiti-covered plywood fence, with razor wire along the top, separates the Sheedy property from the adjoining park. Views toward the project site from the park are disrupted or blocked by the fence and a 30- to 40- foot tall old warehouse on the Sheedy property. Further in the distance, on the project site protruding about 20 feet above the top of the Sheedy warehouse, the top of the concrete batch plant equipment is visible. This equipment would be removed prior to construction of the power plant.

The Sheedy Drayage Company provides crane, rigging, and heavy hauling services. The company operates a fleet of more than 100 trucks, trailers, and cranes (including tower cranes and man lifts). This equipment and other heavy-duty lifting and hauling equipment are stored on the Sheedy property.

From Warm Water Cove Park, a small portion of the top of the proposed three 85-foot tall exhaust stacks for the SFERP would be visible above the Sheedy warehouse. The exhaust stacks would be about 600 feet south of the warehouse. The top portion of the stacks would introduce prominent linear, regular geometric forms with strong vertical lines to the southern view from Warm Water Cove Park. The potential view of the stacks would generate a less than significant visual impact in the context of the existing industrial character of the area, and the on-going heavy equipment storage bordering the park.

The portion of I-280 within the project viewshed is not listed as a state designated California Scenic Route or a California Scenic Highway.

“SFERP is not within the Pier 70 or Dogpatch historic district boundaries”. Views of SFERP structures from these historic districts are substantially disrupted by large industrial buildings in the area. The proposed project would cause low visual contrast and low view disruption when viewed from the historic districts. The visual change would not cause a significant visual impact.

Visual Character or Quality

The third CEQA checklist question: “Would the project substantially degrade the existing visual character or quality of the site and its surroundings?” The project aspects that were evaluated under this criterion include project construction, the power plant and transmission transition structure, the various pipelines, and visible water vapor plumes.

Project Construction

Construction of the power plant from site preparation and grading to commercial operation is expected to take approximately 12 months (SFPUC 2005a, pg. 1-4). During construction, the SFERP structures would appear subordinate within the existing urban/industrial features, and the panoramic background landscape of San Francisco Bay. The project would appear quite small in the wide field of view.

On the project site during the construction period, views of a tall crane(s) and other heavy equipment, building materials, piles of debris, et cetera are expected. From KOP 1, equipment, materials, and workforce vehicles on the project site would generate a less than significant visual distraction due to the viewing angle, and other on-going industrial and maritime support activities in the area.

Nighttime construction is not expected to take place. In the unlikely event that nighttime construction does occur, the applicant would take measures to minimize the off-site visibility of lighting. These measures would include using the minimal lighting required for operations and safety, and using lighting that is shielded and highly directional. The mitigation measures proposed by the applicant and the effective implementation of proposed condition of certification **VIS-1** would ensure that construction lighting impacts, if they occur, are kept to less than significant levels.

The proposed site for the SFERP is surrounded on all sides by industrial activity and structures. There are a few residences with partial views of the site within ½-mile of the proposed site. Residences on the east side of Potrero Hill, represented by KOP 1, have nearly full views of the site from greater than ½-mile away. These residences have elevated panoramic views of the industrial area and San Francisco Bay (see Visual Resources Figure 2 and 3, views from KOP 1), and viewers are accustomed to seeing industrial uses on a regular basis.

Construction screening is typically accomplished by attaching a fabric or adding wooden slats to the perimeter fence. This screening would provide little to no visual benefit to residential viewers of the proposed SFERP site or laydown area. Due to the distance and angle of view of the proposed site from KOP 1, and other factors described above, a condition to require construction activity screening has not been proposed by staff.

Linear Facilities

Construction of the underground electric transmission line, the natural gas pipeline and the potable and process water pipelines would result in a noticeable visual disruption along several public streets for 1-4 months; as a result of construction activities, equipment, excavated piles of dirt, concrete and asphalt pavement, construction personnel and vehicles.

The electric transmission line distance from the SFERP switchyard to the connection at the Potrero Substation is approximately 3,000 feet. The proposed transmission lines would be installed underground. It is expected that the aboveground structures would consist of two steel transmission structures within the proposed SFERP switchyard, and two structures within the existing Potrero Substation. The steel structures would be approximately 8 feet tall (SFPUC 2005a, pg. 8-11-11). The proposed new underground

electric transmission line and the four steel structures would not generate a significant visual impact.

The proposed underground natural gas, waste water and potable water pipelines would have no visual impact.

The ground surface areas affected by the various underground linear facilities are to be cleaned-up, repaired and restored to the pre-construction condition by the applicant. To ensure the restoration of the ground surface as a result of linear construction activities, staff has proposed Condition of Certification **VIS-2**. With the implementation of **VIS-2**, the visibility of the project's linear construction activities would generate a less than significant visual effect.

Construction Laydown Area

The applicant has offered to restore the laydown area to its previous use as a parking area upon completion of the construction of the power plant (SFPUC 2005a, pg. 8.11-17).

Staff has proposed Condition of Certification **VIS-2** to require the removal and restoration of the laydown area upon the completion of the SFERP. With the effective implementation of **VIS-2** the project laydown area would generate a less than significant visual effect.

Power Plant and Structures

The SFERP site is surrounded by various sized industrial buildings and structures that would limit visibility of the project site. To the north of the site are the Sheedy Drayage Company and the Potrero Power Plant. To the south are the Port of San Francisco North Container Terminal, Penske Truck Rental, and other industrial buildings that front Cesar Chavez Street. To the east is the Port of San Francisco's trailer parking area and San Francisco Bay. To the west is the construction laydown area.

Staff uses Key Observation Points[1], or KOPs, as representative locations from which to conduct detailed analyses of the proposed project and to obtain existing condition 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.

Although the proposed project would be visible from several areas near the project site, one KOP has been chosen for analysis of the proposed SFERP. The KOP represents a viewpoint of the project site from a location on Potrero Hill on Watchman Way. Staff visited the KOP selected by the applicant, and other locations in the project's vicinity. Staff believes the KOP selected and presented in the Application For Certification Supplement A (SFPUC 2005a) visual section is 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.

VISUAL RESOURCES - Figure 1 (photo locations) shows locations from which the project would be visible (project viewshed), and the location and view direction of the KOP selected to represent a sensitive viewing area most impacted by the proposed project. All visual resources figures are presented at the end of this analysis. Figure 1 shows the location of the selected KOP. KOP 1 presents a view looking east from Watchman Way towards the proposed SFERP site.

KOP 1 - Watchman Way

VISUAL RESOURCES - Figure 2 presents a view from an urban high density developed residential area near the middle part of Potrero Hill, approximately 0.6-mile from the proposed SFERP site. The view is dominated in the foreground with numerous urban industrial and marine commerce uses that have vertical and geometric block form structures and the expanse of San Francisco Bay.

The view shows diverse textured patterns within a dense urban industrial and marine commerce area that includes a variety of prominent vertical structures such as: a portion of elevated concrete piered I-280, the Port of San Francisco North Container Terminal and its ten 130- to 147-foot cranes. There are large horizontal forms adjacent to the project site, which consist of the Port of San Francisco's Pier 80 structures (i.e., 170,000 and 294,000 square-foot covered storage facilities).

Residents, pedestrians, and motorists would have partial foreground and middle ground views of the proposed project. The potentially visible aspects of the power plant structures at KOP 1 would be the 115-kV switchyard, the three combustion turbine generators and exhaust stacks, the duplex chiller/coolant tower package, the 12-foot tall sound wall for the gas compressor station, the water treatment building, and the top portion of the plant service building.

The project introduces structures that are visually smaller and less massive when compared to other structures in the view. In addition the proposed project structures would replace the visual disturbance currently generated by the concrete batch plant operating on the project site. The concrete plant is at the approximate location of the proposed SFERP's switchyard.

It should be noted that San Francisco Municipal Railway's Metro East Light Rail Maintenance and Operations Facility is to be constructed on the 13 acres to the west of the power plant site fronting on Illinois Street (between Potrero Hill and the power plant site). The new facility includes a maintenance building, paint and body shop, and an outdoor storage yard with a capacity for about 80 light rail cars. The facility's main shop and administration building will be approximately 40 feet tall, and about 180,000 square feet. The facility is currently under construction with completion scheduled for the spring of 2008. The facility's aesthetic design review is to be conducted by the Port of San Francisco. The San Francisco Art Commission is to conduct the color, materials, and public art review for the facility (San Francisco Municipal Railway, Third Street Light Rail Project Rail Project. http://www.sfmuni.com/aboutmun/3rdmaint.htm).

The construction of the power plant is estimated to be completed 6-9 months prior to the completion of the new light rail maintenance and operations facility. During construction

and at completion, the light rail maintenance and operations facility would provide some degree of visual screening of the power plant. From the KOP, the visible aspects of the power plant structures with the constructed light rail facility would consist of the top portion of the three exhaust stacks, the top of the duplex chiller/coolant tower package, and the roof of the corrugated tin recycled water treatment building (see **VISUAL RESOURCES – Figure 3**).

Visual Sensitivity

From KOP 1, project site visibility would be from an elevated perspective that is unobstructed at a middle ground viewing distance. Site visibility from I-280 would consist of disrupted views over roof tops.

A high number of viewers travel on I-280. The Caltrans traffic count in 2004 at the intersection of I-280 and Army Street/Cesar Chavez Street had a peak month north bound travel lane vehicle count of 94,000 vehicles, and a south bound travel lane count of 116,000 vehicles.[2] A vehicle traveling between Cesar Chavez and 25th Street would travel through the project viewshed in 10 seconds or less under normal driving situations.

From KOP 1, residents would generally anticipate open, frontal views of an existing highly urbanized, industrial waterfront landscape; however, new industrial features that would further detract from the panoramic views of San Francisco Bay and East Bay Hills may be perceived as detracting from the available vista.

The panoramic view of the waterfront backdropped by San Francisco Bay and the East Bay Hills offers a diverse landscape with increased visual interest that partially offsets the lower quality of the shoreline industrial development. The contrasting lighter structural colors and blues of the Bay and sky also add variety and interest. Visual quality is moderate, reflecting the balance between a prominent urban/industrial landscape and a panoramic background of predominantly natural features of the Bay. Therefore, viewer concern is moderate.

Visual Change

The visual landscape from KOP 1 is comprised in the foreground of commercial buildings, transportation infrastructure (e.g., I-280), and industrial features that all compete with the picturesque backdrop of San Francisco Bay and the East Bay Hills for the viewer's attention.

From KOP 1, a view of San Francisco Bay (higher quality landscape feature) is already disrupted by I-280 and Port of San Francisco structures. View disruption would be low.

Proposed power plant structures would not be prominent in the KOP view. The structures would appear subordinate within the mosaic of urban/industrial features and the panoramic background landscape. In addition the project would appear small in size in the wide field of view. Project dominance is rated low.

[2] Caltrans, 2004 Traffic and Vehicle Data Systems Unit website: http://traffic-counts.dot.ca.gov/

The project would introduce vertical structural lines and linear forms, specifically three turbine combustion generators and stacks. The introduced forms and lines would be consistent with forms and lines already established by other structures in the vicinity (e.g. Port of San Francisco's ten 130+ foot tall cranes).

The introduction of neutral gray colored project structures into the view would present a minor color contrast with the darker blue colors of San Francisco Bay, the green to brown colors of the East Bay Hills, and the varied coloration of the existing urban/industrial area. Overall, visual contrast with the existing setting would be low.

From KOP 1, the overall visual change caused by the proposed project would be low due to the low visual contrast, low dominance and low degree of view disruption and blockage of the higher quality landscape feature of San Francisco Bay.

When considered within the context of a moderate visual sensitivity of the existing landscape and viewing characteristics, and the low visual change that would be perceived from KOP 1, the project would not cause a significant adverse visual impact. To ensure that SFERP structures are painted in a neutral gray color as proposed and analyzed, staff has proposed condition of certification **VIS-3**.

Impact of Cooling Tower and Combustion Exhaust Stack Plumes

The proposed SFERP is a simple-cycle power plant that would include three 85-foot tall combustion exhaust stacks and a 45-foot tall two-cell chiller/cooling tower package. The applicant has not proposed to use any abatement technology for visible plumes. Staff completed a visible plume modeling analysis of the potential unabated cooling tower and gas turbine exhaust stack plumes for the project utilizing design parameters provided by the applicant (Walters and Blewitt, 2004)[3]. Please refer to **Appendix VR-2** at the end of this visual resources section for a more complete description of staff's Visible Plume Modeling Analysis.

Staff estimated the gas turbine exhaust and cooling tower plume frequencies and dimensions using the Combustion Stack Visible Plume (CSVP) model, and a six-year (1990-1995) meteorological data set obtained from the National Climatic Data Center from San Francisco International Airport.

No combustion exhaust stack water vapor plumes are predicted to occur under full load or 50 percent load conditions during the operation of the SFERP. The SFERP's combustion exhaust will be at such a high temperature (744 to 826 degrees Fahrenheit) that little or no visible water vapor plumes would be expected to form above the exhaust stacks under any combination of operating and ambient conditions.

Staff's visible plume modeling predicts that cooling tower visible plumes would occur 4.9 percent of the time during the seasonal daylight clear hours. Because this frequency is

[3] "The applicant confirms that the cooling tower operating assumption values presented in the applicant's previous visible plume modeling data response(s) and found in Informal Data Response Set 1A, (Docket 04-AFC-1dated August 2, 2004) are still valid for the project as currently proposed" (Source San Francisco Electric Reliability Project Supplement A Data Response, Set 3A dated June 3, 2005).

well below staff's 20 percent frequency threshold (see Appendix VR-2), no further analysis has been conducted. To ensure that the visual impacts of cooling tower plumes remains less than significant, staff has proposed condition of certification **VIS 5** to verify the cooling tower design parameters.

Light or Glare

The fourth CEQA checklist question asks; "Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?"

General sources of night lighting in the KOP 1 view include street and vehicle lights, and area and perimeter lighting of existing commercial, industrial, and maritime operations for safety and security reasons. Specific examples of night time light generators include: the Port of San Francisco North Container Terminal, the Potrero Power Plant, and vehicle lights on I-280. In addition, the Potrero Power Plant maintains flashing red lights (aviation safety lights) on its Unit #3 exhaust stack.

Many of the lights in the area are unshielded or take place in clusters. Existing visible night lighting ranges from a soft amber color to an intense white light. Vehicle head lights and tail lights on I-280 are a prominent source of light and appear as horizontal bright, solid orange and red bands.

The proposed project's night lighting would be most visible from KOP 1. This KOP would have an elevated and mostly unobstructed view of the project's potential night time lighting.

Although the proposed power plant is a peaking unit, it could be operated 24 hours per day, 7 days per week for periods of time. Its operation would require onsite nighttime lighting for safety and security (SFPUC 2005a, pg. 8-11-16). The project would add ambient light to the existing nighttime landscape. If project lighting were uncontrolled, the resultant direct light trespass and uplighting to the nighttime sky could cause a significant adverse visual impact on sensitive visual receptors, such as residences on Potrero Hill.

The applicant has proposed to install lights that are shielded and directed downward, and to install separate switches for the lights on the tallest structures, such as the exhaust stacks, so they could remain turned off except during maintenance activities. The added lighting generated by the proposed project is not expected to significantly change ambient lighting conditions as viewed from KOP 1. In addition, the completion of the San Francisco Municipal Railway light rail facility may significantly block potential off-site light generated by the power plant towards Potrero Hill.

Staff proposes condition of certification **VIS-4** to require review and approval of a lighting plan for the project by Energy Commission staff to ensure that the measures proposed by the SFERP are properly implemented. With the applicant's commitment to minimize offsite light emissions, the SFERP would not generate a substantial new source of light that could adversely affect nighttime views.

The applicant is proposing to utilize a surface treatment for major project structures and fixtures in the public view that will limit glare. Staff proposes condition of certification **VIS-3**, which would require review and approval by Energy Commission staff of a surface treatment plan for the project structures. With the effective implementation of the mitigation measures proposed by the applicant and condition **VIS-3**, the SFERP would not be a source of substantial glare that could adversely affect daytime views.

The applicant may install one freestanding sign at the gated entrance to the SFERP site. The sign is to use non-glare materials, and unobtrusive colors in accordance with the San Francisco Planning Code. The design of any signs required by safety regulations will need to conform to the criteria established by those regulations. To ensure that project signage will be in conformance with the City and County of San Francisco's regulations, staff has proposed a condition of certification (see **LAND-3** in the **LAND USE** section of this Final Staff Assessment).

CUMULATIVE IMPACTS AND MITIGATION

As defined in Section 15355 of the CEQA Guidelines (California Code Regulation, Title 14), a cumulative impact is created as a result of the combination of the project under consideration together with other existing or reasonably foreseeable projects causing related impacts. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time. In other words, though any one project in a given area may not create a significant impact to visual resources, the combination of the new project with all existing or planned projects in the area may create significant impacts. 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; or (3) visual quality is diminished.

The City's intention as presented in numerous land use plans is to fully develop the shoreline within the Central Waterfront Area.

An undeveloped 13-acre property west of to the project site and bounded by 25th Street, Illinois Street and Cesar Chavez Street is to be used for the construction of San Francisco Municipal Railway's Metro East Light Rail Maintenance and Operations Facility. The new facility will provide for the storage, maintenance and operation of about 80 light rail vehicles to be used on the new Third Street Light Rail Line. The light rail maintenance facility will have a main shop/administration building that is approximately 40 feet tall and 180,000 square feet. The facility is currently under construction with completion scheduled for the spring of 2008.

A multi-modal bridge is to be constructed over Islais Creek (south of the project site). The bridge will link Illinois Street to Cargo Way and provide access for rail, truck traffic, and bicyclists. Construction is to start in March 2005 and last 18 months. Two concrete batch plants constructed on the south side of Islais Creek on Piers 92 and 94 are both operational.

Planned projects within the Central Waterfront Area include a mixed-use development at Pier 70, the building of 1,500 housing units, and a large development involving 600 acres in Mission Bay (north of the project site). This development would include

commercial, residential, and industrial uses. A 44- acre area involving Piers 90-94 is in the initial planning phase for a distribution and warehouse complex.

From KOP 1, the SFERP's impact to visual resources, when combined with the existing cumulative impact of other projects described above, would remain subordinate within the industrial waterfront and the panoramic background landscape and would not be cumulatively considerable. The project does not result in a significant cumulative impact to visual resources.

COMPLIANCE WITH LORS

The proposed power plant and associated linear facilities would be constructed within the jurisdiction of the City and County of San Francisco. Therefore, the SFERP would be subject to LORS pertaining to the protection and maintenance of visual resources which are found in the City and County of San Francisco's General Plan and Municipal Code. Specifically, the City's General Plan contains two applicable elements for review: the Recreation and Open Space Element, and the Urban Design Element. The General Plan also includes the Central Waterfront Area Plan which provides more specific development policies for the area where the proposed project site is located. The San Francisco Planning Code provides applicable zoning provisions for development on the project site.

VISUAL RESOURCES Table 2 provides a consistency review discussion of the project with applicable local LORS.

VISUAL RESOURCES Table 2
Proposed Project's Consistency with
Applicable Local LORS Specific To Visual Resources

	Protocol: **City and County of San Francisco** Protocol: **General Plan - Recreation and Open Space**
Provision	Policy 3.1 - Assure that new development adjacent to the shoreline capitalizes on its unique waterfront location, considers shoreline land use provisions, improves visual and physical access to the water and conforms to urban design policies.
Consistency	**Consistent.** The proposed project is a use appropriately located within the heavy industrial zone (M-2 Zone District). The proposed site has limited visual and physical access to San Francisco Bay as a result of existing industrial and marine commerce uses. The proposed site is on City/County of San Francisco property, approximately 225 feet from nearest shoreline (Warm Water Cove).
	Protocol: **City and County of San Francisco** Protocol: **General Plan – Urban Design**
Provision	Policy 1.1 – Recognize and protect major views in the city, with particular attention to those of open space and water.
Consistency	**Consistent.** The project introduces new structure(s) to the Central Waterfront area, but would be constructed in a location that already has limited visual and physical access to San Francisco Bay as a result of industrial and marine commerce uses. The view of San Francisco Bay from KOP 1 is already disrupted (without the project) by the Port of San Francisco North Container Terminal structures and its activities (periodic loading and unloading of ships).
Provision	Policy 1.3 – Recognize that buildings, when seen together, produce a total effect that characterizes the city and its districts.

Consistency	**Consistent.** The project introduces new structure(s) to the Central Waterfront area. The project's design, surface and architectural treatment would not contrast visually with existing industrial and maritime commerce structures in the vicinity of the project site.
Provision	Policy 2.6 - Respect the character of older development nearby in the design of new buildings. Policy 3.1 - Promote harmony in the visual relationships and transitions between new and older buildings. Policy 3.2 - Avoid extreme contrasts in color, shape and other characteristics which will cause new buildings to stand out in excess of their public importance. Policy 3.3 – Promote efforts to achieve high quality of design for buildings to be constructed at prominent locations.
Consistency	**Consistent.** The proposed project design would respect and be consistent with the visual characteristics of existing development in the vicinity of the project site, which is surrounded by various industrial and marine commerce structures. To the north of the site are the Sheedy Drayage Company, and the Potrero Power Plant. To the south are the Port of San Francisco North Container Terminal, Penske Truck Rental, and a line of industrial buildings that front Cesar Chavez Street. To the east is the Port of San Francisco's trailer parking area and San Francisco Bay. The project's proposed neutral gray structures would introduce minor color contrast with the darker blue colors of San Francisco Bay andthe green to brown colors of the East Bay Hills, and would blend with the varied coloration and diverse pattern of the existing dense urban/industrial and waterfront setting.
Provision	Policy 3.4 – Promote building forms that will respect and improve the integrity of open spaces and other public areas.
Consistency	**Consistent.** The proposed project is a use appropriately located within the heavy industrial zone (M-2 Zone District). It would be constructed on a site that already has limited visual and physical access to San Francisco Bay as a result of long-time existing industrial and marine commerce uses. Warm Water Cove Park is the closest public area in the project vicinity. Proposed project structures would not be of a height or mass that would visually distract from the integrity of the park. Views from the park of San Francisco Bay and the East Bay Hills would not be disrupted by the proposed project.
Provision	Policy 3.5 - Relate the height of buildings to important attributes of the city pattern and to the height and character of existing development. Policy 3.6 - Relate the bulk of buildings to the prevailing scale of development to avoid an overwhelming or dominating appearance in new construction.
Consistency	**Consistent**. The heights of existing development within this dense urban industrial and marine commerce area includes: the Potrero Power Plant 305-foot tall exhaust stack, and the Port of San Francisco North Container Terminal masonry structures and its ten steel 130-147-foot cranes. The City's Urban Design Guidelines outline height and bulk requirements. The City's heavy industrial ("M") zone district's height and bulk limits: 100 feet (height) x 250 feet (length) x 300 feet (diagonal dimension). The proposed project's tallest structures are its three 85-foot tall exhaust stacks. The project's tallest building is the 32-foot tall recycled water treatment building. The exhaust stacks and the recycled water treatment building would not exceed the height or bulk dimensions. The proposed power plant would not be visually overwhelming, nor dominate in the existing industrial waterfront landscape.
Protocol:	**City and County of San Francisco**
Protocol:	**General Plan – Central Waterfront Area Plan**
Provision	Policy 10.1 – Reinforce the visual contrast between the waterfront and hills by limiting the height of structures near the shoreline. Relate the height and bulk of new structures away from the shoreline to the character of the topography and existing development.
Consistency	**Consistent**. The City's Urban Design Guidelines outline height requirements. The City's heavy industrial ("M") zone district's height limit is 100 feet. The SFERP's tallest structures would be its three 85-foot tall exhaust stacks. The power generation block,

	which includes the exhaust stacks, is approximately 500-550 feet from the Warm Water Cove shoreline. The project site's "line of sight" to San Francisco Bay is already disrupted by the Port of San Francisco and its ten 130+ foot tall cranes used to load and unload container ships. The height of the proposed project structures when compared to the Port of San Francisco structures would not visually contrast between the waterfront and hills at the proposed project location.
Provision	Policy 10.2 - Protect and create views of the downtown skyline and the San Francisco Bay. Design and locate new development to minimize obstruction of existing views.
Consistency	**Consistent**. The overall goal of the Central Waterfront Area Plan is to create a physical and economic environment conducive to the retention and expansion of San Francisco's industrial and maritime activities. As a result, the view towards downtown San Francisco (north of the project site) is already obstructed by existing tall industrial structures; such as the Potrero Power Plant's Unit #3, its 305-foot tall exhaust stack, the deteriorating 70-foot tall Station "A" complex building, and its three 50-65 foot-tall concrete fuel tanks, and the numerous structures in the former Bethlehem Steel Shipyard on the north side of the Potrero Power Plant.
Provision	Policy 18.1 – Minimize blockage of private and public views and maintain, to the extent feasible, sightlines from Potrero Hill and Mission Bay to the waterfront and downtown.
Consistency	**Consistent**. The view of San Francisco Bay is already disrupted by the Port of San Francisco's Pier 80 cargo terminal structures, and the periodic loading and unloading of a container ship. The proposed project would replace a small visually unattractive concrete batch plant. Project structures would be much smaller in size than those existing in the immediate vicinity, including Port of San Francisco Piers 80, 94 and 96, ten 130-foot plus tall cranes, and the Potrero Power Plant Unit #3 305-foot tall exhaust stack.
Protocol:	**City and County of San Francisco** Protocol: **Planning Code**
Provision	Section 210.6 – The M-2 (Heavy Industrial) districts are the least restricted as to use and are located at the eastern edge of the City, separated from residential and commercial areas. The heavier industries are permitted, with fewer requirements as to screening and enclosure than in M-1 (Light Industrial) districts, but some uses are permitted only as a conditional use or at some distance from residential districts. Section 226 - Manufacturing and Processing
Protocol:	Permitted use - (p) Steam Power Plant.
Consistency	**Consistent**. The project site is within the M-2 Zone District. The proposed project is an electric power generation plant. Power plants are an allowed use within the M-2 Zone District.[4]
Provision	Section 270 – Bulk Limits: Measurement - "M" District height maximum dimension – 100 feet maximum plan dimensions – 250 feet in length.
Consistency	**Consistent**. The project's tallest structures are its three 85-foot exhaust stacks. The project's tallest building is the waste and recycled water treatment building which is 32 feet tall (approximate). The plant service building is the longest building on-site, at approximately 200 feet.

[4] Permitted uses include steam power plants. Because the Planning Code specifically cites steam power plants as a permitted use but does not identify any other type of power plant as being permitted, staff requested a determination from the City and County of San Francisco's Zoning Administrator during the processing of the Potrero Power Plant Unit 7 application as to whether a combined cycle gas-fired power plant would be considered a permitted use in the M-2 zoning district. In a letter dated August 8, 2001, the Zoning Administrator determined that the type of power plant proposed by the applicant was permitted in the M-2 district, and other types of power plants would also be permitted because the "steam" reference is outdated and the Code section had not been updated.

Provision	Section 607 – Business Sign -A sign which directs attention to a business, commodity, service, industry or other activity which is sold, offered, or conducted, other than incidentally, on the premises upon which such sign is located, or to which it is affixed.
Consistency	**Consistent**. The applicant is proposing to install one non-illuminated sign at the main entrance gate to the power plant that would state the name of facility.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

No agency or public comments pertaining to visual resources have been received as of the preparation of this Final Staff Assessment section.

CONCLUSIONS

The visual analysis focused on two main issues; (1) does the construction and operation of the project cause visual impacts; and (2) would the project be in compliance with applicable local LORS.

- The proposed project is located within an area designated as heavy industrial (M-2) and is consistent with the City of San Francisco's Central Waterfront Area Plan.
- The Caltrans California Scenic Highway System listing does not identify the portion of I-280 within the view from KOP 1 as being within a State designated scenic highway corridor.
- The proposed SFERP would be consistent with applicable visual policies of the City and County of San Francisco General Plan, Recreation and Open Space Element, Urban Design Element, and the Central Waterfront Area Plan.
- The proposed project would not cause unmitigated significant visual impacts on a minority or low-income population.
- The construction and operation of the SFERP as proposed, with the effective implementation of the staff recommended conditions of certification below, would ensure that adverse direct and cumulative visual impacts from the project would be less than significant and that the project would comply with all applicable visual resources LORS.

PROPOSED CONDITIONS OF CERTIFICATION

CONSTRUCTION LIGHTING

VIS-1 The project owner shall ensure that lighting for construction of the power plant is used in a manner that minimizes potential night lighting impacts, as follows:

A. All lighting shall be of minimum necessary brightness consistent with worker safety and security;

B. All fixed position lighting shall be shielded/hooded, and directed downward and toward the area to be illuminated to prevent direct illumination of the night sky and direct light trespass (i.e., direct light extending outside the

boundaries of the power plant site or the site of construction of ancillary facilities, including any security related boundaries); and

C. Wherever feasible, any lights not necessary for safety or security shall be turned off when not in use.

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 requires modifications to the lighting, within 15 days of receiving that notification the project owner shall implement the necessary modifications and notify the CPM that the modifications have been completed.

Within 48 hours of receiving a lighting complaint, the project owner shall provide the CPM with a complaint resolution form report as specified in the General Conditions section including a proposal to resolve the complaint, and a schedule for implementation. The project owner shall notify the CPM within 48 hours after completing implementation of the proposal. A copy of the complaint resolution form report shall be included in the subsequent Monthly Compliance Report following complaint resolution.

SITE SURFACE RESTORATION

VIS-2 The project owner shall remove all evidence of the laydown area and linear facility construction activities, and shall restore the ground surface to the original condition or better condition, including the replacement of any vegetation or paving removed during construction where project development does not preclude this. The project owner shall submit to the CPM for review and approval a surface restoration plan which when implemented will satisfy these requirements.

Verification: At least 60 days prior to the start of commercial operation, the project owner shall submit the surface restoration plan to the CPM for review and approval.

If the CPM notifies the project owner that any revisions of the surface restoration plan are needed, within 30 days of receiving that notification the project owner shall submit to the CPM a plan with the specified revisions.

The project owner shall complete surface restoration within 60 days after the start of commercial operation. The project owner shall notify the CPM within seven days after completion of surface restoration that the restoration is ready for inspection.

SURFACE TREATMENT OF PROJECT STRUCTURES AND BUILDINGS

VIS-3 The project owner shall treat the surfaces of all project structures and buildings visible to the public such that a) their color(s) minimize(s) visual intrusion and contrast by blending with the landscape; b) their colors and finishes do not create excessive glare; and c) their colors and finishes are consistent with local policies and ordinances. The transmission line conductors shall be non-specular and non-reflective, and the insulators shall be non-reflective and non-refractive.

The project owner shall submit for CPM review and approval, a specific surface treatment plan that will satisfy these requirements. The treatment plan shall include:

A. A description of the overall rationale for the proposed surface treatment, including the selection of the proposed color(s) and finishes;

B. A list of each major project structure, building, tank, pipe, and wall; the transmission line towers and/or poles; and fencing, specifying the color(s) and finish proposed for each. Colors must be identified by vendor, name, and number; or according to a universal designation system;

C. One set of color brochures or color chips showing each proposed color and finish;

D. One set of 11" x 17" color photo simulations at life size scale, of the treatment proposed for use on project structures, including structures treated during manufacture, from Key Observation Point 1;

E. A specific 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 in the field, until the project owner receives notification of approval of the treatment plan by the CPM. Subsequent modifications to the treatment plan are prohibited without CPM approval.

Verification: At least 90 days prior to specifying to the vendor the color(s) and finish(es) of the first structures or buildings that are surface treated during manufacture, the project owner shall submit the proposed treatment plan to the CPM for review and approval and simultaneously to the City and County of San Francisco Planning Department for review and comment. The Planning Department shall provide the CPM with documents 45 days prior to the estimated date of providing paint specification to vendors.

If the CPM determines that the plan requires revision, the project owner shall provide to the CPM a plan with the specified revision(s) for review and approval by the CPM before any treatment is applied. Any modifications to the treatment plan must be submitted to the CPM for review and approval.

Within ninety (90) days after the start of commercial operation, the project owner shall notify the CPM that surface treatment of all listed structures and buildings has been completed and they are ready for inspection and shall submit one set of electronic color photographs from the same key observation points identified in (d) above.

The project owner shall provide a status report regarding surface treatment maintenance in the Annual Compliance Report. The report shall specify a): the condition of the surfaces of all structures and buildings at the end of the reporting year; b) maintenance activities that occurred during the reporting year; and c) the schedule of maintenance activities for the next year.

PERMANENT EXTERIOR LIGHTING

VIS-4 To the extent feasible, consistent with safety and security considerations, and commercial availability, the project owner shall design and install all permanent exterior lighting such that a) light fixtures do not cause obtrusive spill light beyond the project site; b) lighting does not cause excessive reflected glare; c) direct lighting does not illuminate the nighttime sky; d) illumination of the project and its immediate vicinity is minimized, and e) the plan complies with local policies and ordinances.

The project owner shall submit to the CPM for review and approval and simultaneously to City and County of San Francisco Planning Department for review and comment a lighting mitigation plan that includes the following:

A. Location and direction of light fixtures shall take the lighting mitigation requirements into account;

B. Lighting design shall consider setbacks of project features from the site boundary to aid in satisfying the lighting mitigation requirements;

C. Lighting shall incorporate commercial available fixture hoods/shielding, with light directed downward or toward the area to be illuminated;

D. Light fixtures shall not cause obtrusive spill light beyond the project boundary;

E. All lighting shall be of minimum necessary brightness consistent with operational safety and security; and

F. Lights in high illumination areas not occupied on a continuous basis (such as maintenance platforms) shall have (in addition to hoods) switches, timer switches, or motion detectors so that the lights operate only when the area is occupied.

Verification: At least 90 days prior to ordering any permanent exterior lighting, the project owner shall contact the CPM to discuss the documentation required in the lighting mitigation plan.
At least 60 days prior to ordering any permanent exterior lighting, the project owner shall submit to the CPM for review and approval and simultaneously to City and County of San Francisco Planning Department for review and comment a lighting mitigation plan. The Planning Department shall provide comments to the CPM 45 days prior to ordering date.

If the CPM determines that the plan requires revision, the project owner shall provide to the CPM a revised plan for review and approval by the CPM.

The project owner shall not order any exterior lighting until receiving CPM approval of the lighting mitigation plan

Prior to commercial operation, the project owner shall notify the CPM that the lighting has been completed and is ready for inspection. If after inspection the CPM notifies the project owner that modifications to the lighting are needed, within 30 days of receiving

that notification the project owner shall implement the modifications and notify the CPM that the modifications have been completed and are ready for inspection.

Within 48 hours of receiving a lighting complaint, the project owner shall provide the CPM with a complaint resolution form report as specified in the Compliance General Conditions including a proposal to resolve the complaint, and a schedule for implementation. A copy of the complaint resolution form report shall be submitted to the CPM within 30 days of complaint resolution.

PLUMES

VIS-5 To ensure that the cooling tower plumes will not cause significant visual impacts, the project owner shall ensure that the cooling tower is designed and operated as certified.

The cooling tower shall be designed and operated so that (1) the exhaust air flow rate (per cooling tower cell) will not be less than 118 kilograms per second at an ambient of 52 degrees Fahrenheit and 60 percent relative humidity and will not be less than 108 kilograms per second at an ambient of 80 degrees Fahrenheit and 36 percent relative humidity when the cooling tower cell fan is operating; and (2) the fan from at least one cooling tower cell shall be operating when the cooling tower is receiving any heat load from the turbine inlet air chiller(s).

Verification: At least 90 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 to confirm that design mass flow rates for the cooling tower cells meet the requirements of this Condition. The project owner shall not order the cooling tower until notified by the CPM that this design requirement has been satisfied.

The project owner shall provide written documentation in each Annual Compliance Report to demonstrate that the cooling towers have consistently been operated within the above-specified design parameters, except as necessary to prevent damage to the cooling tower. 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

CCSF - City and County of San Francisco Planning Department. General Plan.

CCSF - City and County of San Francisco Planning Department. Planning Code.

CDT – California Department of Transportation. California Scenic Highway Program.

SECAL - Southern Energy California. 2001a. Amendment to the Application for Certification, Potrero Power Plan Unit 7 Project (00-AFC-4). Addresses the demolition of six existing structures. Submitted to the California Energy Commission on 1/19/2001.

SFERP 2004q - CH2MHill/Carrier (tn: 31854). Data Responses Set 1A. Responses to Staff's Data Requests data 6/4/04. Submitted to CEC/Pfanner/Dockets on 7/6/04.

SFERP 2005n – CH2MHill/Carrier (tn: 34542). Data Response, Set 3A. Submitted to CEC/Pfanner/Dockets on 6/3/05.

SFMR - San Francisco Municipal Railway. Third Street Light Rail Project. 5/5/05.

SFPUC 2005a – San Francisco Public Utilities Commission/Hale (tn: 34403). Amendment A of the Application for Certification. Submitted to CEC/Therkelsen/Dockets on 3/25/05.

Walters, William, and Lisa Blewitt. Visible Plume Analysis for San Francisco Electric Reliability Project. Modeling analysis prepared by William Walters and Lisa Blewitt of Aspen Environmental Group for Energy Commission staff. 8/10/2004.

APPENDIX VR-1: STAFF'S VISUAL RESOURCES EVALUATION METHODOLOGY

Visual resources analysis has an inherent subjective aspect. Use of generally accepted criteria for determining environmental impact significance and a clearly described analytical approach aid in developing an analysis that can be readily understood.

Staff's methodology is based on the California Environmental Quality Act (CEQA) Guidelines. The methodology includes an evaluation of the visual characteristics of the existing setting, the visual characteristics of the proposed project, the circumstances affecting the viewer, and the degree of visual impact that the proposed project would cause.

ELEMENTS OF THE METHODOLOGY

Key Observation Points

A proposed project is potentially visible from a number of areas in a viewshed. Energy Commission staff evaluate the visual impact of the project using a Key Observation Point[5], or KOP. One or more KOPs are selected to be representative of the most critical locations from which the proposed project would be seen. A KOP is representative of a location from which to conduct a detailed analysis of the project, and includes an existing condition/setting photograph, and simulation of the proposed project using the existing condition photograph.

Prior to application submittal, staff participates in a site visit to select appropriate KOP(s) for the analysis. Other photos to demonstrate the general landscape character of the project area are also included, as appropriate.

LORS Consistency

Energy Commission staff consider federal, state, and local laws, ordinances, regulations, and standards (LORS) relevant to visual resources. Conflicts with such LORS can constitute significant visual impacts. For example visual staff examines land use planning documents, such as local government General Plans and Specific Plans, and zoning ordinances applicable to the project site and surrounding area to gain insight as to the type of land uses intended for the area, and the guidelines given for the protection or preservation of visual resources.

Visible Water Vapor Plume Frequency

Staff models the estimated turbine plume frequency and dimensions for the cooling tower and turbine exhaust using the Combustion Stack Visible Plume (CSVP) model, and a multi-year meteorological data set obtained for the area where the project is proposed.

[5] The use of KOPs or similar view locations is common in visual resource analysis. The US Bureau of Land Management and the US Forest Service use such an approach.

A plume frequency of 20 percent of seasonal (typically from November through April) daylight no rain/fog high visual contrast (i.e. “clear”) hours is used to determine potential plume impact significance. If it is determined that the seasonal daylight clear hour plume frequency is greater than 20 percent then plume dimensions are determined and a significance analysis is included in the Visual Resources section of the Staff Assessment for the proposed project. Plume frequencies of less than 20 percent have been determined to generally have a less than significant impact.

California Environmental Quality Act Guidelines

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” (California Code of Regulations, Title 14, Section 15382).

Appendix G of the 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?

The visual analysis typically distinguishes between three different impact durations: temporary impacts, typically lasting no longer than two years; short-term impacts, generally last no longer than five years; and long-term impacts, which are impacts with a duration greater than five years. In general, short-term impacts are not considered significant.

In addition to visiting the project area for personal observation of how and whether a particular view is experienced, staff also searches for other evidence to determine if the local community values a particular view that might be affected by the project. This includes searching the applicable planning documents covering the area produced by local governments and community groups, as well as searches for any other type of evidence showing whether valued scenic vistas exist within the project’s viewshed. Staff relies primarily on personal observation of the project site to make initial determinations of visual character or quality of the area, in comparison with all other landscapes in California, but also gives due deference to official statements by elected governmental bodies concerning the value of visual resources within the project area.

Staff answers each of the four checklist questions for each part of the project both during construction and during operation, including any related facility such as a transmission line or gas pipeline. To answer the first checklist question (Would the project have a substantial adverse effect on a scenic vista?), staff must determine if any

such scenic vista exists within the viewshed of the various aspects of the project, and then determine if the project would have a substantial adverse effect on that vista.

To help make these determinations, visual resource professionals often answer a series of questions developed to help focus the analysis, and examine various ways that the project could create an impact to scenic vistas. The Energy Commission's Visual Resources staff has developed such a list for each of the four CEQA guideline questions, drawing upon published methodologies and academic resources (Smardon, et al.), as well as on past experience with other power plant siting cases. Questions developed to help determine whether the project would significantly affect a scenic vista include:

1. Is the project located in the scenic view of a local/state/federal-designated scenic vista?
2. Is there compelling evidence to show that the view is designated/valued by the local community?
3. Will the project eliminate or block views of valuable visual resources?
4. Would the project create a water vapor plume that could have an adverse effect on a state/federal/local-designated scenic vista?

To help answer the second CEQA checklist question above (i.e., would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?), staff developed the following questions:

1. Is the project located in the scenic view from a local/state/federal-designated scenic highway?
2. Does the project site or its immediate vicinity contain scenic resources, such as trees, rock outcroppings, or historic structures that could be damaged by the project?
3. Would the project create a water vapor plume that could have an adverse effect on the view from a local/state/federal-designated scenic highway?

To answer the third question (i.e., would the project substantially degrade the existing visual character or quality of the site and its surroundings?), staff assesses the existing visual character and quality of the project area, and then determines how the project would affect the character and quality of the project viewshed. To assess whether the project has the potential to substantially degrade the present visual character or quality, staff uses personal observation and such tools as visual simulations to determine if an impact is significant and mitigation is required to reduce the impact to a less-than-significant level. To make that determination, staff examines many factors, such as: how many viewers can see a particular view and for how long, collectively called "viewer exposure;" and to what degree would the project change the aspects of a given view, such as whether the project's components would block a particular view.

To help determine how the community rates and values the visual character and quality of a given site, and whether the project would substantially alter the present visual character or quality, staff developed the following questions:

1. How many residential, recreational, and traveling (motorist) viewers would have views of the project?
2. Is the project site properly zoned?
3. Would a conditional use permit and/or height variance have been required from the city/county (if so what conditions would the city/county place on the power plant)?
4. Does the project conform to the clear written declarations of local/state/federal agencies to protect designated visual resources of importance or the valued aesthetic character of a neighborhood (said declaration must be clear, concise, and uncompromised by conflicting declarations, and be an official action of the governing body (City Council/Board of Supervisors) such as a General Plan element, zoning ordinance, or design guideline)?
5. Will the project substantially alter the existing viewshed, including any changes in natural terrain?
6. Does the project substantially change the existing setting?
7. Has the applicant proposed landscaping?
8. Would the project create a water vapor plume that could have an adverse effect on a KOP view?

The process of answering these questions includes an examination of the present views within the project viewshed in terms of aesthetics – i.e., by examining the various aspects that together define the quality of a view – followed by an assessment of how the various aspects of the aesthetics of the view would be affected by the project, which conversely could be described as an analysis of how well the project area can absorb the various aspects of the project into the landscape.

To answer the fourth CEQA Guidelines checklist question (Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?), staff analyzes the project's lighting plans to ensure they fit with established norms for low-impact lighting designs, and then answers the following questions to determine if a potential for impact from night-lighting exists:

1. With the Energy Commission's standard condition of certification for lighting control, would light or glare be reduced to acceptable levels?
2. Will the project result in significant amounts of backscatter light into the nighttime sky?

APPENDIX VR-2

VISIBLE PLUME MODELING ANALYSIS

William Walters and Lisa Blewitt

INTRODUCTION

The following provides the assessment of the San Francisco Electric Reliability Project (SFERP) cooling tower and gas turbine exhaust stack visible plumes. Staff completed a modeling analysis for the applicant's proposed unabated cooling tower and turbine design.

PROJECT DESCRIPTION

The applicant has proposed a two-cell mechanical-draft cooling tower. The cooling tower load comes primarily from the turbine inlet air chillers; therefore, the cooling load is very small until the temperature is warm enough to run the inlet air chillers and then increases with ambient temperature. The applicant has not proposed to use any methods to abate visible plumes from the cooling towers.

The proposed gas turbines will be General Electric LM 6000 PC Sprint type engines. The turbines will be operated in simple-cycle mode.

VISIBLE PLUME MODELING METHODS

PLUME FREQUENCY AND DIMENSION MODELING

The CSVP model was used to estimate plume frequency and plume dimensions for the cooling tower and turbine exhausts. This model provides conservative estimates of both plume frequency and plume size. This model uses both hourly exhaust parameters and ambient condition data to determine the plume frequency. This model is based on the algorithms of the Industrial Source Complex model (Version 2), that determine conditions at the plume centerline and this model does not incorporate building downwash.

The modeling method combines the cooling tower exhausts into an equivalent single stack. This method may overestimate cooling tower plume size (particularly height) during plume hours with higher winds due to little cell interaction and the potential for building downwash, but will be more accurate during low wind and calm periods when the exhausts from the cooling tower cells will combine into one coherent body. Wind speeds are set to 1 m/s during calm hours.

CLOUD COVER DATA ANALYSIS METHOD

A plume frequency of 20 percent of seasonal (in this case June through November) daylight no rain/fog high visual contrast (i.e. “clear”) hours 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[6] used in the analysis categorizes total sky cover and opaque sky cover in 10 percent 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 percent that have sky 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 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.

If it is determined that the seasonal daylight clear hour plume frequency is greater than 20 percent then plume dimensions are determined and a significance analysis of the plumes is included in the Visual Resources section of the Staff Assessment.

COOLING TOWER VISIBLE PLUME MODELING ANALYSIS

COOLING TOWER DESIGN AND OPERATING PARAMETERS

The following cooling tower design characteristics, presented below in **Table 1**, were determined through a review of the applicant’s AFC (SFERP 2004a, Appendix 8.1) and data responses (SFERP 2004q and 2004u responses to #85). The data presented in **Table 1** was used to model the cooling tower plume frequency and dimensions.

[6] This analysis uses a San Francisco International Airport (SFO) Hourly United States Weather Observations (HUSWO) meteorological data set obtained from the National Climatic Data Center (NCDC).

Table 1
Cooling Tower Operating and Exhaust Parameters [a]

Parameter		Cooling Tower Design Parameters			
Number of Cells		2 (1 x 2)			
Stack Height (Cell Cone Height)		41.9 feet (12.76 meters)			
Cell Stack Diameter		13 feet (3.96 meters)			
Case	**Inlet Air Ambient Condition**	**Chilling**	**Heat Rejection Rate (MW)**	**Exhaust Flow Rate (lbs/s/cell)**	**Exhaust Temperature (°F)**
1 [b]	36°F, 81% RH	No	0.78	284.3	39.8
2 [b]	50°F, 60% RH	No	0.78	277.8	48.8
3 [b]	52°F, 60% RH	Yes	1.88	274.5	56.9
4 [b]	59°F, 60% RH	Yes	3.94	267.4	71.4
5	80°F, 36% RH	Yes	11.42	251.0	85.4

Source: SFERP 2004q, Data Response 85.
Notes:
a. For CSVP modeling, values were extrapolated or interpolated between data points as necessary.
b. Only one of the two cooling tower cells is needed under these operating conditions. Staff has revised the exhaust flow rate to one cell and has, through the use of a heat balance, revised the exhaust temperature presented by the applicant. During cool periods with very load the cooling tower may actually be operated with the recirculating water flow on and the cooling tower fans off; however, staff does not have enough information to be able to model this low exhaust flow condition.

COOLING TOWER VISIBLE PLUME MODELING ANALYSIS

Staff modeled the cooling tower plumes using the Combustion Stack Visible Plume (CSVP) model. **Table 2** provides the CSVP model visible plume frequency results using a six-year (1990-1995) meteorological data set, obtained from NCDC, from SFO.

Table 2 – Staff Predicted Hours with Cooling Tower Steam Plumes SFO 1990-1995 Meteorological Data

Case	Available (hr)	Plume (hr)	Percent
All Hours	52,583	9,588	18.2%
Daylight Hours	26,843	2,635	9.8%
Daylight No Rain No Fog	24,694	1,772	7.2%
Seasonal Daylight No Rain No Fog*	13,523	1,355	10.0%
Seasonal Daylight Clear*	9,017	444	4.9%

*Seasonal conditions occur anytime from June through November.

For the proposed cooling tower, due to the cooling load being directly related to ambient temperature, the worst case seasonal plume conditions are forecast to occur from June through November when the inlet air chillers are operating more frequently.

A plume frequency of 20 percent of seasonal (in this case June through November) daylight clear hours is used as a plume impact study threshold trigger. The plant design, incorporating several conservative operating assumptions indicates that the cooling tower plume frequency will be less than 20 percent of seasonal clear hours.

TURBINE VISIBLE PLUME MODELING ANALYSIS

Staff evaluated the applicant's AFC (SFERP 2004a) 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 for each turbine stack.

HRSG PARAMETERS

Based on the stack exhaust parameters anticipated by the applicant the frequency of visual plumes can be estimated. The turbine exhaust data are provided in **Table 3**.

Table 3
Turbine Exhaust Parameters

Parameter	**Turbine Exhaust Parameters**			
Stack Height	85 feet (25.9 meters)			
Stack Diameter	12 feet (3.66 meters)			
Ambient Conditions	Molecular Weight [b]	Moisture Content (% by weight) [b]	Exhaust Flow Rate (klb/hr) [b]	Exhaust Temp (°F) [b]
Full Load w/Inlet Air Chilling				
36 °F [a]	28.11	6.61	1,128.2	805
59 °F	28.03	7.18	1,107.5	826
80 °F	28.02	7.21	1,107.2	826
50% Load				
36 °F	28.25	5.56	745.4	819
59 °F	28.30	5.19	768.9	782
80 °F	28.37	4.75	787.1	744

Source: AFC (SFERP 2004a, Appendix 8.1A, Table 8.1A-1 and Appendix 8.1B Table 8.1B-1). Some values were calculated using data presented in Table 8.1A-1.

Note(s): a. No inlet evaporative cooling at 36 °F.
b. Values were extrapolated or interpolated between hourly ambient condition data points as necessary.

HRSG VISIBLE PLUME MODELING ANALYSIS

Staff modeled the turbine plumes using the CSVP model with a six-year meteorological data set from SFO. No plumes were predicted to occur under full load or 50 percent load conditions. The high temperature of the simple-cycle turbine exhaust should preclude the formation of visible water vapor plumes under all normally anticipated worst-case weather conditions and worst-case operating conditions.

CONCLUSIONS

Visible water vapor plumes from the proposed SFERP cooling tower are not expected to occur greater than 20 percent of seasonal daylight clear hours. No visible water vapor plumes are expected to occur from the turbine exhausts.

REFERENCES

SFERP 2004a - City and County of San Francisco/Blout (tn: 31130). Application for Certification San Francisco Electric Reliability Project - 145-megawatt natural gas-fired peaking power plant located in San Francisco. Submitted to CEC/Therkelsen/Dockets on 3/18/04.

SFERP 2004q – CH2MHill/Carrier (tn: 31854). Data Responses Set 1A. Response to Staff's Data Requests dated 6/4/04. Submitted to CEC/Pfanner/Dockets on 7/6/04.

SFERP 2004u – CH2MHill/Carrier (tn: 31948). Informal Data Response Set 1. Submitted to CEC/Pfanner/Dockets on 7/23/04.

VISUAL RESOURCES - FIGURE 1

San Francisco Electric Reliability Project - Supplement A - Photo Locations

CALIFORNIA ENERGY COMMISSION, SYSTEMS ASSESSMENT & FACILITIES SITING DIVISION, FEBRUARY 2006

SOURCE: AFC Supplement A, Figure 8.11-1

VISUAL RESOURCES - FIGURE 2

San Francisco Electric Reliability Project -Supplement A - KOP 1 - Existing View of Proposed Project Site from Watchman Way Residences

SOURCE: AFC Supplement A, Figure 8.11-12a

VISUAL RESOURCES - FIGURE 3

San Francisco Electric Reliability Project - Supplement A - KOP 1 - Simulated View of the Project Site from Watchman Way Residences

SOURCE: AFC Supplement A, Figure 8.11-12b

WASTE MANAGEMENT

Testimony of Alvin J. Greenberg, Ph.D., REA, QEP

SUMMARY OF CONCLUSIONS

Waste generated during construction and operation of the San Francisco Electric Reliability Project or those associated with remediation of existing on-site contamination would not result in any significant adverse impacts if the management measures contained in the Amended Application for Certification (Supplements A and B) and the proposed conditions of certification are implemented per the pertinent laws, ordinances, regulation, and standards.

INTRODUCTION

This Final Staff Assessment (FSA) presents an analysis of issues associated with managing wastes generated from constructing and operating the proposed San Francisco Electric Reliability Project (SFERP) and any hazardous wastes already existing on-site as a result of past activities. 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 and for potential site remediation. The technical scope of this analysis encompasses solid wastes existing on-site and those generated during facility construction and operation. Wastewater is more fully discussed in the **Soil and Water Resources** section of this document.

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

- The management of the wastes would 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 would be managed in an environmentally safe manner.
- The disposal of project wastes would not result in significant adverse impacts to existing waste disposal facilities.
- Upon project completion, the site is managed such that contaminants would not pose a significant risk to humans or the environment.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

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

Applicable Law	Description
Federal	
42 U.S.C. § 6922 Resource Conservation and Recovery Act	The 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 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 (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. The San Francisco Department of Public Health enforces this Act.
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 and are enforced by the Cal-EPA Department of Toxic Substances Control.

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.
The Asbestos Airborne Toxic Control Measure	The California Air Resources Board (CARB) adopted the Asbestos Airborne Toxic Control Measure (ATCM) for Construction, Grading, Quarrying, and Surface Mining Operations which became effective in the Bay Area Air Quality Management District (BAAQMD) in 2002. The ATCM requires specific mitigation measures to prevent off-site migration of asbestos-containing dust. The BAAQMD enforces these provisions.
Title 8 California Code of Regulations §**1529 and §5208**	These are regulations requiring the proper removal of asbestos containing materials and are enforced by Cal-OSHA.
Local	
Article 6 of the San Francisco Health Code	This Article controls solid non-hazardous waste production during construction and operation of the project and is enforced by the San Francisco Department of Public Health (SFDPH). The SFDPH has the responsibility for administration and enforcement of waste management laws regarding solid non-hazardous and hazardous wastes at the proposed energy center. Recycling of non-hazardous wastes is governed by the San Francisco Department of the Environment.
Article 4.1 of the San Francisco Public Works Code and the San Francisco Department of Public Works Order No. 158170	Regulate quantity and quality of industrial discharge to the combined sewer system, and specify requirements for discharge of non-hazardous wastewater.
Article 22A of the San Francisco Health Code	Enforced by the SFDPH and requires preparation of a site history report, implementation of soil investigation to evaluate presence of hazardous wastes in the soil, preparation of soil analysis report, site mitigation report, and certification report prior to excavation activities.
BAAQMD regulation 11-2	Includes notification requirements for demolition projects, and must be complied with before a demolition permit is granted.
The San Francisco Building Code Chapter 34, Section 3407	Contains requirements for handling of lead-based paint on the exterior of buildings or steel structures during demolition. This code is enforced by the San Francisco Department of Building Inspection.
California Fire Code	Enforced by the local Fire Department, and includes a requirement that businesses obtain permits for the use and storage of specified hazardous materials. This permit must be obtained before storing regulated hazardous wastes at the project site.

SETTING

The proposed project site is located in a former Western Pacific train yard that was used to transfer, store, and fuel rail cars carrying mostly dry goods (SFPUC 2005a, Section 8.13.3). There are several temporary structures on the proposed site including trailers, a

construction laydown area, and a cement batch plant, which would be removed prior to construction (SFPUC 2005a, Section 2.2.1).

A site characterization study was conducted on the proposed project site by Dames & Moore in 1987. The only findings were drums and containers that were subsequently disposed off-site. A site investigation of soil and groundwater in the area proposed to be occupied by a MUNI facility (including parts of the proposed power plant site) was conducted by AGS Inc. in 1999 (SFERP 2005p). The investigation concluded that both soil and groundwater in portions of the MUNI site are contaminated with petroleum hydrocarbons (from diesel), motor oil, Bunker C-oil, arsenic, and lead (SFPUC 2005a, Section 8.13.3). Since the proposed SFERP site is adjacent to the proposed MUNI site and had been historically used for the same purpose, it is likely that the same levels of contamination exist in soil and groundwater at the SFERP site. Many of the groundwater samples analyzed in the 1999 AGS site investigation were obtained from the proposed power plant site and showed elevated levels of lead, arsenic, carcinogenic Polycyclic Aromatic Hydrocarbons (PAHs), benzene, and hexavalent chromium. However, no soil samples were obtained in the 1999 study from the proposed power plant site. The existing cement batch plant may also have contributed to soil and groundwater contamination and this portion of the site remains to be fully characterized. Additional data was provided in a report prepared by Geomatrix Consultants (SFERP 2005pp). Once again, few samples were obtained from the project site.

In addition to sampling and analysis, both the AGS and Geomatrix reports contained human health risk assessments which purport to show that contaminants pose an insignificant risk to on-site workers or the off-site public. Staff believes, however, that it is inappropriate to use either of these health risk assessments as a basis for stating no significant risk exists because the assessment methodology used in 1999 and 2000 is both outdated and inconsistent with current Cal-EPA policies and guidelines. For example, the 1999 AGS report compares soil and groundwater values with Region 9 US EPA Preliminary Remediation Goals (PRGs), and the 2000 Geomatrix report inappropriately screened Chemicals of Concern and omitted them from the health risk assessment if present at levels less than 1/10 the Region 9 EPA residential PRGs. Both practices were then and continue to remain unacceptable by Cal-EPA Department of Toxic Substances Control. Furthermore, neither document assessed the risks posed by the contaminants found directly on the project site. In both cases, staff's analysis found that the on-site risks were "diluted" by the risks found on the adjoining parcels. If a comparison to screening levels is to be made, staff would require the use of the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) Environmental Screening Levels (ESLs), which are more scientifically based and are required to be used for ecological risk characterizations by the SFBRWQCB. Also, in 1999 and in 2000, naphthalene was not assessed as a carcinogen but it was identified and listed as such in 2004 by Cal-EPA.

A site mitigation plan containing a Risk Management Plan (RMP), a Site Management Plan (SMP), and deed restriction administered by the SFBRWQCB exists for the MUNI site that adjoins the power plant site (SFPUC 2005a, page 8.13.16). The applicant has stated that these three requirements should be extended to the power plant site (SFPUC 2005a, page 8.13.17). The applicant has also reported on contaminant analyses of soils obtained on the project site from geotechnical soil boring that were

conducted in August 2005 (SFERP 2005pp). This additional information, consisting of both discrete and composite samples at surface, 5 feet below ground surface (bgs), and 10 feet bgs, demonstrated that extremely high levels of carcinogens, including arsenic, nickel, and PAHs, were found on the project site. Additionally, high levels of petroleum compounds (diesel and motor oil) and soluble metals were found in the soil, thus potentially posing an ecological risk. (Ecological risks are discussed more fully in the **Soil and Water Resources** section of this FSA.)

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Two issues are addressed in this Waste Management section: potential site contamination and the methods used to handle wastes (Class I hazardous wastes, Class II designed wastes, and Class III municipal solid wastes) during construction and operations. The methods staff uses and the thresholds for determining significance of impacts are different for these two issues.

For any site proposed for the construction of a power plant in California, the applicant must provide sufficient documentation about the nature of any contamination on the site. Staff requires that at the least, a Phase I Environmental Site Assessment (ESA) be prepared and submitted to the Energy Commission for staff's review and evaluation. A Phase I ESA provides a history of use of the site, often as far back as the mid-1800s, and a list of any hazardous waste release within a certain distance of the site. If there is a reasonable potential that the site contains hazardous waste, soil or groundwater would be sampled and analyzed as part of a Phase II ESA.

Staff may utilize either of two approaches or both for determining if hazardous waste present on the site would pose a risk to on-site workers (construction or operations) or the off-site public. The first approach follows standards promulgated by Cal-EPA, principally by the Department of Toxic Substances Control (DTSC), the Office of Environmental Health Hazard Assessment (OEHHA), and the Regional Water Quality Control Boards (RWQCB). Staff would compare the levels of contaminants found on-site with standards such as the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) Environmental Screening Levels (ESLs) or the Cal-EPA Office of Environmental Health Hazard Assessment (OEHHA) California Human Health Screening Levels (CHHSLs). If metals are suspected of being present at unsafe levels, staff would first compare those levels to levels that occur naturally in soil or water as tabulated by DTSC or other federal agencies.

The second approach involves the preparation of a site-specific Human Health Risk Assessment and/or Ecological Risk Assessment. The human health risk assessment would follow Cal-EPA guidelines and must address all affected populations including the most burdened and compromised receptors. Staff would require the applicant to prepare such an assessment and would require some form of remediation if the human health cancer risk exceeded one-in-one million or the non-cancer hazard index exceeded 1.0, per 42 U.S.C. § 6922 (Resource Conservation and Recovery Act), California Health and Safety Code §25100 et seq. (Hazardous Waste Control Act of

1972, as amended), and Article 22A of the San Francisco Health Code. An ecological risk screening evaluation or risk assessment would be required if contaminants might pose a risk to biological receptors. The applicant also would follow Cal EPA and Regional Water Board guidelines and if the ecological risks were significant, appropriate mitigation might be required.

Regarding the management of wastes, staff reviews the applicant's proposed solid and hazardous waste management methods and determines if the methods meet the state standards for waste reduction and recycling. Staff then reviews the available off-site treatment and disposal sites available and determined whether or not the proposed power plant's waste would have a significant impact on the disposal sites allotted daily, yearly, or lifetime volume of waste it is allowed to receive. Staff uses a threshold of less than 10 percent impact on a waste disposal facility to determine if the impact would be significant.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Existing Contamination

As a result of the analysis conducted on the geotechnical soil borings and as a result of staff's analysis of all soil and groundwater samples obtained and reported on by the applicant, staff has determined that further site characterization is needed in order to adequately protect the off-site public, on-site workers, and ecological receptors. In all the reports provided by the applicant, a total of only 25 samples were obtained from the 4-acre project site and only 17 of these were analyzed as discrete samples. Others were analyzed as composite samples and others were not analyzed. No groundwater sampling wells were drilled directly on the project site, although at least two wells were within 250 feet of the down-gradient (east) boundary. Accordingly, staff is requiring additional soil and groundwater sampling and analysis be conducted as per proposed condition of certification **Waste-6** that would require full site characterization, including additional soil, soil gas, and groundwater sampling and analysis, and appropriate remediation prior to site mobilization. Towards this goal, the applicant has already submitted a draft site sampling and analysis plan (SFERP 2006f) that has been reviewed, revised, and approved by staff and the SFBRWQCB.

Staff also determined that it is inappropriate to use either the AGS 1999 health risk assessment or the 2000 Geomatrix health risk assessment as a basis for determining health risks of site workers and the public during site excavation and therefore a revised human health risk assessment based upon the new data plus all existing data specific for the project site must be prepared prior to the preparation of a site-specific remediation plan and site mobilization. In addition, in order to ensure that any potential contaminants found in the soils on the site and/or in groundwater directly beneath the site do not pose a significant risk to ecological receptors, staff is requiring that an ecological risk screening assessment be conducted using SFBRWQCB 2005 Environmental Screening Levels (ESLs) and the results considered in the remediation plan.

Staff is working closely with the SFBRWQCB to ensure that the site is adequately characterized and remediated so that an insignificant risk is posed to workers, the

public, and to ecological receptors. In this case, risk could potentially be posed to the off-site public if soil or dust with sufficiently high levels of contaminants is tracked or blown off-site and thus is available for the public to inhale, touch, or eat the dust. The human health risk assessment that would be prepared by the applicant would assess and describe this potential. Staff is confident that adoption of the proposed Conditions of Certification **Waste-6** and **Waste-7** will ensure the goal of insignificant risk. This is because at past sites with similar contamination, staff has determined that the contaminant concentrations found are seldom high enough to pose a significant risk to the off-site public, as demonstrated by a site-specific human health risk assessment. If the concentrations are indeed high enough, dust control and soil migration control methods can be employed to reduce migration off-site and thus reduce the risks to an insignificant level. Several approaches that will mitigate the potential risks to on-site workers include (a) removal of small areas of soil containing the highest levels of contaminants ("hot spots") and subsequent transportation to a licensed hazardous waste treatment or disposal facility, (b) keeping the soil damp to avoid generation of dust during construction, (c) the use of personal protective equipment, and (d) de-watering trenches so that skin contact with contaminated groundwater is avoided.

Any Asbestos Containing Materials (ACM) used in construction would be required to be removed, as per Cal/OSHA regulations including Title 8 California Code of Regulations §1529, Title 8 California Code of Regulations §5208, and Department of Toxic Substances Control regulations including Health and Safety Code sections 25914.1-3 and 25915 et seq., and BAAQMD regulation 11-2 which contains notification requirements for demolition projects that must be complied with before a demolition permit is granted. However, soil analysis conducted on the project site (SFERP 2005pp) indicated that no asbestos was detected at appropriate detection levels and thus these requirements would not be triggered for this site. Staff finds that proposed conditions of certification **Waste-1** and **Waste-2** (which would 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) would be adequate to address any unknown asbestos or additional soil or groundwater contamination contingency that may be encountered.

The site mitigation plan containing a Risk Management Plan (RMP), a Site Management Plan (SMP), and deed restriction administered by the SFBRWQCB presently includes only the MUNI site that adjoins the power plant site, and should be revised and extended to the power plant site. Staff therefore proposes condition of certification **Waste-7** which requires a revised human health risk assessment, a revised site-specific RMP/SMP, and extension of the deed restriction to the site. Staff believes that this condition of certification would address potential health risks prior to and during site mobilization.

Construction Impacts and Mitigation

Site preparation and construction of the proposed generating plant and associated facilities would last approximately 12 months and generate both nonhazardous and hazardous wastes in solid and liquid forms. Before construction can begin, the project owner would be required to develop and implement a Construction Waste Management Plan as per proposed Condition of Certification **Waste-5**.

Metal debris from welding/cutting activities, packing materials, electrical wiring, and empty non-hazardous chemical containers would be generated during construction. Approximately 15 tons of waste metal is anticipated to be generated during construction. Nonhazardous solid wastes generated during construction would include up to 10 tons of wood, paper, glass, and plastic waste products comprised of excess lumber, packing materials, insulation, and empty non-hazardous chemical containers (SFPUC 2005a, Section 8.13.4.1.2). All non-hazardous wastes would be recycled to the extent possible and non-recyclable wastes would be collected by a licensed hauler and disposed of in a solid waste disposal facility, per Title 14, California Code of Regulations, §17200 et seq. (Minimum Standards for Solid Waste Handling and Disposal) and Article 6 of the San Francisco Health Code.

Additionally, the applicant proposes to use treated wastewater for cooling. As proposed in an amendment to the project description (SFERP 2006c), secondary effluent will be obtained from the Southeast Waste Water Treatment Plant (SEWWTP) at a pressurized manhole located near the intersection of Tulare and 3rd Streets, and treated to Title 22 tertiary standards on-site. Some hazardous and nonhazardous wastes would be generated during construction of the proposed 2,600-foot water pipeline. These would consist of routine construction wastes such as building materials, gasoline and diesel fuel leaks, lubricants (oil and grease), oily rags, paper, wood, scrap metal, etc. These amounts would be minor and if handled in the same manner as that described for the project site, would present an insignificant risk to workers and the public.

Soil excavation during construction would comply with Article 22A of the San Francisco Health Code, which requires preparation of a site history report, implementation of soil investigation to evaluate presence of hazardous wastes in the soil, preparation of soil analysis report, site mitigation report, and certification report. These reports would also include portions of the wastewater line that are between the historical high tide line and the bay. The applicant has submitted a modified Phase I ESA for the SFERP site and linear corridors, which includes a database search of facilities near and along the process water pipeline route that may potentially contribute to contamination, as well as historic topographic maps, historic aerial photos, and Sanborn maps (historical maps dating back to the mid-1800s that were produced for fire insurance purposes and thus show the presence or non-presence of buildings on a particular parcel of land)(SFPUC 2005d and SFPUC 2006a). The modified Phase I ESA concluded that there are nine facilities in the project vicinity that are likely to contribute to contamination, five of which are located along the process water pipeline route. The report states that this information will be provided to the contractors planning excavation activities for this project.

Since excavation activities and trenching during the construction of the proposed water pipeline may encounter potentially contaminated soils and/or groundwater, specific handling, disposal, and other precautions may be necessary as per 22 CCR 66262.10. Staff finds that proposed conditions of certification **Waste-1** and **Waste-2** would be adequate to address any soil and/or groundwater contamination contingency that may be encountered during construction of the process water pipeline.

The applicant proposes to reuse all excavated soil on the site with the exception of contaminated soil. Contaminated soil would be tested and classified in accordance with 22, CCR 66262.10 et seq. and may be disposed offsite at an appropriate land disposal facility. If any of the soil excavated does not meet the requirements for land disposal set in CCR Title 22, then further treatment would be applied to reduce contamination to acceptable levels for disposal. (SFPUC 2005a, Section 8.13.6.1.1).

Because the potential exists to encounter asbestos-containing material at the site, standard mitigation measures to reduce fugitive dust would be implemented by the applicant as specified in CARB's Asbestos Airborne Toxics Control Measure (ATCM). If more than one acre of asbestos-containing soil would be disturbed during construction, the applicant would prepare a dust mitigation plan that will ensure no visible dust beyond the site boundary. This plan would be submitted for approval to the BAAQMD prior to beginning of construction activities, per the Asbestos Airborne Toxics Control Measure. The BAAQMD may also require air monitoring of asbestos dust during construction to ensure the effectiveness of the mitigation measures (SFPUC 2005a, Section 8.13.6.1.1). However, because dust control methods are essential to controlling air pollution during construction, staff is proposing requiring stringent fugitive dust control (**AQ-SC3**) and monitoring (**AQ-SC4**) regardless of the asbestos content of the soil. Please see the **Air Quality** section of this Final Staff Assessment.

Nonhazardous liquid wastes would be generated during construction, and are discussed in the **Soil and Water Resources** section of this document. Storm water runoff would be managed in accordance with a Drainage, Erosion and Sediment Control Plan that would be prepared for the project and approved prior to construction. Other wastewaters would be sampled to determine their disposal. If the wastewater is found to be non-hazardous, it would be treated and discharged to the San Francisco combined sewer system in accordance with City requirements (Article 4.1 of the San Francisco Public Works Code and the San Francisco Department of Public Works Order No. 158170). If the wastewater is found to be hazardous, it would be collected and disposed of at a permitted hazardous waste management facility in accordance with California Health and Safety Code §25100 et seq. (Hazardous Waste Control Act of 1972, as amended) and all other applicable regulations (SFPUC 2005a, Section 8.13.6.1)

Hazardous wastes anticipated to be generated during construction include welding materials, paint, flushing and cleaning fluids, solvents, asbestos containing materials, and lead-based paint. Lead based paint disposal would be regulated by the San Francisco Building Code Chapter 34, Section 3407. The quantities of flushing and cleaning fluids are estimated to be once or twice the internal volume of the pipes cleaned. The quantity of all other hazardous wastes is expected to be minimal (SFPUC 2005a Section 8.13.4.1.4).

The applicant would be considered the generator of hazardous wastes at this site during the construction period and therefore, prior to construction, the project owner would be required to obtain a unique hazardous waste generator identification number from the Department of Toxic Substances Control (DTSC) in accordance with DTSC regulatory authority, as per proposed Condition of Certification **Waste-3**. Wastes would be accumulated at satellite locations and then transported daily to the construction contractor's 90-day hazardous waste storage area located in the construction laydown

area. The wastes thus accumulated would be properly manifested, transported and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies. Staff reviewed the disposal methods described in AFC subsection 8.13.6.1.4 and concluded that all wastes would be disposed in accordance with all applicable LORS. Should any construction waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by proposed Condition of Certification **Waste-4** to notify the CPM whenever the owner becomes aware of this action.

In section 8.13.6 of the Amended AFC, the applicant states that handling and management of construction waste would follow the hierarchical approach of source reduction, recycling, treatment, and disposal. Recycling of wastes would be prioritized in an effort to meet the City and County goals of 75 percent recycling by 2010 and 100 percent recycling by 2020. The minimal quantities of hazardous waste generated would not significantly impact the treatment and disposal resources available in California.

Operation Impacts and Mitigation

The proposed SFERP would generate both nonhazardous and hazardous wastes in solid and liquid forms under normal operating conditions. Before operations can begin, the project owner would be required to develop and implement an Operations Waste Management Plan as per proposed Condition of Certification **Waste-5**.

Nonhazardous Solid Wastes

Nonhazardous solid wastes anticipated to be generated during operation include up to 20 cubic yards of waste annually, comprised of maintenance wastes and office wastes. These wastes would be recycled to the extent possible under the City and County's goals of 75 percent recycling by 2010 and 100 percent recycling by 2020. Non-recyclable wastes would be regularly transported offsite to a solid waste disposal facility (SFPUC 2005a, Sections 8.13.4.2.1 and 8.13.6.2.1).

Nonhazardous Liquid Wastes

Nonhazardous liquid wastes would be generated during facility operation, and are discussed in the **Soil and Water Resources** section of this document. Storm water runoff would be managed in accordance with a Drainage, Erosion and Sediment Control Plan. Other wastewaters would be sampled to determine their quality and disposed of by the appropriate method (SFPUC 2005a, Section 8.13.6.1). Cooling tower blowdown, plant drainage, reverse osmosis water, and backwash water from the power cycle makeup treatment would be discharged to the waste water collection system (SFPUC 2005a, Section 8.13.4.2.2).

Hazardous Wastes

The applicant would be considered to be the generator of hazardous wastes at this site during operations and thus the project owner's unique hazardous waste generator identification number obtained during construction would still be required for generation of hazardous waste, as per proposed Condition of Certification **Waste-3**. Hazardous wastes anticipated to be generated during routine project operation include waste lubricating oil, lubrication oil filters from the combustion turbines, spent SCR catalyst,

oily rags, cooling tower sludge, laboratory analysis waste, oil sorbents, and chemical feed area drainage. Staff concurs that Table 8.13-3 of the Amended AFC provides a complete list of these wastes, the amounts expected to be generated, and their disposal methods. The amounts of hazardous wastes generated during the operation of SFERP would be minimal, and recycling methods would be used to the extent possible. The remaining hazardous waste would be temporarily stored on-site, per the California Fire Code and Title 22, California Code of Regulations, §66262.10 et seq., and disposed of by licensed hazardous waste collection and disposal companies in accordance with all applicable regulations, per Title 22, California Code of Regulations, §66262.10 et seq. Furthermore, as in the construction phase, should any operations waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by proposed Condition of Certification **Waste-4** to notify the CPM whenever the owner becomes aware of this action.

In section 8.13.6 of the AFC, the applicant states that handling and management of operational waste would follow the hierarchical approach of source reduction, recycling, treatment, and disposal. Recycling of wastes would be prioritized in an effort to meet the City and County goals of 75 percent recycling by 2010 and 100 percent recycling by 2020. The minimal quantities of hazardous waste generated would not significantly impact the treatment and disposal resources available in California.

Impact on Existing Waste Disposal Facilities

Nonhazardous Solid Wastes

Section 8.13.5.1 and Table 8.13-3 of the Amended AFC list four Class II and III facilities that will accept nonhazardous solid wastes from the SFERP project. The City currently has an exclusive agreement with Waste Management Inc. (WMI) to dispose up to 15 million tons of non-hazardous waste and inert waste in the Altamont Landfill. The City's contract with WMI is expected to expire in approximately 2010. Thereafter, the City would be free to use any other available disposal facilities. The City has reached its goal of 50 percent recycling, and successful efforts to increase recycling percentages may extend the City's contract with WMI beyond 2010 (SFPUC 2005a, Section 8.13.5.1).

The City is conducting a search for additional landfill capacity available for use after 2010, and some of the nearby options are listed in Table 8.13-3 of the Amended AFC. The closest landfill to the SFERP is the Ox Mountain Sanitary Landfill in Half Moon Bay, approximately 26 miles away, with a remaining capacity of 44.6 million cubic yards and estimated closure date in 2018. The second closest landfill is the Kirby Canyon Recycling Station and Landfill in San Jose, approximately 47 miles away, which has a remaining capacity of over 57 million cubic yards and an estimated closure date in 2022. In total, the four listed facilities (including the Altamont Landfill) possess a total of over 128.8 million cubic yards of remaining capacity. The volume of solid nonhazardous waste from the SFERP requiring off-site disposal would be a small fraction of the existing combined capacity of the available Class III landfills and would not significantly impact the capacity or remaining life of any of these facilities.

Hazardous Wastes

Section 8.13.5.2 of the Amended AFC discusses the three Class I landfills in California: the Buttonwillow Landfill in Kern County, the Superstition Hills Landfill in Imperial County, and the Kettleman Hills Landfill in King's County. The Kettleman Hills facility also accepts Class II and Class III wastes. In total, there is an excess of 20 million cubic yards of remaining hazardous waste disposal capacity at these landfills, with up to 16 years of remaining operating lifetimes. In addition, the Kettleman Hills facility is in the process of permitting an additional 15 million cubic yards of disposal capacity, and the Buttonwillow facility is not expected to reach its capacity until 2040 at current disposal rates (SFERP Data Response WM-90). The amount of hazardous waste transported to these landfills has decreased in recent years due to source reduction efforts by generators and the transport of waste out of state that is hazardous under California law, but not federal law. The referenced section of the AFC also notes the service of numbers of offsite commercial hazardous waste treatment and recycling facilities that provide sufficient capacity for recycling or treating hazardous wastes in the state of California (SFPUC 2005a, Section 8.13.5.2.4).

Most of the hazardous waste generated by the SFERP would be generated during facility construction and startup in the forms of flushing and cleaning liquids. Volumes of hazardous wastes generated during facility operation would be minimal. According to the applicant, the only hazardous waste that would require disposal in a Class I landfill would be SCR catalyst units that cannot be recycled and cooling tower sludge if it is determined to be hazardous (SFERP Data Response WM-90). Accordingly, staff proposes Condition of Certification **Waste-8** to require that the cooling tower sludge is tested as per 22 CCR 66262.10 and report the findings to the CPM in the monthly compliance report. Approximately 200 pounds per year (0.1 tons per year) of cooling tower sludge would be generated during operation. All hazardous wastes generated during both construction and operation would be transported offsite to a permitted treatment, storage, or disposal (TSD) facility for appropriate disposition, preferably recycling. The volume of hazardous waste from the SFERP requiring off-site disposal would be far less than staff's threshold of significance (10 percent of the existing combined capacity of the three Class I landfills) and would therefore not significantly impact the capacity or remaining life of any of these facilities.

CUMULATIVE IMPACTS AND MITIGATION

As proposed, the quantities of nonhazardous and hazardous wastes generated during construction and operation of the SFERP would add to the total quantities of waste generated in San Francisco and the State of California. This facility would generate an estimated 25 tons of solid waste during construction and approximately 20 cubic yards per year during operation. However, due to recycling efforts, the applicant estimates that only 7 tons of waste generated during construction would require disposal, and only about 5 tons a year during operation. In addition, the facility would produce approximately 50 gallons of laboratory analysis waste, 200 pounds of oil sorbents, and 200 pounds of cooling tower sludge each year. Overall, wastes would be generated in minimal quantities, recycling efforts would be prioritized wherever practical, and capacity is available in a variety of treatment and disposal facilities. Therefore staff concludes that these added waste quantities generated by SFERP would not result in significant cumulative waste management impacts.

COMPLIANCE WITH LORS

Energy Commission staff concludes that the SFERP 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 various departments within the California Environmental Protection Agency (Cal-EPA). Because hazardous wastes would be produced during both project construction and operation, the SFERP project would be required to obtain a hazardous waste generator identification number from the California Department of Toxic Substances Control (DTSC). Accordingly, SFERP would be required to properly store, package and label waste, use only approved transporters, prepare hazardous waste manifests, keep detailed records, and appropriately train 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 SFERP.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

No written comments from the public have been received. The Department of Toxic Substance Control (DTSC) provided minor editorial comments on the original AFC section on Waste Management.

CONCLUSIONS

Management of the wastes generated during construction and operation of the SFERP project and existing on-site contamination would not result in any significant adverse impacts if the waste management measures proposed in the Amended AFC and the proposed conditions of certification are implemented per the pertinent LORS.

If approved, the applicant would prepare separate Waste Management Plans for the construction and operation of the SFERP, which would include a description of each waste stream and the management methods planed for each waste. Proposed condition of certification **Waste-5** ensures that these plans would be submitted to the Compliance Project Manager (CPM) and to applicable local agencies prior to site preparation. Staff believes that the project's compliance with all applicable LORS and the Conditions of Certification proposed by staff would adequately insure that no significant adverse environmental impacts would result from the management and disposal of project-related waste.

Staff has proposed Conditions of Certification **Waste-1** through **8** which require that: **1**) the project owner have an experienced Registered Professional Engineer or Geologist available for consultation during soil excavation and grading activities in the event that contaminated soils are encountered; **2**) if potentially contaminated soil is unearthed during excavation at either the proposed site or linear facilities, the Registered Professional Engineer or Geologist inspect the site, determine the need for sampling nature, file a written report, and seek guidance from the CPM and the appropriate regulatory agencies; **3**) the project owner obtain a unique hazardous waste generator identification number from the Department of Toxic Substances Control (DTSC) in

accordance with DTSC regulatory authority; **4**) the project owner notify the CPM whenever the owner becomes aware of any impending waste management-related enforcement action; **5**) the project owner prepare and submit waste management plans for all wastes generated during construction and operation of the facility and submit them to the CPM and the San Francisco Department of Public Health; **6**) site activities involving movement of soils not commence until the site is adequately characterized and remediated; and **7**) a revised human health risk assessment be prepared, an ecological risk screening assessment be conducted and the results considered in the choice of site remediation, a revised Risk Management Plan (RMP) and Site Management Plan (SMP) be prepared, and the deed restriction for the neighboring MUNI site be extended to the power plant site; and **8**) cooling tower sludge be tested.

Staff is working closely with the SFBRWQCB to ensure that prior to any site mobilization (activities), the site will be adequately characterized for the presence of hazardous waste in the soils, groundwater, and soil gas, that the site will be remediated and mitigation measures implemented so as to protect human health – both on-site workers and the off-site public – and ecological receptors. If staff's proposed conditions **Waste-6** and **Waste-7** are adopted, an insignificant risk would be posed to human and ecological receptors and this goal achieved.

PROPOSED 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 Compliance Project Manager (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 review and 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 San Francisco Department of Public Health,

the San Francisco Fire Department, and the Berkeley Office of 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 during construction and operations.

Verification: The project owner shall keep its copy of the identification number on file at the project site and notify the CPM via the relevant 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 for approval.

The Operation Waste Management Plan shall be submitted to the CPM no less than 30 days prior to the start of project operation for approval. 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 and provide a comparison of the actual

methods used to those the planned management methods proposed in the original Operation Waste Management Plan.

WASTE-6 The project owner shall ensure that the site is properly characterized and remediated. The project owner shall prepare a work plan in narrative outline form detailing the number and location of samples of soil, soil gas, and groundwater to be obtained and analyzed, the analytes, the method of analysis and the Practical Quantitation Limits (PQLs) to be used. The project owner shall submit this plan to the SF Bay Regional Water Quality Control Board (SFBRWQCB) and the SF Department of Public Health for review and comment, and to the CPM for review and approval. The project owner shall also prepare a Site Investigation Report and Remediation Plan in standard Remedial Investigation (RI) report format and shall submit this report to the SF Bay Regional Water Quality Control Board and the SF Department of Public Health for review and comment, and to the CPM for review and approval. In no event shall any project construction commence that involves either the movement of contaminated soil or construction on contaminated soil until the CPM has determined that all necessary remediation has been accomplished.

Verification: At least sixty (60) days prior to the start of site mobilization, the project owner shall provide the RI Report and any documentation that the site has been appropriately characterized and remediated to the SFBRWQCB for review and comment and to the CPM for review and approval. The project owner shall provide a copy of all correspondence with the SFBRWQCB to the CPM within 10 days of receipt. In the event that certain specific site activities need to start prior to full characterization and remediation, the project owner shall make such a request to the CPM for review and approval.

WASTE-7 The project owner shall prepare a human health risk assessment work plan in narrative outline form addressing soil and groundwater contamination on the site and submit this work plan to the SFBRWQCB for review and comment and to the CPM for review and approval. The project owner shall also prepare:

a) a Human Health Risk Assessment,

b) an Ecological Risk Screening Assessment using site-specific groundwater concentrations compared to SFBRWQCB 2005 ESLs,

c) a revised site-specific Risk Management Plan (RMP), and

d) a site specific Site Management Plan (SMP).

All four of these reports shall be submitted to the SFBRWQCB and the SF Department of Health for review and comment and to the CPM for review and approval. The project owner shall also enter into an agreement with the SFBRWQCB to extend the MUNI site deed restriction to the power plant site.

Verification: At least sixty (60) days prior to the start of site mobilization, the project owner shall provide: (a) a revised Human Health Risk Assessment addressing soil and groundwater contamination on the site, (b) an Ecological Risk Screening Assessment,

(c) a revised site-specific Risk Management Plan (RMP), and (d) a revised site-specific Site Management Plan (SMP) to the SFBRWQCB and SF Department of Public Health for review and comment and to the CPM for review and approval. Documentation that the existing MUNI site deed restriction covers the power plant site shall be submitted to the CPM.

WASTE-8 The project owner shall ensure that the cooling tower sludge is tested as per 22 CCR 66262.10 and report the findings to the CPM.

Verification: The project shall include the results of sludge testing in a report provided to the CPM. If four consecutive tests show that the sludge is non-hazardous, the project owner may apply to the CPM to discontinue testing.

REFERENCES

SFERP 2004a - City and County of San Francisco/Blout (tn: 31130). Application for Certification San Francisco Electric Reliability Project - 145-megawatt natural gas-fired peaking power plant located in San Francisco. Submitted to CEC/Therkelsen/Dockets on 3/18/04.

SFERP 2004h - CH2MHill/Carrier (tn: 31274). Attachment to the Data Adequacy Supplement: Attachment WM-DA-1, the Phase I Environmental Site Assessment. Submitted to CEC/Pfanner/Dockets on 4/16/04.

SFERP 2004o – CH2MHill/Carrier (tn: 31856). Data Response Set 1A. Attachment S&W-48, Analytical Results for February 2004 Sampling Event. Submitted to CEC/Pfanner/Dockets on 7/6/04.

SFERP 2004q – CH2MHill/Carrier (tn: 31854). Data Responses Set 1A. Response to Staff's Data Requests dated 6/4/04. Submitted to CEC/Pfanner/Dockets on 7/6/04.

SFERP 2005p – CH2MHill/Carrier (tn: 34544). Data Response, Set 3A – Attachment WM-184A. Submitted to CEC/Pfanner/Dockets on 6/2/05.

SFERP 2005pp – CH2MHill/Carrier (tn: 35871). SFPUC Preliminary Staff Assessment Comments, Set 3. (Attachment WM-71A & Attachment WM-71B). 11/11/2005. Rec'd 11/11/2005.

SFPUC 2005a – San Francisco Public Utilities Commission/Hale (tn: 34403). Amendment A of the Application for Certification. Submitted to CEC/Therkelsen/Dockets on 3/25/05.

SFPUC 2005d – San Francisco Public Utilities Commission (tn: 36120). Amendment to the Project Description, Process & Cooling Water Supply. POS. 12/20/2005. Rec'd 12/22/2005.

SFPUC 2006a – CH2MHILL/Carrier (tn: 36141). Preliminary Staff Assessment Comments, Set 4, Revised. POS. 12/30/2005. Rec'd 01/04/2006.

SFERP 2006f – CH2MHill/Carrier (tn: 36246). Draft Field Sampling Plan. 1/25/2006. Rec'd 1/25/2006.

WORKER SAFETY AND FIRE PROTECTION

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

SUMMARY OF CONCLUSIONS

Staff concluded that if the applicant for the proposed San Francisco Electric Reliability Project provides a Project Construction Safety and Health Program and a Project Operations and Maintenance Safety and Health Program, as required by Conditions of Certification **WORKER SAFETY -1, -2, -3, -4,** and **-5**, the project would incorporate sufficient measures to ensure adequate levels of industrial safety, and comply with applicable laws, ordinances, regulations, and standards. The proposed conditions of certification provide assurance that the Construction Safety and Health Program and the Operations and Maintenance Safety and Health Program proposed by the applicant will be reviewed by the appropriate agencies before implementation. The conditions also require verification that the proposed plans adequately assure worker safety and fire protection and comply with applicable laws, ordinances, regulations, and standards.

Staff also concludes that the proposed project would not have significant impacts on local fire protection services. The proposed facility would be located within an industrial area that is currently served by the local fire department. The fire risks of the proposed facility do not pose significant added demands on local fire protection services. Staff also concludes that the San Francisco Hazmat Team is adequately equipped and staffed to respond to more serious hazardous materials incidents at the proposed facility with an adequate response time.

INTRODUCTION

Worker safety and fire protection is regulated through laws, ordinances, regulations, and standards (LORS), at the federal, state, and local levels. Industrial workers at the facility operate equipment and handle hazardous materials daily and may face hazards that can result in accidents and serious injury. Protection measures are employed to eliminate or reduce these hazards or to minimize the risk through special training, protective equipment and procedural controls.

The purpose of this Final Staff Assessment (FSA) is to assess the worker safety and fire protection measures proposed by the San Francisco Electricity Reliability Project (SFERP) and to determine whether the applicant has proposed adequate measures to:

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

LAWS, ORDINANCES, REGULATION, AND STANDARDS

WORKER SAFETY AND FIRE PROTECTION Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
29 U.S. Code sections 651 et seq (Occupational Safety and Health Act of 1970)	This Act mandates safety requirements in the workplace with the purpose of "[assuring] so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources" (29 USC § 651).
29 CFR sections 1910.1 to 1910.1500 (Occupational Safety and Health Administration Safety and Health Regulations)	These sections define the procedures for promulgating regulations and conducting inspections to implement and enforce safety and health procedures to protect workers, particularly in the industrial sector.
29 CFR sections 1952.170 to 1952.175	These sections provide Federal approval of California's plan for enforcement of its own Safety and Health requirements, in lieu of most of the Federal requirements found in 29 CFR §1910.1 to 1910.1500.
State	
8 CCR all applicable sections (Cal/OSHA regulations)	Requires that all employers follow these regulations as they pertain to the work involved. This includes regulations pertaining to safety matters during construction, commissioning, and operations of power plants, as well as safety around electrical components, fire safety, and hazardous materials use, storage, and handling.
24 CCR section 3, et seq.	Incorporates the current addition of the Uniform Building Code.
Health and Safety Code section 25500, et seq.	Risk Management Plan requirements for threshold quantity of listed acutely hazardous materials at a facility.
Health and Safety Code sections 25500 to 25541	Requires a Hazardous Material Business Plan detailing emergency response plans for hazardous materials emergency at a facility
Local (or locally enforced)	
1998 Edition of California Fire Code and all applicable NFPA standards (24	NFPA standards are incorporated into the California Uniform Fire Code. The fire code contains general provisions for fire safety, including: 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

CCR Part 9)	of combustible materials; 7) exits and emergency escapes; and 8) fire alarm systems. The California Fire Code incorporates current editions of the UFC standards. The City of San Francisco adopted the California Fire Code (CFC) into its municipal code in 1999, and is the administering agency for the CFC standards.
California Building Code Title 24, California Code of Regulations (24 CCR § 3, et seq.)	Comprised of eleven parts containing the building design and construction requirements relating to fire and life safety and structural safety. The California Building Standards Code incorporates current editions of the Uniform Building Code and includes the electrical, mechanical, energy, and fire codes applicable to the project. The Uniform Building Code, the 2001 California Building Standards Code, and the San Francisco Building Code are enforced by the City and County of San Francisco, San Francisco Department of Building Inspection (SFPUC 2005a Sections 8.15.2 and 8.15.6).
Uniform Fire Code, 1997	Contains standards of the American Society for Testing and Materials and the NFPA. It is the United State's 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.

SETTING

Fire support services to the site will be under the jurisdiction of the San Francisco Fire Department (SFFD). The closest SFFD station is No. 25 located at 3305 Third Street, approximately 0.3 miles away with a response time of about 3 to 4 minutes. The second and third closest stations are No. 37 located at 798 Wisconsin Street approximately 1.1 miles away and station No. 9 located at 2245 Jerrold Avenue approximately 1.3 miles away, both with a response time of 3 to 4 minutes (SFPUC 2005a Section 8.8.3.6.2 and Appendix 8.8B, CH2MHill 2004). Each of these stations is staffed with one officer and three firefighters and equipped with one engine. Station No. 9 also has a truck manned by one officer and four firefighters (SFPUC 2005a Section 8.8.3.6.2, Appendix 8.8B, and CH2MHill 2004). All fire fighters at all locations, including the HAZMAT team at Station 36, are trained at the level of Emergency Medical Technician (EMT) -1. In addition, Station 25 has an ambulance and 2 paramedics, Station 37 has a part-time ambulance and paramedics, and Station 9 has an ambulance but no paramedics to staff it at this time.

The San Francisco Hazardous Materials Team located in Station No. 36 at 109 Oak Street approximately 4 miles from the project site is considered first responder for HazMat incidents, with a response time of about 30 minutes. Backup support and technical consultants would be provided by the San Francisco Environmental Health Section of the Department of Public Health. Staff has determined that the hazardous materials response time is adequate and that the SFFD HazMat Response Team is adequately trained and equipped to respond in a timely manner (CCSF 2004).

The SFFD has indicated that Fire Stations No. 25, 37, and 9 are adequately equipped and manned to deal with any incident at the proposed facility. However, the SFFD

indicated that their capability to handle fires at the proposed facility could be improved with more training in fighting fires where hazardous materials are present and/or involved (CCSF 2004). Staff notes that this training is part of routine fire department training and therefore will not propose that this be made a condition of certification. Staff determined that the response time is adequate and consistent with the UFC and the NFPA.

WORKER SAFETY AND FIRE PROTECTION Table 1
Equipment and Personnel at SFFD*

SFFD Station	Response Time	Distance to SFERP	Equipment	#of Firefighters per shift	EMS Capability
Station No. 25 3305 Third Street San Francisco	Approx. 3 to 4 minutes	Approx. 0.3 miles	1 Engine 1 Ambulance	1 Officer 3 Firefighters	EMT-1 Paramedic unit
Station No. 37 798 Wisconsin St. San Francisco	Approx. 3 to 4 minutes	Approx. 1.1 miles	1 Engine 1 Part time ambulance	1 Officer 3 Firefighters	EMT-1 Part time paramedic unit
Station No. 9 2245 Jerrold Ave. San Francisco	Approx. 3 to 4 minutes	Approx. 1.3 miles	1 Engine 1 Fire Truck 1 Ambulance	2 Officers 7 Firefighters	EMT-1
Station No. 36 109 Oak Street San Francisco	Approx. 30 minutes	Approx. 4 miles		Hazmat Team	EMT-1

*Source: SFERP Supplement A to the AFC Section 8.8; information received by e-mail from John Carrier (CH2MHill 2004); and personal communication with SFFD (CCSF 2004).

In addition to construction and operations worker safety issues, this site has soil and groundwater contamination. The contamination includes metals, organics, and residual petroleum products. The staff assessment section on **WASTE MANAGEMENT** discusses this issue in great detail. Proposed conditions of certification **Waste-6** and **Waste-7** would require that the site is adequately characterized, a human health risk assessment is prepared, and the site is remediated and managed such that any residual contamination would pose an insignificant risk to the on-site construction and operations workers, the off-site public, and to ecological receptors.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Two issues are assessed in Worker Safety-Fire Protection:

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

Worker safety issues are a matter of adhering to the spirit and intent of the Cal-OSHA regulations. This is essentially a LORS compliance matter, and if all LORS are followed, workers will be adequately protected. Thus, the standard for staff's review and determination of significant impacts on workers is whether or not the applicant has demonstrated adequate knowledge about and dedication to implementing all pertinent and relevant Cal-OSHA standards.

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

DIRECT/INDIRECT IMPACTS AND MITIGATION

Worker Safety

Industrial environments are potentially dangerous during construction and operation of facilities. Workers at the proposed project will 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 SFERP 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 will be adequately protected from health and safety hazards.

A Safety and Health Program will be prepared by the applicant to minimize worker hazards during construction and operation. Staff uses the phrase "Safety and Health Program" to refer to the measures that will be taken to ensure compliance with the applicable LORS during the construction and operational phases of the project.

Construction Safety and Health Program

The SFERP encompasses construction and operation of a natural gas fired-facility. Workers will be exposed to hazards typical of construction and operation of a gas-fired simple cycle facility.

Construction Safety Orders are published at 8 CCR sections 1502, et seq. These requirements are promulgated by Cal/OSHA and are applicable to the construction phase of the project. The Construction Safety and Health Program will include the following:

- Construction Injury and Illness Prevention Program (8 CCR § 1509)
- Construction Fire Prevention Plan (8 CCR § 1920)
- Personal Protective Equipment Program (8 CCR §§ 1514 - 1522)
- Emergency Action Program and Plan

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

- Electrical Safety Program
- Motor Vehicle and Heavy Equipment Safety Program;
- Forklift Operation Program;
- Excavation/Trenching Program;
- Fall Protection Program;
- Scaffolding/Ladder Safety Program;
- Articulating Boom Platforms Program;
- Crane and Material Handling Program;
- Housekeeping and Material Handling and Storage Program;
- Respiratory Protection Program;
- Employee Exposure Monitoring Program;
- Hand and Portable Power Tool Safety Program;
- Hearing Conservation Program;
- Back Injury Prevention Program;
- Hazard Communication Program;
- Heat and Cold Stress Monitoring and Control Program;
- Pressure Vessel and Pipeline Safety Program;
- Hazardous Waste Program;
- Hot work Safety Program;
- Permit-Required Confined Space Entry Program; and
- Demolition Procedure (if applicable).

The AFC includes adequate outlines of each of the above programs (SFPUC 2005a, Section 8.7.4.3.1). Prior to the start of construction of the SFERP, detailed programs and plans will be provided pursuant to the Condition of Certification **WORKER SAFETY-1**.

Operations and Maintenance Safety and Health Program

Prior to the start of operations at the SFERP, the Operations and Maintenance Safety and Health Program will be prepared. This operational safety program will include the following programs and plans:

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

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

The AFC includes adequate outlines of the Injury and Illness Prevention Program, Emergency Action Plan, Fire Prevention Program, and Personal Protective Equipment Program (SFPUC 2005a, Section 8.7.4.3.2). Prior to operation of the SFERP, all detailed programs and plans will be provided pursuant to Condition of Certification **WORKER SAFETY-2**.

Safety and Health Program Elements

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

Injury and Illness Prevention Program (IIPP)

The IIPP will include the following components as presented in the AFC (SFPUC 2005a Section 8.7.4.3.2):

- identity of person(s) with authority and responsibility for implementing the program;
- establish safety and health policy of the plan;
- define work rules and safe work practices for construction activities;
- system for ensuring that employees comply with safe and healthy work practices;
- system for facilitating employer-employee communications;
- procedures for identifying and evaluating workplace hazards and developing necessary program(s);
- methods for correcting unhealthy/unsafe conditions in a timely manner;
- determine and establish training and instruction requirements and programs; and

- specify safety procedures.

Fire Prevention Plan

California Code of Regulations requires an Operations Fire Prevention Plan (8 CCR § 3221). The AFC outlines a proposed Fire Prevention Plan which is acceptable to staff (SFPUC 2005a Section 8.7.4.3.2). The plan will include the following topics:

- determine general program requirements;
- determine fire hazard inventory, including ignition sources and mitigation;
- develop good housekeeping practices and proper materials storage;
- establish employee alarm and/or communication system(s);
- provide portable fire extinguishers at appropriate site locations;
- locate fixed fire fighting equipment in suitable areas;
- specify fire control requirements and procedures;
- establish proper flammable and combustible liquid storage facilities;
- identify the location and use of flammable and combustible liquids;
- provide proper dispensing and determine disposal requirements for flammable liquids;
- establish and determine training and instruction requirements and programs; and
- identify personnel to contact for information on plan contents.

Staff proposes that the applicant submit a final Fire Prevention Plan to the California Energy Commission Compliance Project Manager (CPM) for review and approval and to the SFFD for review and comment to satisfy proposed Conditions of Certification **WORKER SAFETY-1** and **WORKER SAFETY-2**.

Personal Protective Equipment Program

California regulations require Personal Protective Equipment (PPE) and first aid supplies whenever hazards are present that due to process, environment, chemicals or mechanical irritants, can cause injury or impair bodily function as a result of absorption, inhalation or physical contact (8 CCR sections 3380 to 3400). The SFERP operational environment will require PPE.

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

The PPE Program ensures that employers comply with the applicable requirements for PPE and provides employees with the information and training necessary to protect them from potential workplace hazards.

Emergency Action Plan

California regulations require an Emergency Action Plan (8 CCR § 3220). The AFC contains a satisfactory outline for an emergency action plan (SFPUC 2005a Section 8.7.4.3.2).

The outline lists the following features:

- establish emergency escape procedures and emergency escape route for the facility;
- determine procedures to be followed by employees who remain to operate critical plant operations before they evacuate;
- provide procedures to account for all employees and visitors after emergency evacuation of the plant has been completed;
- specify rescue and medical duties for assigned employees;
- identify fire and emergency reporting procedures to regulatory agencies;
- develop alarm and communication system for the facility;
- establish a list of personnel to contact for information on the plan contents;
- provide emergency response procedures for ammonia release; and
- determine and establish training and instruction requirements and programs.

Written Safety Program

In addition to the specific plans listed above, additional LORS apply to the project, called "safe work practices." Both the Construction and the Operations Safety Programs will address safe work practices under a variety of programs. The components of these programs include, but are not limited to, the programs found under the heading Construction Safety and Health Program on pages 4.14-5 and 4.14-6 of this staff assessment:

In addition, the project owner would be required to provide personnel protective equipment and exposure monitoring for workers who are involved in activities on sites where contaminated soil and/or contaminated groundwater exist as per staff's proposed Conditions of Certification **WORKER SAFETY-1** and**-2**. In addition, staff's proposed conditions of certification found in the **WASTE MANAGEMENT** section of this staff assessment would require:

- the project owner to prepare a human health risk assessment for the site,
- preparation and implementation of a site-specific Risk Management Plan (RMP), a site-specific Site Management Plan (SMP), and a deed restriction administered by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) covering the power plant site,

- that site activities involving movement of soils would not commence until the site is adequately characterized and remediated,
- the project owner to have an experienced Registered Professional Engineer or Geologist available for consultation during soil excavation and grading activities in the event that contaminated soils are encountered, and
- if potentially contaminated soil is unearthed during excavation at either the proposed site or linear facilities, the Registered Professional Engineer or Geologist shall inspect the site, determine the need for sampling and analysis, file a written report, and seek guidance from the CPM and the appropriate regulatory agencies.

These proposed Conditions of Certification would ensure that workers are properly protected from any hazardous wastes presently at the site.

Safety Training Programs

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

Additional Mitigation Measures

Protecting construction workers from injury and disease is among the greatest challenges in occupational safety and health. The following facts are reported by the National Institute for Occupational Safety and Health (NIOSH):

- More than 7 million persons work in the construction industry, representing 6% of the labor force. Approximately 1.5 million of these workers are self-employed.
- Of approximately 600,000 construction companies, 90% employ fewer than 20 workers. Few have formal safety and health programs.
- From 1980-1993, an average of 1,079 construction workers were killed on the job each year, more fatal injuries than in any other industry.
- Falls caused 3,859 construction worker fatalities (25.6%) between 1980 and 1993.
- 15% of workers' compensation costs are spent on construction injuries.
- Assuring safety and health in construction is complex, involving short-term work sites, changing hazards, and multiple operations and crews working in close proximity.
- In 1990, Congress directed NIOSH to undertake research and training to reduce diseases and injuries among construction workers in the United States. Under this mandate, NIOSH funds both intramural and extramural research projects.

The hazards associated with the construction industry are thus well documented. These hazards increase in complexity in the multi-employer worksites typical of large complex industrial type projects such as the construction of gas-fired power plants. In order to reduce and/or eliminate these hazards, it has become standard industry practice to hire a Construction Safety Supervisor to ensure a safe and healthful environment for all personnel. This has been evident in the audits of power plants under construction recently conducted by the staff. The Federal Occupational Safety and Health

Administration (OSHA) has also entered into strategic alliances with several professional and trade organizations to promote and recognize safety professionals trained as Construction Safety Supervisors, Construction Health and Safety Officers, and other professional designations. The goal of these partnerships is to encourage construction subcontractors to improve their safety and health performance; to assist them in striving for the elimination of the four hazards (falls, electrical, caught in/between and struck-by hazards), which account for the majority of fatalities and injuries in this industry and have been the focus of targeted OSHA inspections; to prevent serious accidents in the construction industry through implementation of enhanced safety and health programs and increased employee training; and to recognize those subcontractors with exemplary safety and health programs.

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

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

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

- Lack of posted confined space warning placards/signs;
- Confusing and/or inadequate electrical and machinery lockout/tagout permitting and procedures;
- Confusing and/or inappropriate procedures for handing over lockout/tagout and confined space permits from the construction team to commissioning team and then to operations;
- Dangerous placement of hydraulic elevated platforms under each other;
- Inappropriate placement of fire extinguishers near hotwork;
- Dangerous placement of numerous power cords in standing water on the site thus increasing the risk of electrocution;

- Construction of an unsafe aqueous ammonia unloading pad; and
- Inappropriate and unsecure placement of above-ground natural gas pipelines inside the facility but too close to the perimeter fence.
- Lack of adequate employee or contractor written training programs addressing proper procedures to follow in the event of finding suspicious packages or objects either on- or off-site.

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

Fire Hazards

During construction and operation of the proposed SFERP there is the potential for both small fires and major structural fires. Electrical sparks, combustion of fuel oil, natural gas, hydraulic fluid, mineral oil, insulating fluid at the power plant switchyard or flammable liquids, explosions, and over-heated equipment, may cause small fires. Major structural fires in areas without automatic fire detection and suppression systems are unlikely to develop at power plants. Fires and explosions of natural gas or other flammable gasses or liquids are rare. Compliance with all LORS will be adequate to assure protection from all fire hazards.

Staff reviewed the information provided in the AFC and spoke to representatives of the City and the City's Fire Department to determine if available fire protection services and equipment would adequately protect workers, and to determine the project's impact on fire protection services in the area. The project will rely on both onsite fire protection systems and local fire protection services. The onsite fire protection system provides the first line of defense for small fires. In the event of a major fire, fire support services, including trained firefighters and equipment for a sustained response, would be provided by the SFFD (SFPUC 2005a, Section 8.8.3.6.2).

Construction

During construction, portable fire extinguishers will be located throughout the site, and safety procedures and training will be implemented. In addition, the applicant indicated that the City will be notified of any fire incident during construction and will provide fire protection backup for larger fires that can not be extinguished using the portable suppression equipment (SFERP 2004u, WS-115).

Operation

The information in the AFC indicates that the project intends to meet the fire protection and suppression requirements of the California Fire Code, all applicable recommended NFPA standards (including Standard 850 addressing fire protection at electric generating plants), and all Cal-OSHA requirements. Fire suppression elements in the proposed plant will include both fixed and portable fire extinguishing systems. The fire water will be supplied from the City's existing fire water system at a rate of up to 1,500 gpm using SFPUC's Hetch Hetchy Water Supply system, or the City's Auxiliary Water Supply System as needed (SFPUC 2005a Table 8.14-6, and SFERP 2004u WS-116).

A CO_2 fire protection system will be provided for the combustion turbine generators and accessory equipment. The system will have fire detection sensors that will trigger alarms, turn off ventilation, close ventilation openings, and automatically release the CO_2 (SFPUC 2005a, Section 2.3.2.1.1).

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

The applicant would be required by **Worker Safety-1** and**-2** to provide the final Fire Protection and Prevention Program to staff and to the SFFD prior to construction and operation of the project, to confirm the adequacy of the proposed fire protection measures.

Emergency Medical Response

A state-wide survey was conducted by staff to determine the frequency of emergency medical response (EMS) and off-site fire-fighter response for natural gas-fired power plants in California. The purpose of the analysis was to determine what impact, if any, power plants may have on local emergency services. Staff has concluded that incidents at power plants that require fire or EMS response are infrequent and represent an insignificant impact on the local fire departments, except for rare instances where a rural fire department has mostly volunteer fire-fighting staff. However, staff has determined that the potential for both work-related and non-work related heart attacks exists at power plants. In fact, staff's research on the frequency of EMS response to gas-fired power plants shows that many of the responses for cardiac emergencies involved non-work related incidences, including visitors. The need for prompt response within a few minutes is well documented in the medical literature. Staff believes that the quickest medical intervention can only be achieved with the use of an on-site defibrillator; the response from an off-site provider would take longer regardless of the provider location. This fact is also well documented and serves as the basis for many private and public locations (e.g., airports, factories, government buildings) maintaining on-site cardiac defibrillation devices. Therefore, staff concludes that with the advent of modern cost-effective cardiac defibrillation devices, it is proper in a power plant environment to maintain such a devise on-site in order to convert cardiac arrythmias resulting from industrial accidents or other non-work related causes. Therefore, an additional COC

(**WORKER SAFETY-5**) is proposed which would require that a portable automatic cardiac defibrillator be located on site.

CUMULATIVE IMPACTS AND MITIGATION

Staff reviewed the potential for the construction and operation of SFERP combined with existing industrial facilities and expected new facilities, including the adjacent MUNI project, to result in impacts on the fire and emergency service capabilities of the SFFD, and determined that cumulative impacts were insignificant. The City's fire department stated that they feel adequately staffed and equipped to deal with any incident at the proposed facility (CCSF 2004). Given the industrial area where the project is proposed to be built, and the lack of unique fire hazards associated with a modern gas-fired power plant, staff concludes that this project will not have any significant incremental burden on the department's ability to respond to a fire or medical emergency.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

No agency or public comments were received relating to worker safety and fire protection.

CONCLUSIONS

Staff concluded that if the applicant for the proposed SFERP provides a Project Construction Safety and Health Program and a Project Operations and Maintenance Safety and Health Program as required by Conditions of Certification **WORKER SAFETY -1**, and **-2**; and fulfils the requirements of **WORKER SAETY-3** through**-5**, the project would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. Staff also concludes that the proposed project would not have significant impacts on local fire protection services.

PROPOSED CONDITIONS OF CERTIFICATION

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

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

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

Plan shall be submitted to the San Francisco Fire Department for review and comment prior to submittal to the CPM for approval.

Verification: At least 30 days prior to the start of construction, the project owner shall submit to the CPM for review and approval a copy of the Project Construction Safety and Health Program. The project owner shall provide a copy of a letter to the CPM from the San Francisco Fire Department stating the Fire Department's comments on the Construction Fire Prevention Plan and Emergency Action Plan.

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

- An Operation Injury and Illness Prevention Plan;
- An Emergency Action Plan;
- Hazardous Materials Management Program;
- Fire Prevention Program (8 CCR § 3221); and;
- Personal Protective Equipment Program (8 CCR §§ 3401-3411).

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

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

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

- Have over-all authority for coordination and implementation of all occupational safety and health practices, policies, and programs;
- Assure that the safety program for the project complies with Cal/OSHA & federal regulations related to power plant projects;
- Assure that all construction and commissioning workers and supervisors receive adequate safety training;

- Complete accident and safety-related incident investigations, emergency response reports for injuries, and inform the CPM of safety-related incidents; and
- Assure that all the plans identified in Worker Safety 1 and 2 are implemented.

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

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

- Record of all employees trained for that month (all records shall be kept on site for the duration of the project);
- Summary report of safety management actions and safety-related incidents that occurred during the month;
- Report of any continuing or unresolved situations and incidents that may pose danger to life or health; and
- Report of accidents and injuries that occurred during the month.

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

Verification: Prior to the start of construction, the project owner shall provide proof of its agreement to fund the Safety Monitor services to the CPM for review and approval.

WORKER SAFETY-5 The project owner shall ensure that a portable automatic cardiac defibrillator is located on site during construction and operations and shall implement a program to ensure that workers are properly trained in its use and that the equipment is properly maintained and functioning at all times.

Verification: At least 30 days prior to the start of site mobilization the project owner shall submit to the CPM proof that a portable automatic cardiac defibrillator exists on site and a copy of the training and maintenance program for review and approval.

REFERENCES

California Fire Code 1998. Published by the International Fire Code Institute comprised of the International Conference of Building Officials, the Western Fire Chiefs Association, and the California Building Standards Commission. Whittier, Ca.

City and County of San Francisco (CCSF) 2004. Record of conversation with Fire Marshall Paul Chin during a conference call August 3, 2004.

CH2MHill 2004. E-mail received from John Carrier dated August 2, 2004.

SFERP 2004a - City and County of San Francisco/Blout (tn:31130). Application for Certification San Francisco Electric Reliability Project - 145-megawatt natural gas-fired peaking power plant located in San Francisco. Submitted to CEC/Therkelsen/Dockets on 3/18/04.

SFERP 2004u – CH2MHill/Carrier (tn:31948). Informal Data Response Set 1 (Data Responses WS-115, 116, 117, and 118). Submitted to CEC/Pfanner/Dockets on 7/23/04.

SFPUC 2005a – San Francisco Public Utilities Commission/Hale (tn: 34403). Amendment A of the Application for Certification. Submitted to CEC/Therkelsen/Dockets on 3/25/05.

Uniform Fire Code 1997, Vol. 1. Published by the International Fire Code Institute comprised of the International Conference of Building Officials and the Western Fire Chiefs Association, Whittier, Ca.

USOSHA (United States Occupational Safety and Health Administration). 1993. Process Safety Management / Process Safety Management Guidelines For Compliance. U.S. Department of Labor, Washington, DC.