7.1 AIR QUALITY

This analysis of the potential air quality impacts of two new FP10 units and two new Simple Cycle gas turbines at the Marsh Landing Generation Station was conducted according to California Energy Commission (CEC) power plant siting requirements. The analysis also addressed U.S. Environmental Protection Agency (U.S. EPA) Prevention of Significant Deterioration (PSD) requirements and Bay Area Air Quality Management District (BAAQMD) permitting requirements for Determination of Compliance/Authority to Construct (DOC/ATC). Section 7.1.1, Affected Environment, describes the local environment surrounding the project that is relevant to evaluation of the air quality impacts. Section 7.1.2, Environmental Consequences, evaluates the project's air quality impacts from emissions of NO_X, carbon monoxide (CO), sulfur dioxide (SO_2), precursor organic compound (POC) also called volatile organic compound (VOC) in some regulations but used interchangeably herein, particulate matter less than 10 micrometers in diameter (PM_{10}), and particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$). Section 7.1.3, Cumulative Impacts Analysis and Protocol, addresses the approach proposed to assess the cumulative impacts of the project's emissions. Section 7.1.4, Mitigation Measures, describes the project's emission offset strategy. Section 7.1.5, Best Available Control Technology Analysis, discusses the detailed Best Available Control Technology (BACT) analysis conducted for the project. Section 7.1.6, Laws, Ordinances, Regulations, and Standards (LORS), describes all applicable laws, ordinances, regulations, and standards. Section 7.1.7, Involved Agencies and Agency Contacts, lists the agency personnel contacted during preparation of the air quality assessment. Section 7.1.8, Permits Required and Permitting Schedule, lists the air quality permits required for the project and provides a permit schedule. Section 7.1.9, References, lists the references used to conduct the air quality assessment.

Some air quality data are presented in other sections of this Application for Certification (AFC), including an evaluation of toxic air pollutants (see Section 7.6, Public Health), information related to the fuel characteristics (see Chapter 5, Gas Supply), and expected capacity factor of the proposed facility and heat rates (see Chapter 2, Project Description).

7.1.1 Affected Environment

This section describes the regional climate and meteorological conditions that influence transport and dispersion of air pollutants, as well as the existing air quality within the project region. The monitoring data presented in this section are considered to be representative of the project site. The location of the project is shown on Figure 7.1-1.

The project will be constructed entirely within the existing Contra Costa Power Plant (CCPP) site, and is located about 1/10 of a mile from the Antioch city limits. The site is surrounded by industrial uses to the south, west, and east, and the San Joaquin River to the north.

The proposed new generation units will be located on approximately 27 acres in the western portion of the CCPP property, generally within the footprint of the area previously occupied by five tanks and an area to the east. The balance of the CCPP site, 87 acres, will remain unchanged. While there is a nonconforming caretaker residence approximately 1,600 feet to the east of the MLGS project boundary, the nearest residential neighborhood is approximately 2,000 feet southwest of the MLGS facility fence line. The nearest Class I area is Point Reyes National Seashore, 82 kilometers (50 miles) to the west.

7.1.1.1 Climate and Meteorology

The climate of the San Francisco Bay region, along with much of coastal California, is controlled by a semi-permanent high-pressure system that is centered over the northeastern Pacific Ocean. In the summer, the relatively northern location of this strong high-pressure system results in clear skies inland and frequent coastal fog. Very little precipitation occurs during the summer months because storm

systems are blocked by the high-pressure system. Beginning in the autumn and continuing through the winter, the high-pressure system weakens and moves south, allowing storm systems originating from the Alaskan Gulf and the Pacific Ocean into the area. Temperature, winds, and rainfall are more variable during these months.

The predominant regional surface winds during the winter are northerly and southerly. During the spring, summer, and autumn, the winds are stronger and westerly. These strong westerly winds are caused by the combination of high pressure offshore and a thermal low pressure resulting from higher temperatures inland.

Atmospheric stability and mixing heights are important parameters in the determination of pollutant dispersion. Atmospheric stability reflects the amount of atmospheric turbulence and mixing. In general, the less stable an atmosphere, the greater the turbulence, resulting in more mixing and better dispersion. The mixing height, measured from the ground upward, is the height of the atmospheric layer in which convection and mechanical turbulence promote mixing. Good ventilation results from a high mixing height and at least moderate wind speeds within the mixing layer. In general, the frequent occurrence of temperature inversions over the San Francisco Bay Area limits this mixing height and consequently limits the availability of air for dilution.

In the Carquinez Strait region, low mixing depths and low wind speeds typically occur when the pressure gradient direction shifts to an easterly direction due to a high-pressure system over the Central Valley. Furthermore, if this occurs in the summer or autumn, the winds from the Central Valley are warmer, increasing photochemical activity, and contain more pollutants than the usually cooler marine air. An easterly flow is more common during the winter when the high-pressure system over the Pacific Ocean is no longer offshore. During the spring, summer, and autumn, the air pollution potential in the region is moderated by the strong westerly winds.

Long-term average temperature and precipitation data have been collected at Antioch, the surface meteorological station nearest to the project site, and are presented in Table 7.1-1. Average low and high temperatures during the summer vary from the mid-50s to the low-90s, respectively (in degrees Fahrenheit [ºF]). Summer precipitation is extremely low due to the strong stationary high-pressure system located off the coast that prevents most weather systems from moving through the area. The project site receives an average of 13 inches of rain annually. This amount is lower than most of the region due to a rain-shadow effect caused by Mt. Diablo to the southwest. During the winter, average low and high temperatures vary from the mid-30s to the mid-60s, respectively. About 80 percent of the precipitation in the area occurs from November through March, generally in association with storm systems that move through the region.

Wind speed and direction measurements were obtained from PG&E, and were collected at the switchyard adjacent to the site. Winds measured at that station are predominantly from the south and southeast and from the north-northwest. The annual average pattern of joint wind speed and wind direction frequencies in the area is illustrated in the wind rose presented in Figure 7.1-2. A detailed discussion of the meteorological data used to support dispersion modeling for evaluation of the air quality impacts is presented in Section 7.1.2.3, Air Quality Impacts Analysis, under Meteorological Data.

7.1.1.2 Existing Air Quality

Ambient air quality standards have been set by both the federal government and the State of California to protect public health and welfare with an adequate margin of safety. Pollutants for which National Ambient Air Quality Standards (NAAQS) or California Ambient Air Quality Standards (CAAQS) have been set are often referred to as “criteria” air pollutants. The term is derived from the comprehensive health and damage effects review that culminates in pollutant-specific air quality criteria documents,

which precede the establishment of NAAQS and CAAQS. These standards are reviewed on a legally prescribed frequency and are revised as new health and welfare effects data warrant. Each NAAQS or CAAQS is based on a specific averaging time over which the concentration is measured. Different averaging times are based upon protection against short-term, high-dosage effects or long-term, low-dosage effects. NAAQS may be exceeded no more than once per year. CAAQS are not to be exceeded.

The ambient air quality in Contra Costa County is monitored at nine permanent air quality monitoring stations operated by BAAQMD. The monitoring stations within the county that are closest to the project site are the Pittsburg–10th Street (Pittsburg) station, about 10 miles to the west of the project site, the Concord station, approximately 15 miles southwest of the site, and the Bethel Island Road (Bethel Island) station, located approximately 7 miles east of the site. These stations monitor all criteria pollutant concentrations except for lead; the Pittsburg and Bethel Island stations also do not monitor $PM_{2.5}$. The only air quality monitoring station in Contra Costa County that monitors $PM_{2.5}$ is the Concord station. Because lead monitoring stations are absent in northern California, the station closest to the project site that measures lead is located in Fresno County at the Parlier-Tuolumne Street station, about 163 miles southeast of the site.

Given the above, the criteria pollutants monitored at these stations are ozone (O_3), PM_{10}, $PM_{2.5}$, CO, nitrogen dioxide (NO_2), SO_2, and lead (Pb). Air quality measurements taken at these stations are presented in Tables 7.1-2 through 7.1-8. For the air quality impact analysis described in Section 7.1.2.3, the maximum recorded concentration from the most recent 3 years that data is available (2004-2006) at any of these monitoring stations were used to represent background air quality levels.

Ozone

On June 15, 2005 the 1-hour federal ozone standard was revoked for all areas except the 8-hour ozone nonattainment Early Action Compact (EAC) areas (40 CFR 50.9(b)). EAC areas are those that do not yet have an effective date for their 8-hour designations. The 1-hour federal ozone standard is no longer in effect in any California Air Basin, because there are no EAC areas in California,.

Concentration data for ozone in parts per million (ppm) that were recorded within the most recent three years at the Pittsburg, Concord, and Bethel Island monitoring stations are summarized in Tables 7.1-2a, 7.1-2b, and 7.1-2c.

The 1-hour state ozone CAAQS of 0.09 ppm was exceeded three times in 2006 at the Pittsburg monitoring station, but was not exceeded in 2005 or 2004. The Concord monitoring station exceeded the 1-hour state ozone standard eight times in 2006, and once in both 2005 and 2004. The Bethel Island monitoring station did not exceed the state standard in 2005, but recorded values above the 1-hour state ozone standards nine times in 2006 and once in 2004.

The federal 8-hour ozone NAAQS of 0.08 ppm has also been exceeded occasionally at all three monitoring stations. The federal standard requires maintaining 0.08 ppm as a 3-year average of the fourth-highest daily maximum values. Therefore, the number of days that the maximum concentration exceeds the standard concentration is not the number of violations of the standard for the year. In June 2004, the Bay Area was designated as a marginal nonattainment area of the national 8-hour ozone standard. The 8-hour ozone NAAQS was exceeded at the Pittsburg monitoring station once in 2006, and was not exceeded in 2005 or 2004. At the Concord station, the 8-hour ozone NAAQS was exceeded four times in 2006, but was not exceeded in 2005 or 2004. The Bethel Island station exceeded the 8-hour federal ozone standards once in 2006, but was below this standard in 2005 and 2004. As supported by the data in Tables 7.1-2a-c, the project site is located in an area that is in nonattainment of the state 1-hour ozone standard, and the state and federal 8-hour standards.

Particulates

Particulates in the air are caused by a combination of: (1) windblown fugitive dust or road dust; (2) particles emitted directly from combustion sources (primarily carbon particles); and (3) organic, sulfate, and nitrate aerosols formed in the air from emitted hydrocarbons, sulfur oxides, and nitrogen oxides. Respirable particulate matter, which has a diameter of 10 microns or less, is referred to as PM_{10}. It can contribute to increased respiratory disease, lung damage, cancer, premature death, as well as reduced visibility, and surface soiling. In 1987, the United States Environmental Protection Agency (U.S. EPA) adopted standards for PM_{10} and phased out the previous standards that had been in effect for total suspended particulate (TSP) standards that had been in effect until then.

The San Francisco Bay Air Basin (the Basin) is designated as state nonattainment for $PM_{10,}$ and unclassified for federal PM_{10} attainment status. Concentration data for this pollutant in micrograms per cubic meter ($\mu g/m^3$) that were recorded within the most recent three years at the Pittsburg, Concord, and Bethel Island monitoring stations are summarized in Tables 7.1-3a, 7.1-3b, and 7.1-3c. The federal standard uses a gravimetric/beta attenuation method for measuring particulate matter, while the state standard uses an inertial separation and gravimetric analysis method. The tables show that the 24-hour average CAAQS of 50 $\mu g/m^3$ for PM_{10} has been exceeded in the vicinity of the project site a few times a year. The federal 24-hour average NAAQS of 150 $\mu g/m^3$ for PM_{10} was not exceeded at any time in the last three years at the Pittsburg, Concord, or Bethel Island stations, with a maximum recorded 24-hour PM_{10} concentration of 84 $\mu g/m^3$ in 2006.

Prior to July 2003, the annual geometric mean PM_{10} concentration was referred to as the state annual average. Since then, the state annual average has been changed to match the federal standards (i.e., annual arithmetic mean), which is called the national annual average and is calculated as the arithmetic average of the four arithmetic quarterly averages. The federal annual PM_{10} standard was revoked by the U.S. EPA in 2006 due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution. However, the measured annual geometric and arithmetic mean concentrations recorded at the nearest air monitoring station to the project site, Pittsburg, has consistently been at or above the CAAQS of 20 $\mu g/m^3$ for PM_{10}. The maximum annual arithmetic mean concentration recorded at Pittsburg station was 22 $\mu g/m^3$ in 2004.

Fine particulates ($PM_{2.5}$) result from fuel combustion in motor vehicles and industrial sources, residential and agricultural burning, and from atmospheric reactions involving NO_X, SO_X, and organics. The potential health effects of $PM_{2.5}$ are considered more serious than those of PM_{10}. In 1997, the U.S. EPA established annual and 24-hour NAAQS for $PM_{2.5}$ for the first time. The standard regulating the 3-year average of the 98th percentile of 24-hour PM_{10} concentrations (35 $\mu g/m^3$) became effective on December 17, 2006.

$PM_{2.5}$ data are presented in Tables 7.1-4 for the Concord air quality monitoring station. The San Francisco Bay Air Basin is designated as state nonattainment for $PM_{2.5,}$ and unclassified for federal $PM_{2.5}$ attainment status. The station shows that the federal 24-hour average NAAQS of 35 $\mu g/m^3$ is exceeded frequently in vicinity of the project. The highest 24-hour $PM_{2.5}$ concentration of 73.7 $\mu g/m^3$ was measured at the Concord monitoring station during 2004. Note that the $PM_{2.5}$ 24-hour standard was changed from 65 $\mu g/m^3$ to 35 $\mu g/m^3$ in October of 2006; thus, the 2005 and 2006 highest monitored values for $PM_{2.5}$ were below the federal standard that was in effect at that time. The annual average $PM_{2.5}$ data for the same monitoring station are also presented in this table. The annual arithmetic mean concentrations are at or below the California $PM_{2.5}$ ambient air quality standard of 12 $\mu g/m^3$. The maximum annual arithmetic mean concentration recorded at Concord station was 12 $\mu g/m^3$ in 2004.

Carbon Monoxide

CO is a product of incomplete combustion, principally from automobiles and other mobile sources of pollution. CO emissions from wood-burning stoves and fireplaces can also be important sources of this pollutant. Health effects resulting from exposure to high CO levels can include chest pain in heart patients, headaches, and reduced mental alertness.

Recorded CO monitoring data for the Pittsburg, Concord, and Bethel Island monitoring stations are provided in Tables 7.1-5a through 7.1-5c. These tables indicate that the Contra Costa County portion of the Basin is in attainment for CO. In April 1998, the Basin was redesignated to attainment for the national 8-hour CO standard.

The data in Tables 7.1-5a through 7.1-5c indicate that maximum 1-hour average CO levels comply with the NAAQS and CAAQS of 20.0 ppm. This limit has not been exceeded at any station in the last 3 years. The maximum 1-hour concentration was 4.1 ppm at the Pittsburg monitoring site in 2004. The tables also show that maximum recorded 8-hour average CO levels comply with the NAAQS and CAAQS of 9.0 ppm within the last 3 years. The maximum 8-hour concentration was 2.0 ppm at the Concord station in 2004.

Nitrogen Dioxide

Nitrogen oxides (NO_X) emissions are primarily generated from the combustion of fuels. Nitrogen oxides include nitric oxide (NO) and NO_2. Because NO converts to NO_2 in the atmosphere over time and NO_2 is the more toxic of the two, NO_2 is the listed criteria pollutant. The control of NO_2 is important because of this pollutant's role in the atmospheric formation of ozone, the principal component of smog, and a criteria air pollutant. NO_2 can also provoke lung irritation and damage.

Recorded NO_2 concentration data for the Pittsburg, Concord, and Bethel Island monitoring stations are provided in Tables 7.1-6a through 7.1-6c. As supported by the tables, the Basin has been in attainment of NO_2 for many years.

Maximum annual average (arithmetic mean) NO_2 levels comply with the federal NAAQS of 0.053 ppm. This limit has not been exceeded in the last 3 years. The maximum annual average concentration was 0.012 ppm at the Concord station in 2004 and 2005. The data in the tables also show that maximum 1-hour average NO_2 levels comply with the CAAQS of 0.25 ppm. This limit also has not been exceeded in the last 3 years. The maximum 1-hour concentration was 0.065 ppm at the Concord station in 2004.

On February 23, 2007, the California Air Resources Board (CARB) approved new, more stringent CAAQS for NO_2. The new 1-hour standard will be 0.18 ppm, which is not to be exceeded, and the new annual average standard is 0.030 ppm. The Office of Administrative Law must approve the standards before they take effect. The new CAAQS are expected to become effective in the near future.

Sulfur Dioxide

Sulfur dioxide (SO_2) is emitted when any sulfur-containing fuel is burned, or from chemical plants that treat or refine sulfur or sulfur-containing chemicals. Natural gas contains trace amounts of sulfur, while fuel oils contain much larger amounts. SO_2 can increase lung disease and breathing problems for asthmatics. It reacts in the atmosphere to form acid rain, which damages crops and vegetation, as well as buildings and materials.

Summaries of monitored SO_2 concentration data are presented in Tables 7.1-7a through 7.1-7c for the Contra Costa County monitoring stations. These tables show that the San Francisco Bay Air Basin being in attainment for all applicable state and federal AAQS for SO_2.

The SO_2 data in Tables 7.1-7a and 7.1-7b demonstrate that the 24-hour average CAAQS of 0.04 ppm is not exceeded in the project vicinity and the federal 24-hour average SO_2 NAAQS of 0.14 ppm has not been exceeded between 2004 and 2006. The maximum 24-hour SO_2 monitored concentration of 0.010 ppm was measured at the Concord monitoring station in 2004. The recorded annual average (arithmetic mean) SO_2 concentrations at the monitoring stations are also presented in the tables and in all cases are well below the federal ambient air quality standard of 0.03 ppm. The maximum 1-hour average SO_2 levels comply with the CAAQS of 0.25 ppm. This limit also has not been exceeded in the last 3 years. The maximum 1-hour concentration was 0.090 ppm at the Concord monitoring station in 2004.

Lead

Lead exposure can occur through multiple pathways, including inhalation of air and ingestion of lead in food from water, soil, or dust contamination. Excessive exposure to lead can trigger seizures, mental retardation or behavioral disorders, and other central nervous system damage. Lead gasoline additives, nonferrous smelters, and battery plants were the most significant contributors to atmospheric lead emissions. Legislation in the early 1970s required gradual reduction of the lead content of gasoline over a period of time, which has dramatically reduced lead emissions from mobile and other combustion sources. In addition, unleaded gasoline was introduced in 1975, and together these controls have essentially eliminated violations of the lead standard for ambient air in urban areas. There are no monitoring stations in Contra Costa County that measure lead concentrations. Measured lead concentration levels at Parlier, California, the closest monitoring station measuring lead, are presented in Tables 7.1-8 for 2006. Data for 2004 and 2005 were not available. The data in these tables support the attainment status in the Basin for lead.

Particulate Sulfates

Particulate sulfates are the product of further oxidation of SO_2. Sulfate compounds consist of primary and secondary particles. Primary sulfate particles are directly emitted from open pit mines, dry lakebeds, and desert soils. Fuel combustion is another source of sulfates, both primary and secondary. Secondary sulfate particles are produced when SO_X emissions are transformed into particles through physical and chemical processes in the atmosphere. Particles can be transported long distances. The Basin is in attainment with the CAAQS for sulfates, and there is no NAAQS for sulfates.

Other State-Designated Criteria Pollutants

Along with sulfates, California has designated hydrogen sulfide and visibility-reducing particles as criteria pollutants, in addition to the federal criteria pollutants. The entire state is in attainment for visibility-reducing particles, and the Basin is in attainment for hydrogen sulfide.

7.1.2 Environmental Consequences

This section describes the analysis conducted to assess the potential air quality impacts from the project. Impacts due to the project are considered significant if, when combined with background ambient concentrations, they would exceed an ambient air quality standard, or if by themselves they would exceed an applicable PSD significant impact level; these standards are discussed in Section 7.1.6. Emissions estimates for both construction and operation of the project are presented in this section. Dispersion model selection and setup are also described (i.e., emissions scenarios and release parameters, building wake effects, meteorological data, and receptor locations) and results of the analysis are presented.

7.1.2.1 Project Construction Emissions

The primary emission sources during construction will include exhaust from heavy construction equipment and vehicles and fugitive dust generated in areas disturbed by grading, excavating, and erection of facility structures. The projected construction schedule is expected to be 33 months. Demolition and construction activities, including grading, will take place within the 27-acre MLGS site. Approximately 14 acres within the existing CCPP site, but outside the MLGS site, will be used for temporary construction laydown, offices, and parking areas. These construction areas are previously disturbed or paved areas that do not require any grading.

Construction equipment and vehicle exhaust emissions were estimated using equipment lists and construction scheduling information provided by the project design engineering firm, which are presented in Chapter 2, Project Description, and Appendix J. Equipment-specific emissions factors were used to estimate mass emissions for all criteria pollutants from diesel-fueled construction equipment are based on South Coast Air Quality Management District (SCAQMD) OFFROAD Emission Factors. Emission factors for on-road vehicles are based on results from EMFAC Emissions Model 2007 Version 2.3. Emission factors for gasoline-fueled construction equipment are based on OFFROAD 2007 model emission factors. Assumptions used in calculating project construction emissions included a 33-month construction period; 22 construction days per month; a single-shift, 10-hour workday; and a 50-hour workweek. The list of fueled equipment needed during each month of the construction effort (see Table 7.1-9) served as the basis for estimating pollutant emissions throughout the term of construction and helped to identify the periods of probable maximum short-term emissions. An ultra-low fuel sulfur content of 0.0015 percent by weight (15 ppm) was assumed for all diesel construction equipment operations.

Fugitive dust emissions resulting from onsite soil disturbances were estimated using Midwest Research Institute (MRI), 1996 emission factors for bulldozing and dirt-pushing, travel on unpaved roads, and handling/storage of aggregate materials. A dust control efficiency of 83.23 percent for project site and temporary construction area activities was assumed to be achieved for these activities by frequent watering or other measures when required.

Emissions from on-road delivery trucks and worker commute trips were estimated using trip generation information presented in Section 2.7 and emission factors provided by SCAQMD for Onroad Vehicles from the EMFAC2007 model. Construction workers were assumed to commute to the project site from locations within Contra Costa County.

The short-term maximum emissions were calculated using Month 6 construction equipment. Activities in Month 6 include demolition of tanks and piping, grading, bulldozing, and excavating. Annual emissions were based on the worst 12 consecutive months of the construction period.

The emissions from each disturbed area are presented as either area sources for fugitive dust or point sources for combustion emissions for all pollutants. Point sources were selected so that the ozone limiting method (OLM) version of the AERMOD dispersion model could be used to calculate NO_2 emissions impact for both the 1-hour and annual averaging times. To apply the OLM option in AERMOD to predict NO_2 concentrations, hourly ozone data are required. Hourly ozone data recorded at the Bethel Island BAAQMD air quality monitoring station for the same years corresponding to the input meteorological data were used in this analysis.

The equipment point source emissions were calculated by means of the emission spreadsheet in Appendix J and stack parameters for different-sized (horsepower) equipment. These stack parameters were obtained

from the CARB document *Risk Management Guidance for the Permitting of New Stationary Source Diesel-Fueled Engines* (2000).

Detailed spreadsheets are provided in Appendix J; these show the calculations of emissions from all project construction activities and equipment, and the data and assumptions used in these calculations. Table 7.1-10 present the estimated maximum monthly emissions and maximum annual emissions of air pollutants due to project construction.

7.1.2.2 Operational Emissions

The proposed combustion turbines will use pipeline quality natural gas fuel exclusively. Chapter 5 presents the expected composition of the natural gas to be delivered from PG&E to the MLGS site. Estimated emissions of sulfur oxides for combustion of this fuel by the project's equipment assumed full oxidation of all fuel sulfur to SO_2 and a natural gas sulfur content of 0.40 grains per 100 standard cubic feet (scf). For short-term emissions a conservative estimate of a natural gas sulfur content of 1.0 grains per 100 scf was used for the calculations, as 1.0 grains per 100 scf is the upper limit as specified in PG&E's Rule 21 of Section C.

Normal Operating Emissions

The only emission sources of the project once it becomes operational will be the four power blocks: two Siemens Flex Plant 10 (FP10) units and two Siemens Simple Cycle units. Maximum short-term operational emissions from the units were determined from a comparative evaluation of potential emissions corresponding to turbine commissioning, normal operating conditions, and CTG startup/shutdown conditions. The long-term operational emissions from the units were estimated by summing the emissions contributions from normal operating conditions and CTG startup/shutdown conditions. Estimated annual emissions of air pollutants for the units have been calculated based on the expected operating schedule for the units presented below in Tables 7.1-11 and 7.1-12.

The criteria pollutant emission rates and stack parameters provided by the units vendors for three load conditions (60 percent, 85 percent, and 100 percent for the FP10 units and 60 percent, 75 percent, and 100 percent for the Simple Cycle units) at three ambient temperatures (94°F, 60°F, and 20°F) are presented for the FP10 and Simple Cycle units in Table 7.1-13 and Table 7.1-14, respectively.

These cases encompass CTG operations with and without power augmentation, and with and without evaporative cooling of the inlet air to the turbines. The combined scenarios presented in these tables bound the expected normal operating range of each proposed unit.

Turbine Startup and Shutdown Emissions

The expected emissions and durations associated with CTG startup and shutdown events are summarized in Table 7.1-15. Based on vendor information, startup (i.e., the period from initial firing to compliance with emission limits) of the FP10 units is expected within 12 minutes, and the Simple Cycle units within 11 minutes. During a shutdown event, the efficiency of the emission controls will continue to function at normal operating levels down to a load of 60 percent for the FP10 units and the Simple Cycle units; thus, shutdown periods and emissions are measured from the time this load is reached.

For the FP10 units, the hours that include a startup event have higher rates of emissions for all criteria pollutants, compared to the hours that include a shutdown event, or to normal operating conditions with fully functioning SCR and CO oxidation catalyst. Thus, the hours that include a startup event were used

for the worst-case short- and long-term emission estimates in the air quality dispersion modeling simulations for these pollutants.

For the Simple Cycle units, the hours that include a startup event have higher NO_X, CO, and volatile organic compounds (VOC) emissions, compared to the hours that include a shutdown event, or to normal operating conditions with fully functioning selective catalytic reduction (SCR) and CO oxidation catalyst. For PM_{10}, the hours that include a shutdown event have slightly higher emissions. SO_2 has the highest emissions during normal operation conditions.

Emissions Scenarios for Modeling

Reasonable worst-case project emissions scenarios were developed for each pollutant and averaging time for which modeling is required to evaluate the project's maximum potential impacts on air quality, acid deposition, and visibility. These scenarios form the basis for the air dispersion modeling analyses presented in Section 7.1.2.3.

Table 7.1-16 summarizes the worst-case emissions scenarios adopted to assess maximum impacts to air quality and air quality-related values in the modeling analyses presented in Section 7.1.2.3. Note that modeling of turbine commissioning impacts was conducted separately due to the temporary, one-time nature of this activity. Some notes regarding the selection of the modeling scenarios and the resulting emission calculations in Table 7.1-16 are provided below.

The PM_{10} non-startup or shutdown emission rates are based on values guaranteed by vendors, and include both filterable (front-half) and condensable (back-half) particulate matter.

Estimated annual emissions for the pollutants incorporate the maximum requested numbers of startups and shutdowns, as well as the proposed maximum steady-state operating hours with and without power augmentation (see Table 7.1-11 and Table 7.1-12). For purposes of developing the average annual emission estimates, the contributions associated with all normal operating hours were calculated based on an assumed 100 percent turbine load and ambient temperature of 60 ºF for the specified number of hours per year.

Short-term turbine emissions were calculated for the pollutants with averaging times corresponding to the AAQS. The worst-case startup condition was assumed for purposes of estimating maximum 1-hour emission rates for all pollutants. SO_X emissions were calculated as directly proportional to fuel usage. Since the highest maximum fuel usage rate would occur when the units are running at 100 percent with an ambient temperature of 20°F, this condition was selected to represent maximum hourly SO_X emissions. For annual emission calculations, 0.4 grains of sulfur per 100 scf of fuel flow was used. For short-term (1-hour and 3-hour) emission estimates, 1.0 grains of sulfur per 100 scf was used, the upper limit as mandated by PG&E. The 3-hour SO_X emission rate was calculated based on a scenario with four gas turbines running at 100 percent using the winter minimum temperature of 20°F with three startups for the FP10, and three startups and two shutdowns for the Simple Cycle units. The 8-hour maximum CO emission rate was calculated assuming two startups and one shutdown for the FP10 and three startups, two shutdowns for the Simple Cycle units, and full operation at 100 percent using the winter minimum temperature of 20°F.

Combined Annual Project Emissions

The total combined annual emissions from all emission sources of the project are shown in Table 7.1-17, including the two FP10 turbine units and two Simple Cycle units. Annual emissions of all pollutants for the FP10 were calculated for 4,383 hours of operation with 193 startups and 193 shutdowns, with 322 hours of normal operational emissions, 4,000 hours with power augmentation, all calculated at the

yearly average temperature of 59°F. The Simple Cycle units emissions were calculated with 877 total hours, with 100 startups, 100 shutdowns, and 849 hours of normal operation at full load at the yearly average temperature of 60°F.

Combustion Turbine Commissioning Emissions

Commissioning of each new combustion turbine will be performed in a defined series of tests that will be conducted following its installation at the project facility. The specific tests to be run on each combustion turbine include:

- First fire,
- FSNL and first synchronization,
- Individual CTG/HRSG steam blows (FP10 units only),
- Turbine load testing,
- Install emission testing equipment,
- STG trip test and load test (FP10 units only),
- Combined-cycle testing/Drift test (FP10 units only),
- Emission tuning/Drift testing,
- Pre-performance/Source testing, and
- California Independent System Operator (Cal-ISO) certification

The first four commissioning tests typically each take a day or less to complete.

The duration of all tests may be affected by unforeseen events, and therefore can only be estimated in advance. A maximum of 500 hours of operation during commissioning of each combustion turbine with partially abated emissions is expected over a period not to exceed 5 months for each set of turbines. A minimum of one turbine start would be needed for each test. Additional starts may be necessary. The annual frequency of turbine starts during the year when commissioning occurs is not expected to exceed the frequency of turbine starts during operation (see Table 7.1-11 and Table 7.1-12). Fuel flow monitoring will be conducted for all tests.

Cold, pre-operational equipment checks will be required. However, these checks will not require the equipment to be running or emitting air pollutants. The Applicant proposes a commissioning period of approximately 5 months for each set of turbines during which all installed equipment will be run and tested. The period will be divided into three phases:

1. Simple Cycle Gas Turbine Commissioning,

2. FP10 Gas Turbine Commissioning (Simple Cycle gas turbines may operate during this period),

3. Performance and Reliability Testing.

The gas turbine commissioning periods will begin when the turbines first burn natural gas. The Applicant will make every effort to minimize emissions of CO, VOC, and NO_X during the commissioning period. However, not all of the equipment to abate these emissions will be fully operational at the start of the commissioning period. The Applicant requests a maximum of 500 hours of partially abated emissions for each gas turbine train.

When it has been installed, the oxidation catalyst in each train will abate CO and VOC emissions from the gas turbine because it is essentially a passive device. While in some cases the oxidation catalyst can be

installed prior to initial startup of the combustion turbines, it may not be installed until late in the commissioning period. The SCR catalyst may not be installed at the same time as the oxidation catalyst. NO_X emissions from the gas turbines may be only partially abated during times that the gas turbine burners are being tuned and the SCR system is being tested. Regardless of the fact that the oxidation catalyst and SCR may not be installed until late in the commissioning process, the inherent low emissions of NO_X, CO, and VOC associated with the ultra low NO_X combustors will ensure that the impacts of these emissions are kept to acceptable levels. Dispersion modeling to evaluate the impacts of commissioning tests on local air quality is presented in Section 7.1.2.3. This modeling assumed the Simple Cycle units would be commissioned first and may be fully operational at the time the FP10 units will be undergoing commissioning activities. To be conservative it was further assumed the Simple Cycle units would be undergoing start up emissions during the peak FP10 unit commissioning periods.

Conservative, worst-case turbine commissioning emissions were estimated by assuming that the control efficiency of the applicable abatement systems will essentially be zero during the initial commissioning phase. After the combined steam blows are completed, it is assumed that the oxidation and SCR catalysts are installed. The expected control efficiency of the SCR and CO catalyst during normal operation is approximately 78 percent for NO_X, 80 percent for CO, and 30 percent for VOC. Therefore, the worst-case commissioning emission rates (at turbine loads greater than 60 percent) would be about 4.5 times the normal NO_X rate, 5 times the normal CO rate, and 1.5 times the normal VOC rate.

The durations and corresponding pollutant emission rates of individual commissioning tests for a single combustion turbine generator are shown in Tables 7.1-18 and 7.1-19.

Greenhouse Gas Emissions

In 2006, the California Assembly passed the Global Warming Solutions Act (AB32) directing the CARB to develop regulations to reduce statewide greenhouse gas emissions to 1990 levels by 2020. Potential greenhouse gas emissions from the project were calculated using the California Climate Action Registry power/utility protocol. The estimated greenhouse gas emissions from the project, which includes the four new CTG units, are presented in Table 7.1-20. Additional calculation details are provided in Appendix J.

7.1.2.3 Air Quality Impacts Analysis

The purpose of the air quality impact analysis is to evaluate whether criteria pollutant emissions resulting from the project would cause or contribute significantly to a violation of a CAAQS or NAAQS, or contribute significantly to degradation of air quality–related values in Class I areas. Mathematical models designed to simulate the atmospheric transport and dispersion of airborne pollutants are used to quantify the maximum expected impacts of project emissions for comparison with applicable regulatory criteria. Potential impacts of toxic air contaminant emissions from the project are evaluated in Section 7.6, Public Health.

Separate criteria pollutant modeling analyses were conducted to address the air quality effects of emissions from project construction activities and facility operations, because these activities would occur at different times. Impacts from construction activities include fugitive dust from grading and traffic in disturbed areas and exhaust combustion products from diesel- and gasoline-fueled construction equipment and vehicles. The impacts from operations would be associated with natural gas combustion in the CTG units.

The air quality modeling methodology described in this section has been documented in a formal modeling protocol, which has been submitted for comments to CEC and BAAQMD. A copy of this protocol is provided in Appendix J. The modeling approaches used to assess various aspects of the project's potential impacts to air quality are discussed below.

Model and Model Option Selections

The impacts of project construction and operations emissions on criteria pollutant concentrations in the area adjacent to the project site were evaluated using the AERMOD dispersion model (Version 07026). AERMOD is appropriate for this AFC because it has the ability to assess dispersion of emission plumes from multiple point, area, or volume sources in flat, simple, and complex terrain, while utilizing sequential hourly meteorological input data. The regulatory default options were used, including building and stack tip downwash, default wind speed profiles, exclusion of deposition and gravitational settling, consideration of buoyant plume rise, and complex terrain.

For the AERMOD simulations to evaluate construction and commissioning impacts of NO_2 concentrations, the ozone-limiting method option of the model was used to take into account the role of ambient ozone in limiting the conversion of emitted NO_X (which occurs mostly in the form of NO) to NO_2, the pollutant regulated by ambient standards. The input data to the AERMOD-OLM model includes representative hourly ozone monitoring data for the same years corresponding to the meteorological input record. These simulations used the ozone data from the BAAQMD Bethel Island monitoring station for the years 2000-2002 and 2004-2005.

To evaluate whether urban or rural dispersion parameters should be used in the model simulations, an analysis of land use adjacent to the project site was conducted in accordance with Section 8.2.8 of the *Guideline on Air Quality Models* (U.S. EPA, 2003), *Correlation of Land Use and Cover with Meteorological Anomalies* (Auer, 1978), AERMOD implementation guide (U.S. EPA, 2005), and its addendum (U.S. EPA, 2006a). Based on the Auer land use classification procedure, more than 50 percent of the area within a 1.86-mile (3-kilometer) radius of the project site is appropriately classified as rural. Thus, according to the U.S. EPA AERMOD implementation guide, AERMOD's rural option was selected. Land use parameter values when processing the onsite Contra Costa meteorological data are discussed in the Meteorological Data section.

Building Wake Effects

The effects of building wakes (i.e., downwash) on the plumes from the project's CTGs were evaluated in the modeling for operational emissions, in accordance with U.S. EPA guidance (U.S. EPA, 1985). Location coordinates and dimensions of the buildings within new and existing areas of the site that could potentially cause plume downwash effects for the new stacks were determined for different wind directions using the U.S. EPA Building Profile Input Program – Prime (BPIP-Prime) (Version 04274). The following structures were identified within the project site to be included in the downwash analysis (the number of multiple identical structures are denoted with parenthesis):

- CTG-HRSGs (2)
- CTG-SCRs (2)
- Air-cooled heat exchangers (2)
- Gas turbine inlet filters (4)
- Waste water storage tank
- RO permeate storage tank
- Demineralized water storage tank
- Raw water storage tank
- Buildings associated with existing CCPP CTGs (4)
- Existing Gateway CTG-HRSGs (2)
- Existing Gateway air cooled condenser
- Three existing CCPP oil tanks

The results of the BPIP-Prime analysis were included in the AERMOD input files to enable downwash effects to be simulated. Input and output electronic files for the BPIP-Prime analysis are included with those from all other dispersion modeling analyses on the digital versatile discs (DVDs) that are being submitted to accompany this AFC.

Meteorological Data

Onsite meteorological data have been collected by PG&E. Excellent data capture occurred for the years 2000 through 2002 and 2004 through 2005, and thus these years were selected to be used to create the AERMET data input file. Onsite data for 2003 had inadequate data capture, and therefore were not used in AERMET. The PG&E data were collected within the boundary of the PG&E 230-kV switchyard adjacent to the Contra Costa Power Plant (CCPP) and the MLGS site, and meet the U.S. EPA criteria for representativeness (U.S. EPA, 1995a), as follows:

- *Proximity*: The data were collected within the boundary of the CCPP site, and thus meet the criteria for proximity.
- *Complexity of Terrain and Exposure of Meteorological Monitoring Site*: Both the project and the meteorological station are located on the southern bank of the San Joaquin River and are the same distances from prominent terrain features in the surrounding area.
- *Period of Data Collection*: The 2000 through 2002 and 2004 through 2005 data set represents data collection over five years. Although only one year of onsite data is required, a five-year data set was used to better represent project site conditions, as well as to capture worst-case meteorological conditions.
- *Data Quality:* The PG&E meteorological station was audited regularly to ensure quality data were collected.

Onsite hourly data include wind speed, wind direction, standard deviation of the horizontal wind, and temperature for years 2000 through 2002 and 2004 through 2005.

In processing the data for input into AERMOD, additional parameters typically not collected at site specific stations are required; thus, the site specific data are supplemented with data from the nearest National Weather Service (NWS) station. Surface data were obtained from the Concord Buchanan Field Airport for the same years as the onsite data: 2000 through 2002 and 2004 through 2005. This station is approximately 25 kilometers (16 miles) west of the project and is surrounded by suburban areas, in rolling terrain. The terrain immediately surrounding the project site can be categorized as suburban with rolling hills; thus the land use and the location with respect to near-field terrain features are similar. Cloud cover information from Concord Buchanan Field Airport data was used; however, Concord surface winds were not substituted for missing hours in the CCPP onsite meteorological data sets.

The Oakland Airport upper air data monitoring station is located approximately 52 kilometers (32 miles) southwest of the project. This is the closest upper air station and was determined to be the most representative data available for use in this modeling analysis. The MODIFY option was used for Oakland upper air data AERMET processing in order to perform some preliminary quality control as the data were extracted.

The U.S. EPA *AERMOD Implementation Guide, January 2008* (U.S. EPA, 2008a), discusses that a newly developed tool called AERSURFACE may be used to establish realistic and reproducible surface characteristics values. Therefore, the AERSURFACE program was used to determine surface characteristics for input into AERMET for this project. AERSURFACE uses U.S. Geological Survey

(USGS) National Land Cover Data 1992 archives (NLCD92) to determine the albedo, Bowen ratio, and surface roughness length representative of the surface meteorological station.

The recommended 1-km (0.6-mile) radius around the meteorological tower was used to calculate surface roughness values from the USGS land use data files (AERSURFACE User's Guide: U.S. EPA, 2008b). AERSURFACE subsequently applies an inverse geometric mean to calculate surface roughness. AERSURFACE uses a 10-km × 10-km (6- by 6-mile) land use domain with the meteorological tower as the center point to compute the most representative albedo and Bowen ratio values. The albedo is based on an unweighted arithmetic mean while the Bowen ratio uses an unweighted geometric mean.

For the AERSURFACE input, five sectors (62°-150°, 150°-182°, 182°-243°, 243°-274°, 274°-62°) corresponding with different land-use types around the meteorological station were used per BAAQMD recommendation. The latitude and longitude of the CCPP meteorological tower is approximately 38.0157 N, 121.762 W.

Representative surface moisture input was determined for each month of every year using Antioch Pump Plant 3 meteorological station precipitation data and the percentile method specified in the AERSURFACE User's Guide. The surface moisture determinations are provided by BAAQMD in Table 7.1-21. Months assigned to each season were as follows: Spring—February and March; Summer—April through July; Autumn—August through October; Winter—November through January and not receiving continuous snow cover. Finally, the seasonal output obtained for the surface characteristics for all sectors, dependent on average, wet, or dry surface moisture conditions, are presented in Table 7.1-22. These are the surface characteristics that were used for input into AERMET.

Figure 7.1-2 presents the annual wind rose based on the 2000-2002 and 2004-2005 CCPP onsite meteorological data. Seasonal windroses based on the 5 years of onsite meteorological data are provided as Appendix J. Winds blow predominantly from the west for all seasons, although wind direction is much more variable during the winter.

Receptor Locations

The receptor grids used in the AERMOD modeling analyses described in this protocol for operational sources were as follows:

- 25-meter spacing along the MLGS fence line and extending from the fence line out to 100 meters beyond the CCPP property line;
- 100-meter spacing from 100 m to 1 km beyond the property line;
- 500-meter spacing within 1 to 5 km of property line; and
- 1,000-meter spacing within 5 to 10 km of property line.

Figures 7.1-3 and 7.1-4 show the placement of near-field and far-field receptor points, respectively. Within the 1,000-meter spacing 5- to 10-km from the property line, it was determined that a tighter 250-meter spaced receptor grid would best cover a hill southwest of the project. Terrain heights at receptor grid points were determined from USGS digital elevation model (DEM) files. In the course of the refined modeling analysis to evaluate operational project emissions, if a maximum predicted concentration for a particular pollutant and averaging time was located within a portion of the receptor grid with spacing greater than 25 meters, a supplemental dense receptor grid was placed around the original maximum concentration point and the model was rerun. The dense grid used 25-m spacing and extended to the next grid point in all directions from the original point of maximum concentration.

Terrain heights specifically corresponding to the supplementary grid points will be determined from the USGS DEM files in the same manner as for the original receptors.

Due to the large computational time required to run AERMOD for multiple sources and 5 years of hourly meteorological input data, this receptor grid, with the additional dense nested grid points, was determined to best balance the need to predict maximum pollutant concentrations and allow all operational modeling runs to be completed within a reasonable period of time.

Because construction emission sources release pollutants to the atmosphere from small equipment stacks or from soil disturbances at ground level, maximum predicted construction impacts for all pollutants and averaging times typically occur within the first kilometer from the site boundary. Accordingly, only receptors out to a distance of 1 km were used for the construction modeling.

Construction Impacts Modeling

Section 7.1.2.1 describes the development of project emissions estimates over the planned 33-month construction period. For purposes of evaluating construction air quality impacts, it is useful to break the construction schedule into a sequence of essentially non-overlapping phases, each occurring on specific areas of the project site and with characteristic equipment and vehicle requirements. An Excel workbook was created to estimate pollutant emissions from construction activities, with separate worksheets for the equipment exhaust and fugitive dust emissions associated with short-term and annual construction activities. Emissions from worker commuter trips to and from the project site during specific construction activities were also included (see Appendix J).

Worst-case modeling was conducted for short-term averaging times using all construction equipment from Month 6. Annual emissions were modeled for Months 1 to 12 of the construction schedule.

All construction activities were assumed to occur during a 10-hour work day. Calculation of annual emissions was based on a summation over all construction activities for the consecutive 12-month period that would produce the highest emissions of all pollutants. The OLM option of AERMOD was used to account for the role of ambient ozone levels on the atmospheric conversion rate of NO_X emissions (initially mostly in the form of NO) to NO_2 (the pollutant addressed by ambient standards). The record of hourly ozone measurements at the BAAQMD Bethel Island monitoring station during the same 5 years of the meteorological input data set were used to support the OLM calculations.

Turbine Impact Screening Modeling

As described previously, a screening modeling analysis was performed to determine which CTG operating modes and stack parameters produced the worst-case offsite impacts (i.e., maximum ground-level concentrations for each pollutant and averaging time). Screening modeling was performed for both the (1) FP10 CTG stack scenario and (2) the Simple Cycle CTG stack scenario. Only the emissions from the CTGs were considered in this preliminary modeling step. The screening model was accomplished with AERMOD, as described in the previous sections. Building wake information and the receptor grid described above were also used. All five years of meteorological data were used in the screening analysis.

The AERMOD model simulated natural gas CTG emissions from:

- The 21.3-foot-diameter (6.5-m), 150.5-foot-tall (45.9-m) stack; representative of the FP10 Combined-Cycle CTG stack scenario; and

- The 31.3-foot-diameter (9.5-m), 150.3-foot-tall (45.8-m) stack; representative of the Simple Cycle CTG stack scenario.

The stacks were modeled as point sources at their proposed locations within the project site. Tables 7.1-23 and 7.1-24 summarize the CTG screening results for both scenarios (combined-cycle and simple-cycle) under the different CTG operating loads and ambient temperature conditions. First, the model was run with unit emissions (1.0 grams per second) from each stack to obtain normalized concentrations that are not specific to any pollutant. CTG vendor data used to derive the stack parameters for the different operating conditions evaluated in this screening analysis are included in Appendix J.

The maximum ground-level concentrations predicted to occur offsite with the unit turbine emission rates for each of the 12 operating conditions shown in Tables 7.1-23 and 7.1-24 were then multiplied by the corresponding turbine emission rates for specific pollutants. The highest resulting concentration values for each pollutant and averaging time were then identified (see bolded values in the table).

The stack parameters associated with these maximum predicted impacts were used in all subsequent simulations of the refined AERMOD analyses described in the next subsection. Note that the lower exhaust temperatures and flow rates at reduced turbine loads correspond to reduced plume rise, in some cases resulting in higher offsite pollutant concentrations than the higher base load emissions. Model input and output files for the screening modeling analysis are included with those from all other modeling tasks on the Air Quality and Public Health Modeling DVDs that are provided separately with this AFC.

1-Hour Startup Scenarios

The worst-case one-hour NO_2 and CO impacts would occur during an hour with one startup; thus, the results of the screening analysis were not used to determine the turbine stack parameters. The results provided in Table 7.1-25 indicate that maximum hourly NO_2 and CO concentrations during normal operations for both the FP10s and the Simple Cycle turbines would occur with the stack parameters corresponding to full-load operations. However the magnitude of the emissions for both these pollutants during the worst-case 60 minutes of a four-turbine startup sequence would be higher than those during normal operations at any ambient temperature condition. Since a startup is a transition from non-operation to full-load operation, the stack exhaust velocity and temperature during most of this operation are lower than the values indicated as "worst-case" by the turbine screening modeling. Accordingly, modeling simulations were conducted to estimate the maximum one-hour NO_2 and CO concentrations during a startup with reduced stack exhaust velocity and temperature.

Refined Modeling

A refined modeling analysis was performed to estimate offsite criteria pollutant impacts from operational emissions of the project. The modeling was performed as described in the previous sections, using 5 years of hourly meteorological input data. The new project FP10 units were modeled assuming the worst-case emissions corresponding to each averaging time and the turbine stack parameters that were determined in the turbine screening analysis (see above). The maximum mass emission rates that would occur over any averaging time, whether during turbine startups, normal operations, turbine shutdowns, or a combination of these activities, were used in all refined modeling analyses (see Table 7.1-26). Emission rate calculations and assumptions used for all pollutants and averaging times are documented in Appendix J.

Fumigation Analysis

Fumigation may occur when a plume that was originally emitted into a stable layer of air is mixed rapidly to ground level when unstable air below the plume reaches plume height. Fumigation can cause relatively

high ground-level concentrations for some elevated point sources during either the breakup of the nocturnal radiation inversion by solar warming of the ground surface (inversion breakup fumigation), or by the transport of pollutants from a stable marine environment to an unstable onshore environment (shoreline fumigation). The transition from stable to unstable surroundings can rapidly draw a plume down to ground level and create relatively high pollutant concentrations for a short period. In general, this phenomenon will be transient, seldom persisting for as long as an hour. Typically, a fumigation analysis is conducted using SCREEN3 when the project site is rural and the stack height is greater than 10 meters.

The SCREEN3 model was used to calculate concentrations from both inversion breakup fumigation and shoreline fumigation. A unit emission rate was used (1 gram per second) in the fumigation modeling to represent the project emissions and the model results were scaled to reflect expected plant emissions for each pollutant. Since SCREEN3 only models the impacts from one source, the model was run twice, once for the FP10 combined cycle stack parameters and once for simple cycle stack parameters. To calculate the inversion breakup fumigation, the default thermal internal boundary layer (TIBL) factor of 6 in the SCREEN3 model was used. For shoreline fumigation, a range of TIBL factors, 2, 4, and 6, were used to determine the highest impact. BAAQMD provided a modified version of SCREEN3 that allows the input of various TIBL factors.

For both the nocturnal inversion and shoreline inversion analyses, impacts were determined for each source, then summed over all sources using peak predicted fumigation concentrations regardless of location. Since fumigation impacts can affect concentrations longer than 1 hour, the procedures described in Section 4.5.3 of "Screening Procedures for Estimating the Air Quality Impact of Stationary Sources" (U.S. EPA, 1992a) were used to determine the 3-, 8- and 24-hour average concentrations.

SCREEN3 predicted the peak concentration from nocturnal inversion fumigation from project emissions to be 9.8 $\mu g/m^3$ for NO_2 1-hour, 1.8 $\mu g/m^3$ for SO_2 1-hour, 1.5 $\mu g/m^3$ for SO_2 3-hour, 0.6 $\mu g/m^3$ for SO_2 24-hour, 71.9 $\mu g/m^3$ for CO 1-hour, 18.3 $\mu g/m^3$ for CO 8-hour, and 0.92 $\mu g/m^3$ for $PM_{10}/PM_{2.5}$ 24-hour averaging periods. The peak concentration from the shoreline inversion fumigation analysis from project emissions was predicted to be 61.0 $\mu g/m^3$ for NO_2 1-hour, 11.3 $\mu g/m^3$ for SO_2 1-hour, 5.8 $\mu g/m^3$ for SO_2 3-hour, 0.8 $\mu g/m^3$ for SO_2 24-hour, 447.3 $\mu g/m^3$ for CO 1-hour, 38.5 $\mu g/m^3$ for CO 8-hour, and 1.3 $\mu g/m^3$ for $PM_{10}/PM_{2.5}$ 24-hour averaging periods.

7.1.2.4 Modeling Results – Compliance with Ambient Air Quality Standards

Air dispersion modeling was performed according to the methodology described in Section 7.1.2.3 to evaluate the maximum increase in ground-level pollutant concentrations resulting from project emissions, and to compare the maximum predicted impacts, including background pollutant levels, with applicable short-term and long-term CAAQS and NAAQS. The impacts from construction activities and plant operations were analyzed separately because they would occur during different time periods. The same 5-year record of hourly meteorological data described in Section 7.1.2.3 was used in the AERMOD modeling to evaluate both construction and operational impacts.

In evaluating both construction and operational impacts, the AERMOD model was used to predict the increases in criteria pollutant concentrations at all receptor concentrations due to project emissions only. Next, the maximum modeled incremental increases for each pollutant and averaging time were added to the maximum background concentrations, based on air quality data collected at the most representative monitoring stations during the last 3 years (i.e., 2004 through 2006). These background concentrations are presented and discussed in Section 7.1.1.2. The resulting total pollutant concentrations were then compared with the most stringent CAAQS or NAAQS.

Construction Impacts

The section on construction emissions of air pollutants described how Month 6 of the construction schedule was selected to represent worst-case emission conditions for the purpose of analyzing peak short-term impacts to local air quality. Annual impacts were modeled with all emissions that would occur during the first 12 months of construction, since this period will have a higher intensity of construction activity than any subsequent part of the schedule. Some notes regarding the modeling results for specific pollutants are provided below.

As reflected in the construction modeling results presented in Table 7.1-27, high PM_{10} and $PM_{2.5}$ background concentrations have been recorded at Contra Costa County monitoring stations during recent years. Because of the land use characteristics of this area, it is highly probable that these conditions result primarily from high wind episodes and mobile pollution sources. The predicted contribution of the proposed construction activities would be minor by comparison with these sources, but would have the potential to temporarily contribute to existing violations of the state and federal PM_{10} standards if construction occurs during a period of high background concentrations.

AERMOD with OLM predicted maximum 1-hour and annual NO_2 concentration due to project construction emissions which, when added to conservative background values from the nearest BAAQMD monitoring stations, are below both 1-hour and annual California standards. Predicted maximum impacts for CO and SO_2 are also less than the most stringent ambient standards.

Operational Impacts

As described previously, the emissions used in the AERMOD simulations for the project operations were selected to ensure that the maximum potential impacts would be addressed for each pollutant and averaging time corresponding to an ambient air quality standard. The emissions used for each pollutant and averaging time are explained and quantified in Table 7.1-16. This subsection describes the maximum predicted operational impacts of the project for normal FP10 combined-cycle operating conditions. Commissioning impacts, which would occur on a temporary, one-time basis and would not be representative of normal operations, were addressed separately, as described below under Turbine Commissioning.

Table 7.1-28 summarizes the maximum predicted criteria pollutant concentrations due to the operational FP10 combined-cycle plant. The incremental impacts of project emissions would be below the federal PSD significant impact levels (SILs) for all attainment pollutants, despite the use of worst-case emissions scenarios for all pollutants and averaging times. Although maximum predicted values for PM_{10} are below the SILs, these thresholds do not apply to this pollutant because the Basin is designated nonattainment with respect to the federal ambient standards. No SILs have been established yet for $PM_{2.5}$.

Table 7.1-28 also shows that the modeled impacts due to the project emissions, in combination with conservative background concentrations, would not cause a violation of any NAAQS and would not significantly contribute to the existing violations of the federal and state PM_{10} and $PM_{2.5}$ standards. In addition, as described later, all of the project's operational emissions of nonattainment pollutants and their precursors will be offset to ensure a net air quality benefit.

The locations of predicted maximum impacts would vary by pollutant and averaging time. Peak annual average concentrations for all pollutants would be within approximately 1,000 feet to the east of the facility fenceline. The 1-hour maxima for NO_2, SO_2, and CO and 24-hour PM_{10} are predicted to occur in the elevated terrain approximately 5 miles southwest of the facility. The highest 3-hour and 24-hour SO_2, and the highest 8-hour CO concentrations are expected to occur a few hundred feet north of the plant site.

Figure 7.1-5 shows the locations of the maximum predicted operational impacts for all pollutants and averaging times.

Turbine Commissioning

Each of the project CTGs could be operated for up to 500 hours with partially abated emissions for purposes of commissioning the new generating equipment. The expected sequence of commissioning tests and the associated emissions during each stage of CTG commissioning are presented in Section 7.1.2.2. Separate modeling was conducted using AERMOD to evaluate maximum short-term effects of these activities in terms of the impacts on offsite 1-hour NO_2 concentrations and 1-hour and 8-hour CO concentrations. These are the pollutants (along VOCs, which are not modeled) for which emissions would be expected to be significantly higher than during normal operations, owing to the nonoperability of the SCR and oxidation catalyst emission control systems during some of the commissioning tests. Emissions of SO_X and particulate matter (PM) depend primarily on the rate of fuel combustion and are unaffected by the availability or nonavailability of the SCR and oxidation catalyst. Thus, emissions of these pollutants during commissioning are not expected to exceed the levels that would occur during full-load normal operations of the turbines, and separate modeling for commissioning impacts on SO_X and PM levels is unnecessary.

Stack NO_X and CO emission rates were presented in Table 7.1-18 and Table 7.1-19. Modeling was conducted for the tests that were expected to produce the highest offsite concentrations at ground level, i.e., the test with the highest emission rate in combination with the lowest exhaust flow and temperature. For the NO_X modeling, the emissions for the row labeled "CTG 1 Testing at 40% load" in Table 7.1-18 and Table 7.1-19 were used. Maximum CO impacts were evaluated for the case labeled "CTG Testing (Full Speed No Load, FSNL, Excitation Test, Dummy Synch Checks)." Startup stack parameters were used.

Table 7.1-29 shows the results of the model simulations for turbine commissioning. The tabulated impacts are the highest concentrations for the indicated averaging that are predicted by AERMOD to occur using 5 years of hourly meteorological input data. The modeling was conducted for commissioning of both simple-cycle turbines concurrently under worst-case emission conditions and then for commissioning of both FP10 turbines concurrently under worst-case emission conditions with the Simple Cycle turbines operating at startup conditions. Table 7.1-29 demonstrates that when the maximum incremental commissioning impacts are added to applicable background concentrations and compared with the most stringent state or national ambient standards, no violations of the applicable standards for these pollutants are predicted to occur.

Impacts for Nonattainment Pollutants and their Precursors

The emission offset program described in the BAAQMD Rules and Regulations was developed to facilitate net air quality improvement when new sources locate within the BAAQMD. Project impacts of nonattainment pollutants (PM_{10}, $PM_{2.5}$, and O_3) and their precursors (NO_X, SO_2, and VOC) will be fully mitigated by emission offsets. The emission reductions associated with these offsets have not been accounted for in the modeled impacts noted above. Thus, the impacts indicated in the foregoing presentation of model results for the project may be significantly overestimated.

Effects on Visibility from Plumes

Modern combined-cycle power plants burning natural gas fuel emit PM at levels far below the concentration corresponding to visible smoke. Combustion sources also emit water vapor that sometimes may condense in the atmosphere to form visible plumes. However, the generally warm, dry conditions in Contra Costa County are not conducive to lengthy visible stack plumes, and the historical operation of the

existing CCPP Units 6 and 7 indicates that moisture plumes rarely extend to appreciable distances. Evaporative cooling towers are another potentially more important source of visible moisture plumes at power plants, but the project will employ air-cooled condensers that do not produce moisture plumes.

The Simple Cycle units will have exhaust gas temperatures exiting the stack above 700ºF for all operating loads. No visible plumes will occur from these units.

7.1.2.5 Impacts on Air Quality and Air Quality Related Values – PSD Modeling Analyses

U.S. EPA has promulgated PSD regulations applicable to Major Sources and Major Modifications, as these terms are defined in 40 CFR 51.166. The project would be a Major Modification to an existing Major Source because of the increases that would result in CO, PM_{10} and NO_X emissions. Many of the PSD requirements are the same as those that must be met for compliance with the BAAQMD's New Source Review rule (Regulation II, Rule 2) and CEC's guidance for air quality impact evaluations (e.g., quantification of project emissions, demonstration of BACT, AAQS analysis). However, PSD requires the following additional analyses:

- An analysis of the potential incremental impacts from the new emissions from the project relative to PSD SILs, and if necessary with the PSD increments.
- An analysis of AQRVs to ensure the protection of visibility in federal Class I National Parks and National Wilderness Areas within 100 km (62 miles) of the project site;
- An evaluation of potential impacts on soils and vegetation of commercial and recreational value; and
- An evaluation of potential growth-inducing impacts.

Impacts in Class II PSD Areas

As the project would trigger PSD as a Major Modification, modeling is required to determine whether its incremental impacts on ambient levels of attainment pollutants (NO_2, SO_2, and CO) would exceed Class II SILs. The SILs for PM_{10} and $PM_{2.5}$ are not applicable because of the state nonattainment status of the San Francisco Bay Air Basin for this pollutant. If project emissions were predicted to cause the SILs for attainment pollutants to be exceeded, then an analysis of total increment consumption since the local PSD baseline date would be required. However, as demonstrated by Table 7.1-28, the maximum modeled incremental pollutant concentrations for all attainment pollutants are below the Class II SILs; thus, no further analysis of impacts in PSD Class II areas is required.

Impacts in Class I PSD areas

An evaluation of impacts in Class I areas within 100 km (62 miles) of the project is typically conducted when the potential emissions increases from the project would be sufficient to trigger federal PSD requirements. The Applicant contacted the National Park Service administrator for Point Reyes National Seashore, the only Class I area located within 100 km of the project. The National Park Service determined a Class I impact analysis is not required for this project. They stated:

> "The National Park Service Air Resources Division has reviewed the information you provided below regarding the proposed Contra Costa Generation Project which is proposing to locate some 82 kilometers east of the Point Reyes National Seashore, a Class I area administered by the National Park Service. Due to the low amount of

proposed emissions and the distance to Point Reyes National Seashore, the National Park Service does not request that a Class I increment analysis and an Air Quality Related Values analysis be performed for the Contra Costa Generation Project's [MGLS] PSD permit. Please forward this e-mail to the permitting agency for their notification. The permitting agency may contact the National Park Service Air Resources Division if it has any questions on this issue." (Notar, 2008)

7.1.3 Cumulative Impacts Analysis and Protocol

CEC requirements specify that an analysis may be required to determine the cumulative impacts of the project and other projects within a 6-mile radius that have received construction permits but are not yet operational or that are in the permitting process. The cumulative impact analysis is intended to assess whether the emissions of the combined effects of these sources may cause or contribute to a violation of any ambient air quality standard.

In addition, CEC staff have specifically requested that additional modeling simulations be performed to evaluate the combined effects of emissions from the proposed FP10 units with those from existing CCPP Units 6 and 7, which will continue to operate when the MLGS facility becomes operational. Both units are utility boilers burning natural gas exclusively and have been retrofitted with low NO_X burners. Unit 7 also is equipped with a SCR systems for NO_X control. In addition, PG&E is currently constructing the Gateway Generating Station (GGS) immediately adjacent to and east of the CCPP. The GGS is anticipated to start operations by early 2009.

A more extensive cumulative analysis to include the above sources and other new or imminent emission sources within a 6-mile radius will be conducted later when sufficient information on these sources becomes available. A request has been made to BAAQMD for information on all new facilities within this radius that are either currently in the permitting process or under construction. The required information will include permitted emission rates, source location coordinates, and stack parameters required for inclusion in the cumulative AERMOD simulations. When this information is received, it will be forwarded to CEC for approval as the basis for the full cumulative analysis.

The results of the final cumulative impact analysis will be reported under separate cover.

7.1.4 Mitigation Measures

This section discusses the mitigation measures proposed by the Applicant that will be implemented to reduce project-related impacts to air quality.

AIR-1 Emission Reduction Credits. Per Bay Area Air Quality Management District Regulations 2-2-215, 302, and 303, the project is required to provide emission offsets in the form of emissions reduction credits (ERC) for increases in emissions of nonattainment pollutants in excess of specified thresholds that will result from the operation of the proposed facility on a pollutant-specific basis. Per District Regulations 2-2-302 VOC and NO_X ERCs are required to be provided at an offset ratio of 1.0:1.0 or 1.15:1.0, depending on the amount of emissions levels. Since both VOC and NO_X are ozone precursors, Regulations 2-2-302.2 allows ERCs of VOCs to be used as an interpollutant offset for NO_X, at the required offset ratios.

Sections 2-2-304 and 2-2-305 impose emissions offset requirements, or require project denial, if SO_2, NO_2, $PM_{10/2.5}$, or CO air quality modeling results indicate emissions will either interfere with the attainment or maintenance of the applicable AAQS, or exceed PSD increments. The modeling analyses show that facility emissions will not interfere with the attainment or maintenance of the applicable air quality standards.

For major sources subject to PSD review, Regulation 2-2-305 requires an applicant to either demonstrate through modeling that its emissions will comply with the CO AAQS, or provide contemporaneous emission offsets. The project will not cause a violation of any applicable CO ambient air quality standard. Therefore, CO emission offsets are not required.

Mirant California emission offsets inventory and estimated required ERCs due to project operations are shown in Tables 7.1-30 and 7.1-31, respectively. As shown in Table 7.1-30, Mirant California demonstrated its capability to provide the required emission offsets for the project.

7.1.5 Best Available Control Technology Analysis

In accordance with the PSD regulations, as well as the requirements of BAAQMD rules, the project will be required to use BACT to minimize emissions from the proposed combustion turbine trains. A detailed BACT analysis was conducted to evaluate available control options for the project and is presented in Table 7.2-32. A summary of the proposed BACT is provided below

Table 7.1-33 presents the proposed BACT determination for the MLGS emission sources..

Per BAAQMD regulation 2-2-301, the application of BACT is required for any new or modified emissions unit if the new unit or modification results in an increase in permitted daily emissions greater than 10 pounds per day for a specific criteria pollutant. BACT is defined in Rule 2-2-206 as the most stringent emission limitation or control technique of the following:

206.1 The most effective emission control device or technique which has been successfully utilized for the type of equipment comprising such a source; or

206.2 The most stringent emission limitation achieved by an emission control device or technique for the type of equipment comprising such a source; or

206.3 Any emission control device or technique determined to be technologically feasible and cost-effective by the APCO; or

206.4 The most effective emission control limitation for the type of equipment comprising such a source which the EPA states, prior to or during the public comment period, is contained in an approved implementation plan of any state, unless the applicant demonstrates to the satisfaction of the APCO that such limitations are not achievable. Under no circumstances shall the emission control required be less stringent than the emission control required by any applicable provision of federal, state or District laws, rules or regulations.

The primary air emission sources for the project are the two FP10 units and two Simple Cycle gas turbines. Each combined-cycle power block consists of one Siemens Flex Plant 10 (FP10). The steam produced by the each HRSG will be sent to an individual steam turbine generator (STG). Each Simple Cycle power block consists of one Siemens SSC6-5000F Simple Cycle unit. The project will have emissions in excess of 10 pounds per day (lb/day) for NO_X, VOC, CO, PM_{10}, and SO_X. Therefore, BACT will be required for these pollutants. The emission rates determined to be BACT for this project are summarized below.

BACT for the applicable pollutants was determined by reviewing the BAAQMD BACT Guidelines Manual, the SCAQMD BACT Guidelines Manual, the most recent Compilation of California BACT Determinations, CAPCOA (2nd Ed., November 1993), and U.S. EPA's BACT/LAER Clearinghouse. For

the combustion turbines, the SCAQMD considers BACT to be the most stringent level of demonstrated emission control that is feasible.

BACT for NO_X emissions from the Simple Cycle combustion turbines will be the use of low NO_X emitting equipment and add-on controls. The project will use a selective catalytic reduction (SCR) system with ammonia injection to reduce NO_X emissions to 2.5 ppmvd at 15 percent O_2 on a 3-hour average basis for the simple cycle. The BAAQMD BACT guidelines indicate that BACT from large, simple-cycle combustion turbines (≥40 MW) is an exhaust concentration of 2.5 ppmvd NO_X, corrected to 15 percent O_2; therefore, the proposed combustion turbines will meet the BACT requirements for NO_X.

The BACT for NO_X emissions from the combined-cycle combustion turbines will be the use of ultra low NO_X combustors and SCR with ammonia injection designed to achieve a NO_X emission limit of 2.0 ppmvd (at 15 percent O_2) on a 3-hour average. Other technologies have either not achieved a NO_X level of 2.0 ppm (at 15 percent O_2) in practice for gas turbines of a similar size to that proposed for the MLGS project, or offer equivalent NO_X control efficiency with other less desirable features. The BAAQMD BACT guidelines indicate that BACT from large, combined-cycle combustion turbines (≥40 MW) is an exhaust concentration of 2.0 ppmvd NO_X, corrected to 15 percent O_2; therefore, the proposed combined-cycle combustion turbines will meet the BACT requirements for NO_X.

BACT for CO emissions from all power blocks will be achieved by using oxidation catalysts as a post-combustion control technology to reduce CO emissions to 3.0 ppmvd, corrected to 15 percent O_2. BAAQMD's BACT determinations indicate that BACT from large, simple-cycle combustion turbines (≥40 MW) is 6.0 ppmvd CO (at 15 percent O_2). As or the combined-cycle combustion turbines, BACT determination is at 4.0 ppmvd CO (at 15 percent O_2). Therefore, the proposed combustion turbines will meet the BACT requirements for CO.

As recommended in BAAQMD's BACT determination, BACT for VOC emissions will be achieved by use of oxidation catalysts as a post-combustion control technology to reduce VOC emissions to 2.0 ppmvd for each of the four power blocks. By achieving this level of control each of the proposed combustion turbines will meet the BACT requirements for CO (3.0 ppmvd, corrected to 15 percent O_2).

BACT for PM_{10} is the exclusive use of pipeline-quality natural gas. The proposed turbines will exclusively burn pipeline-quality natural gas that will be delivered by PG&E. Therefore, the proposed combustion turbines will meet the BACT requirements for PM_{10}.

BAAQMD BACT Guidelines 89.1.3 and 89.1.6 specifies BACT determination for SO_2 for both simple and combined-cycle combustion turbines with an output rating of ≥ 40 MW as the exclusive use of clean-burning natural gas with a sulfur content of < 1.0 grains per 100 scf. The proposed turbines will exclusively burn pipeline-quality natural gas that will be delivered by PG&E with an expected average sulfur content of 0.40 grains per 100 scf, which will result in minimal SO_2 emissions.

7.1.6 Laws, Ordinances, Regulations, and Standards

The applicable laws, ordinances, regulations, and standards (LORS) related to the potential air quality impacts from the project are described below. These LORS are administered (either independently or cooperatively) by the BAAQMD, the U.S. EPA Region IX, the CEC, and the CARB.

7.1.6.1 Federal

The federal Clean Air Act (CAA) of 1970, 42 USC 7401 et seq., as amended in 1977 and 1990, is the basic federal statute governing air pollution. The provisions of the CAA that are potentially relevant to this project are listed below and discussed in the following sections:

- Air Quality Control Regions;
- National Ambient Air Quality Standards;
- Prevention of Significant Deterioration;
- Acid Rain Program;
- New Source Review;
- New Source Performance Standards;
- Maximum Achievable Control Technology Standards;
- Title V Operating Permits; and
- Risk Management Program.

Applicable requirements of the State of California and the local AQMD are discussed in Sections 7.1.6.2 and 7.1.6.3, including regulations that apply to both construction and operations.

Air Quality Control Regions

Because air pollution is a regional problem and not limited to political or state boundaries, the CAA established Air Quality Control Regions (AQCR). This is a method of dividing the country into regional air basins. The project site is located in northeastern Contra Costa County belonging to the San Francisco Bay Area Intrastate Air Quality Control Region (Title 40 CFR Part 81.21).

National Ambient Air Quality Standards

U.S. EPA, in response to the federal CAA of 1970, established NAAQS in 40 CFR Part 50. NAAQS include both primary and secondary standards for six "criteria" pollutants. These criteria pollutants are O_3, CO, NO_2, SO_2, PM_{10}, and Pb.

Primary standards were established to protect human health, and secondary standards were designed to protect property and natural ecosystems from the effects of air pollution.

The 1990 Clean Air Act Amendments (CAAA) established attainment deadlines for all designated areas that were not in attainment with the NAAQS. In addition to the NAAQS described above, a new federal standard for $PM_{2.5}$ and a revised O_3 standard were promulgated in July 1997. The new federal standards were challenged in a court case during 1998.

The court required revisions in both standards before U.S. EPA could enforce them. The U.S. Supreme Court upheld an appeal of the District Court decision in February 2001. Under an interim policy, the preexisting federal PM_{10} and 1-hour O_3 standards would continue to be implemented for the next several years until any required actions by U.S. EPA were completed. In 1997, EPA established annual and 24-hour NAAQS for $PM_{2.5}$ for the first time. In 2006, the federal annual PM_{10} standard was revoked by the U.S. EPA due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution. The 3-year average of the 98th percentile of 24-hour PM_{10} concentrations (35 $\mu g/m^3$) was effective on December 17, 2006. The State of California has adopted CAAQS that are in some cases more stringent than the federal NAAQS. The NAAQS and CAAQS relevant to the project are summarized in Table 7.1-34.

The U.S. EPA, the CARB, and the local air pollution control districts determine air quality attainment status by comparing local ambient air quality measurements from the state or local ambient air monitoring stations with the NAAQS and CAAQS. Those areas that meet ambient air quality standards are classified as "attainment" areas; areas that do not meet the standards are classified as "nonattainment" areas. Areas that have insufficient air quality data may be identified as unclassifiable areas. These attainment designations are determined on a pollutant-by-pollutant basis. The project site is designated a federal

nonattainment area for O_3 based on air quality monitoring data showing exceedances of the NAAQS. The project vicinity is designated a state nonattainment area for O_3, based on air quality monitoring data showing exceedances of the CAAQS. Table 7.1-35 presents the attainment status (both federal and state) for Contra Costa County in the BAAQMD.

As mentioned above, both the U.S. EPA and the CARB are involved with air quality management in the Bay Area, along with the BAAQMD. The area of responsibility for each of these agencies is described below.

U.S. EPA has ultimate responsibility for ensuring, pursuant to the CAAA, that all areas of the United States meet, or are making progress toward meeting, the NAAQS. The State of California falls under the jurisdiction of U.S. EPA Region IX, which is headquartered in San Francisco. U.S. EPA requires that all states submit state implementation plans (SIPs) for nonattainment areas that describe how the NAAQS will be achieved and maintained. Attainment plans must be approved by the CARB before they are submitted to the U.S. EPA.

Regional or local air quality management districts (or air districts) such as the BAAQMD are responsible for preparation of plans for attainment of federal and state standards. The CARB is responsible for overseeing attainment of the CAAQS, implementation of nearly all phases of California's motor vehicle emissions program, and oversight of the operations and programs of the regional air districts. Each air district is responsible for establishing and implementing rules and control measures to achieve air quality attainment within its district boundaries. The air district also prepares an air quality management plan (AQMP) that includes an inventory of all emission sources within the district (both manmade and natural), a projection of future emissions growth, an evaluation of current air quality trends, and an assessment of any rules or control measures needed to attain the NAAQS and CAAQS. This AQMP is submitted to CARB, which then compiles AQMPs from all air districts within the state into the SIP. The responsibility of the air districts is to maintain an effective permitting system for existing, new, and modified stationary sources, to monitor local air quality trends, and to adopt and enforce such rules and regulations as may be necessary to achieve the NAAQS and CAAQS.

Prevention of Significant Deterioration Requirements

In addition to the ambient air quality standards described above (NAAQS), the federal PSD program has been established to protect deterioration of air quality in those areas that already meet national ambient air quality standards. The BAAQMD has been delegated PSD authority by the U.S. EPA. Specifically, the PSD program establishes allowable concentration increases for attainment pollutants due to new emission sources that are classified as major sources. These increases allow economic growth, while preserving the existing air quality, protecting public health and welfare, and protecting Class I areas (national parks and wilderness areas).

The PSD regulations define a "major stationary source" as any source type belonging to a list of 28 source categories that emits, or has the "potential to emit" 100 tons per year or more of any pollutant regulated under the CAA, or any other source type that has the potential to emit such pollutants in amounts equal to or greater than 250 tons per year. If a source is considered major for PSD purposes because of one pollutant, then PSD review is applicable for those other pollutants emitted from the source in amounts greater than the PSD significance levels. The PSD regulations require major stationary sources to undergo a preconstruction review that includes an analysis and implementation of BACT, a PSD increment consumption analysis, an ambient air quality impact analysis, and analysis of AQRVs (impacts on visibility and vegetation). The MLGS is subject to these requirements.

The incremental project emissions for SO_2, NO_X, PM_{10}, VOC, and CO are as shown in Table 7.1-36 and compared with the PSD significance thresholds. The project emissions of NO_X, PM_{10}, VOC, and CO would be above these PSD triggers; thus, the Applicant must demonstrate through modeling (except for VOC for which no AAQS apply) that such emissions will not interfere with the attainment or maintenance of the applicable NAAQS and will not cause exceedances of the applicable PSD increments shown in Table 7.1-37. For project emissions of CO that would exceed the trigger levels, the Applicant must demonstrate through modeling that the increase in emissions would not interfere with the attainment or maintenance of the CO NAAQS. Allowable PSD increments for SO_2 and NO_X in Class I and II areas are summarized in Table 7.1-37.

As described in Section 7.1.2.5, there is one Class I area within 100 km of the project site (Point Reyes National Sea Shore). The National Park Service determined that a Class I impact analysis is not required for this project.

Acid Rain Program Requirements

Title IV of the CAAA applies to sources of air pollutants that contribute to acid rain formation, including certain sources of SO_2 and NO_X emissions. Title IV is implemented by the U.S. EPA under 40 CFR 72, 73, and 75. Allowances of SO_2 emissions are set aside in 40 CFR 73. Sources subject to Title IV are required to obtain SO_2 allowances, to monitor their emissions, and obtain SO_2 allowances when a new source is permitted. Sources such as the project that use pipeline-quality natural gas are exempt from many of the acid rain program requirements. However, these sources must still estimate SO_2 and carbon dioxide (CO_2) emissions, and monitor NO_X emissions with certified CEMS. All subject facilities must submit an acid rain permit application to U.S. EPA within 24 months of commencing operation.

New Source Performance Standards

New source performance standards (NSPS) have been established by U.S. EPA to limit air pollutant emissions from certain categories of new and modified stationary sources. The NSPS regulations are contained in 40 CFR Part 60 and cover many different industrial source categories. Stationary gas turbines are regulated under Subpart KKKK. The enforcement of NSPS has been delegated to the BAAQMD, and the NSPS regulations are incorporated by reference into the District's Regulation X. In general, local emission limitation rules or BACT requirements in California are far more restrictive than the NSPS requirements. For example, the controlled NO_X emission rate from the project's gas turbines of less than 0.08 pound (lb) of NO_X per MW-hour will be well below the Subpart KKKK requirement of 0.39 lb of NO_X per MW-hour. Similarly, the projected maximum SO_2 emissions from the MLGS gas turbines will be about 0.011 lb of SO_2 per MW-hour, which is substantially less than the Subpart KKKK requirement of 0.58 lb of SO_2 per MW-hour.

NSPS fuel requirements for SO_2 will be satisfied by the use of natural gas, and emissions and fuel monitoring that will be performed to meet the requirements of BACT will comply with NSPS, acid rain, and other regulatory requirements.

Maximum Achievable Control Technology

The CAAA of 1990, under revisions to Section 112, require a project to list and promulgate national emission standards for hazardous air pollutants (NESHAPS) in order to control, reduce, or otherwise limit the emissions of hazardous air pollutants (HAPs) from major categories and area sources. As these standards are promulgated, they are published in 40 CFR 63.

Stationary gas turbines are on the list of 174 categories of major and area sources that would be henceforth subject to emission standards. The specific Maximum Achievable Control Technology

(MACT) standard potentially applicable to new stationary gas turbines is 40 CFR 63 Subpart YYYY. Also potentially applicable to the project is 40 CFR 63 Subpart DDDDD, which regulates HAP emissions from boilers. MACT standards are intended to reduce emissions of air toxics through the installation of control equipment rather than through risk-based emission limits. However, since the proposed facility will not be a major source of HAPs, no additional controls under these NESHAPS are required.

Federally Mandated Operating Permits

Title V of the CAA requires U.S. EPA to develop a federal operating permit program that is implemented under 40 CFR 70. This program is administered by BAAQMD under Regulation II, Rules 6. Permits must contain emission estimates based on potential-to-emit, identification of all emission sources and controls, a compliance plan, and a statement indicating each source's compliance status. The permits must also incorporate all applicable federal, state, or air quality control district orders, rules and regulations. Because the facility will undergo new construction and operations, the project will apply for a new Title V permit.

Consistency with Federal Requirements

The BAAQMD is authorized by the U.S. EPA to issue PSD permits for projects in the Basin. Thus, a combined application will be made to the BAAQMD for the PSD permit and the Authority to Construct (ATC)/Permit to Operate (PTO) application. The BAAQMD has authority to implement and enforce most other applicable federal requirements, including the NSPS, NESHAPS, Title IV Acid Rain, and Title V Federal Operating Permit requirements. The Applicant will apply for a new Title V permit that will include Title IV Acid Rain provisions.

Risk Management Plan

Regulations (40 CFR 68) under the CAA are designed to prevent accidental releases of hazardous materials. The regulations require facilities that store more than a threshold quantity of the listed regulated substance to develop a Risk Management Plan, including an offsite-consequence analysis for the worst-case accidental release of a hazardous substance, hazard assessments and response programs to prevent accidental releases of listed chemicals. Section 112(r)(5) of the CAA discusses the regulated substances. These substances are listed in 40 CFR 68.130. Aqueous ammonia, which will used as a reagent to the project SCR NO_X control system, is a listed substance, and its Threshold Quantity for solutions of 20 percent and greater is 20,000 pounds of solution.

7.1.6.2 State

The CARB was created by the Mulford-Carrell Air Resources Act in 1968. The primary responsibilities of the CARB include (1) to develop, adopt, implement and enforce the state's motor vehicle pollution control program; (2) to administer and coordinate the state's air pollution research program; (3) to adopt and update the CAAQS; (4) to review the operations of the local air pollution control districts; and (5) to review and coordinate the SIPs for achieving NAAQS.

State Implementation Plan

The federal CAA requires each state to prepare a SIP to demonstrate how it will attain the NAAQS within the federally imposed deadlines. In California, local districts adopt new rules to demonstrate attainment of the NAAQS by reducing emissions. CARB reviews the SIP. The relevant BAAQMD Rules and Regulations that have been incorporated into the SIP are presented below under the local LORS.

California Clean Air Act

In 1989, California established CAAQS, including stringent enforcement of the NAAQS and additional standards for visibility-reducing particles, sulfates, and hydrogen sulfide. Local districts prepare air quality plans to demonstrate how the AAQS will be attained.

Toxic Air Contaminant Program

The Toxic Air Contaminant Identification and Control Act of 1983 created a state process to identify toxic air contaminants and to control their emissions. The CARB identifies and prioritizes the pollutants to be considered for identification as toxic air contaminants. The CARB assesses the potential for human exposure to a substance while the Office of Environmental Health Hazard Assessment (OEHHA) evaluates the corresponding health effects. These agencies prepare a risk assessment report to determine if the substance poses a significant health risk and should be identified as a toxic air contaminant. This program includes the 189 HAPs named by the CAAA. If necessary, the CARB develops air toxics control measures to reduce emissions. No measures in this program are applicable to the project, since the project would not exceed the Title V threshold of 10 tons per year (tpy) of any single HAP, or 25 tpy of a combination of HAPs. The HAPs are addressed by the Federal Title V Operating Permit.

Air Toxics Hot Spots Program

As required by the California Health and Safety Code Section 44300 (originally Assembly Bill 2588 – Air Toxics "Hot Spots" Information and Assessment Act). This program was created in 1987 to develop a statewide inventory of air toxics emissions from stationary sources. Applicable facilities must prepare the following: (1) an emissions inventory plan identifying air toxics; (2) an emission inventory report quantifying air toxics emissions; and (3) a health risk assessment, if air toxics emissions are at high levels. Facilities whose air toxics pose a significant health risk must also prepare and implement risk reduction plans. This requirement is applicable only after the start of operations. Section 7.6, Public Health, indicates that air toxics impacts from the project would be insignificant.

Authority to Construct and Permit to Operate

Under Regulation II, BAAQMD administers the air quality regulatory program for the construction, alteration, replacement, and operation of new power plants within its jurisdiction. Regulation II incorporates other BAAQMD rules that pertain to sources that may emit air contaminants through the issuance of air permits (i.e., Authority to Construct [ATC] and Permit to Operate [PTO]). This permitting process allows the BAAQMD to adequately review new and modified air pollution sources to ensure compliance with all applicable prohibitory rules and to ensure that appropriate emission controls are used. An ATC allows for the construction of the air pollution source and remains in effect until the PTO application is granted, denied, or canceled. For power plants under the siting jurisdiction of the CEC, the BAAQMD issues a Determination of Compliance (DOC). The DOC is incorporated into the CEC license. Once the CEC issues a license, the BAAQMD is able to issue a ATC. Once the project commences operations and demonstrates compliance with the ATC, BAAQMD will issue a PTO. The PTO specifies conditions that the air pollution source must meet to comply with other air quality standards and will incorporate applicable ATC requirements.

Power Plant Siting Requirements

Under the California Environmental Quality Act (CEQA), the CEC has been charged with assessing the environmental impacts of each new power plant and considering the implementation of feasible mitigation measures to prevent potential significant impacts. CEQA Guidelines [Title 14, California Administrative Code, Section 15002(a)(3)] state that the basic purpose of CEQA is to "prevent

significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible."

The CEC siting regulations require that, unless certain conditions justifying an override are shown, a new power plant can only be approved if the project complies with all federal, state, and local air quality rules, regulations, standards, guidelines, and ordinances that govern the construction and operation of the project. A project must demonstrate that facility emissions will be appropriately controlled to mitigate significant impacts from the project and that it will not jeopardize attainment and maintenance of the state and federal AAQS. Cumulative impacts, impacts due to pollutant interaction, and impacts from non-criteria pollutants must also be considered.

CEC and CARB Memorandum of Understanding

A Memorandum of Understanding between the CEC and CARB establishes requirements of the CEC to ensure protection of environmental quality during AFC review.

Consistency with State Requirements

State law grants local air pollution control districts and air quality management districts with the responsibility for regulating emissions from stationary sources. As discussed previously in this section, the project is under the local jurisdiction of the BAAQMD. Compliance with BAAQMD rules and regulations will ensure compliance with state air quality requirements.

7.1.6.3 Local

The BAAQMD is the local district with authority to implement and enforce air quality regulations. The BAAQMD prepares an Air Quality Plan to define its strategies for attaining the CAAQS and NAAQS, and its relevant control measures for implementing those strategies (Health and Safety Code [HS&C] Section 40914).

The BAAQMD Rules and Regulations are authorized by HS&C Section 4000 et seq., and Section 40200 et seq. This section presents the BAAQMD requirements that are applicable to the project. The BAAQMD has the delegated authority for implementing local, state, and federal air quality regulations in Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara and Napa counties, and southwestern Solano and southern Sonoma counties. The project is subject to BAAQMD regulations that apply to new source review of emissions, prohibitory regulations, and requirements for toxic air pollutants. The following sections evaluate the project's compliance with applicable District requirements.

The project is required to secure a preconstruction Determination of Compliance from the BAAQMD, and to demonstrate continued compliance with regulatory limits. The preconstruction review includes BACT and offsetting of emissions.

Rules and Regulations

The following paragraphs outline the BAAQMD rules and regulations that apply to the project:

Regulation I–General Provisions and Definitions

Regulation I, Section 301 – Public Nuisance

The releases of air contaminants anticipated under the project are not expected to "cause injury, detriment, nuisance or annoyance to any considerable number of persons or the public." In addition, none of the project's sources of air contaminants are expected to endanger "the comfort, repose, health or safety of any such persons or the public, or cause injury or damage to business or property." The air quality impact analysis is designed to ensure that the project will not cause any public nuisance.

Regulation II–Permits

Regulation II, Rule 1, Sections 301 and 302—Authority to Construct and Permit to Operate

Mirant will submit an application to the district to obtain an ATC and PTO for the combustion gas turbines.

Regulation II, Rule 2—New Source Review

The purpose of this rule is to provide for the review of new and modified sources and provide mechanisms.

Regulation 2, Rule 2, Section 301 ("Best Available Control Technology Requirement") requires BACT for a new or modified sources that have the potential to emit 10 pounds or more per highest day of VOCs, non-precursor organic compounds (NPOCs), NO_X, SO_2, PM_{10}, or CO.

Regulation 2, Rule 2, Section 302 ("Offset Requirements, Precursor Organic Compounds and Nitrogen Oxides") stipulates that federally enforceable emission offsets are required for VOC and NO_X emission increases from permitted sources which will emit more than 35 tons per year or more on a pollution-specific basis. For these facilities that emit more than 35 tons per year or more of NO_X or VOC, offsets are provided at a ratio of 1.15 to 1.0. The project is expected to emit more than 35 tons per year of NO_X and VOC, so emission offsets would be provided as necessary. Section 303 ("Offset Requirement, PM_{10} and Sulfur Dioxide") stipulates that emission offsets would be provided at a ratio of 1:1 for facilities that will result in a cumulative increase minus any contemporaneous emission reduction credits at the facility, in excess of 1.0 ton per year of PM_{10} or sulfur dioxide. The facility is expected to emit greater than 100 tons per year of PM_{10}, so emission offsets will be provided per this regulation. However, the facility is expected to release less than 100 tons per year of SO_2, so no emission offsets are required for this pollutant. Details of emission offset strategy are given in Section 7.1.4.

Pursuant to Regulation 2-2-414-1 ("PSD Air Quality Analysis"), air quality analysis was performed including meteorological and topographic data for the project. This analysis includes ensuring that the emission increases caused by the facility will not cause or contribute to a violation of an air quality standard or an exceedance of any applicable PSD increment. The protocol for this modeling is presented in Section 7.1.2.3 and the results are presented in Section 7.1.2.

Pursuant to Regulation 2-2-417 ("Visibility, Soils, and Vegetation Analysis"), an analysis of the impairment to visibility, soils and vegetation that would occur as a result of the new or modified source and the general commercial, residential, industrial and other growth associated with the source or modification needs to be submitted with the application. The applicant need not provide an analysis of the impact on vegetation if it has no significant commercial or recreational value. Analysis of visual impacts is discussed in Section 7.1.2.5.

Regulations 2-2-304 and 2-2-305 ("PSD Requirements" and "Carbon Monoxide Modeling Requirement") specify the incremental emission triggers for SO_2, NO_X, PM_{10}, and CO. For project emissions of SO_2, NO_X, or PM_{10} above these PSD triggers, the applicant must demonstrate through modeling that no air quality standard will be exceeded. For project emissions of CO which exceed the trigger levels, the applicant must demonstrate through modeling that the increase in emissions will not interfere with the attainment or maintenance of the CO NAAQS. Section 7.1.6.1, discusses these PSD requirements further.

Regulation 2, Rule 3, ("Power Plants") contains procedures for the review and standards for the approval of authorities to construct power plants. This regulation will be complied with through the submittal to BAAQMD of a stand alone application for an Authority to Construct.

Pursuant to Regulation 2, Rule 7 ("Acid Rain"), the gas turbine units will be subject to the requirements of Title IV of the Federal Clean Air Act. Allowances of SO_2 emissions are set aside in 40 CFR 73. See Section 7.1.6.1 for a discussion of compliance.

Regulation III–Fees

Regulation III identifies the fees that are applicable to permit modifications, new facilities, and permitted emissions. The required fees will be submitted with the application for Permit to Construct/Permit to Operate in compliance with this rule.

Regulation VI–Particulate Matter and Visible Emissions

The project will utilize the following to minimize the release of particulate matter and diminish the visibility of emissions:

- Ultra low NO_X burner technology and proper combustion practices;
- Natural gas as the combustion fuel for the proposed gas turbines; and

The emission sources of the project are expected to comply with the standards set forth in Regulation 6:

- No visible emission from any of the sources will be as dark or darker than No. 1 on the Ringelmann Chart, or of such opacity as to obscure an observer's view to an equivalent or greater degree for a period more of than three minutes in any hour (Regulation 6, Section 301);
- No visible emission from any of the sources will be equal to or greater than 20 percent opacity as perceived by an opacity sensing device for a period of more than three minutes in any hour (Regulation 6, Section 302);
- No emission from any of the sources will contain particulate matter in excess of 0.15 grains per dry cubic foot of exhaust gas volume (Regulation 6, Section 310).

Calculated in accordance with Regulation 6-310.3, the worst-case grain loading from operation of the turbines was calculated to be less than 0.05 grains per dry standard cubic foot of exhaust gas. Therefore, the grain loading from the turbines is expected to be in compliance with this regulation. Particulate matter associated with the construction of the facility is exempt from district permit requirements but is subject to Regulation 6. It is expected that the CEC will impose conditions on construction activities that will require the use of water or chemical dust suppressants to minimize PM_{10} emissions and prevent visible particulate emissions.

Regulation VII–Odorous Substances

Regulation 7, Rule 302 prohibits the discharge of any odorous substances which remain odorous at the property line after dilution with four parts of odor-free air. Regulation 303 prohibits the discharge of ammonia in concentrations greater than 5,000 ppm. Because the ammonia emissions from the SCR units will be limited to 5 ppmvd for the combined-cycle units and 10 ppmvd for the Simple Cycle units each at 15 percent O_2, the project is expected to be in compliance with this regulation.

Regulation VIII–Organic Compounds

This regulation limits the emission of organic compounds to the atmosphere. The project is exempt from this regulation per 8-2-110 because natural gas is the only fuel used in the project. Solvents used in cleaning and maintenance are expected to comply with Regulation 8, Rule 4, by emitting less than 5 tpy of VOCs.

Regulation IX–Inorganic Gaseous Pollutants

This regulation emission limits for various compounds.

Regulation 9, Rule 1, "Sulfur Dioxide": Section 301 ("Limitations on Ground Level Concentrations") limits SO_2 emissions to 0.5 ppm continuously for 3 consecutive minutes, 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours. Modeling results indicate that the maximum concentration of SO_2 released in one hour result in ground level concentrations less than 3 ppb. Section 302 ("General Emission Limitation") prohibits emissions from a gas stream containing SO_2 in excess of 300 ppm (dry). Expected emissions of SO_2 are not expected to exceed 20 ppm.

Regulation 9, Rule 9, "Nitrogen Oxides from Stationary Gas Turbines": General emission limits in 9-9-301.3 states that gas turbines rated at 10.0 MW and over, with SCR, shall not exceed 9 ppmv, except that, for non-gaseous fuel firing during natural gas curtailment or short testing periods, the limit is 25 ppmv. The project turbines are expected to comply with this rule.

Table 7.1-38 presents the applicable federal, state, and local regulations that the project must adequately address as part of the permitting process.

7.1.7 Involved Agencies and Agency Contacts

Agency contacts regarding public health assessment of the project are listed in Table 7.1-39.

7.1.8 Permits Required and Permitting Schedule

Permits required for the project that are associated with air quality are listed in Table 7.1-40.

Under Regulation II, BAAQMD regulates the construction, alteration, replacement, and operation of new power plants. The project is required to obtain a preconstruction Determination of Compliance from the BAAQMD. Regulation II, Rule 1, Sections 301 and 302 incorporates other BAAQMD rules pertaining to sources that may emit air contaminants through the issuance of air permits (i.e., ATC/PTO). This permitting process allows the BAAQMD to adequately review new and modified air pollution sources to ensure compliance with all applicable prohibitory rules and to ensure that appropriate emission controls are used. An ATC allows for the construction of the air pollution source and remains in effect until the PTO application is granted, denied, or canceled. For power plants under the siting jurisdiction of the CEC, the BAAQMD issues a Determination of Compliance in lieu of an ATC. The DOC is incorporated into the CEC license. When the project commences operation and demonstrates compliance with the

DOC, BAAQMD will issue a PTO. The PTO specifies conditions that the air pollution source must meet to comply with other air quality standards and will incorporate applicable DOC requirements. The final DOC should be issued within 6 months after receipt of complete applications.

7.1.9 References

Auer, August H., Jr., 1978. American Meteorological Society. Journal of Applied Meteorology, 17(5): 636-643. "Correlation of Land Use and Cover with Meteorological Anomalies," May 1978.

Breiner, Joan; Benjamin Gimeno, and Mark Fenn, 2007. "Calculation of Theoretical and Empirical Nutrient N Critical Loads in the Mixed Confier Ecosystems of Southern California," March 2007.

CARB (California Air Resources Board), 2000. *Risk Management Guidance for the Permitting of New Stationary Source Diesel-Fueled Engines*, October 2000.

CARB (California Air Resources Board), 2007. *Off-Road Mobile Source Emission Factors, Off-Road* Emissions Inventory Program.

CEC (California Energy Commission), 1997. "Regulations Pertaining to the Rules of Practice and Procedure and Plant Site Certification." Title 20, California Code of Regulations. Chapters 1, 2, and 5.

CEC (California Energy Commission), 2006. Rules of Practice and Procedure and Power Plant Site Certification Regulations Revisions, 04-SIT-2, December 14, 2006.

Fenn, Mark; Richard Haeuber, Tonnesen, Gail; Baron, Jill; Grossman-Clarke, Susanne; Hope, Dianne; Jaffe, Daniel; Copeland, Scott; Geiser, Linda; Ruether, Heather; Sickman, James; 2003. "Nitrogen Emissions, Deposition, and Monitoring in the Western United States," *BioScience*, Vol. 53, No. 4, April 2003.

FLAG (Federal Land Managers' Air Quality Related Values Workshop), 2000. Phase I Report, U.S. Forest Service – Air Quality Program, National Park Service – Air Resources Division, U.S. Fish and Wildlife Service – Air Quality Branch, December 2000.

National Park Service, 2007. Particulate Matter Speciation: http://www2.nature.nps.gov/air/permits/ect/index.cfm.

Notar, John, 2008. Email correspondence between John Notar, National Park Service Air Resources Division and Julie Mitchell, URS Corporation. February 1, 2008.

SCAQMD (South Coast Air Quality Management District), 1993. *CEQA Air Quality Handbook*. April 1993.

U.S. EPA (U.S. Environmental Protection Agency), 1985. *Guideline for Determination of Good Engineering Stack Height (Technical Support Document for the Stack Height Regulation*) (Revised), EPA-450/4-80-023R. Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. June 1985.

U.S. EPA (U.S. Environmental Protection Agency), 1988. *Workbook for Plume Visual Impact Screening and Analysis*, U.S. Environmental Protection Agency, Research Triangle Park, NC. September 1988.

U.S. EPA (U.S. Environmental Protection Agency), 1990. *New Source Review Workshop Manual Prevention of Significant Deterioration and Nonattainment Area Permitting* (Draft), Office of Air

Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. October 1990.

U.S. EPA (U.S. Environmental Protection Agency), 1992a. *Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised*. EPA-454/R-92-019. October 1992.

U.S. EPA (U.S. Environmental Protection Agency), 1992b. *Addendum to Workbook for Plume Visual Impact Screening and Analysis*, U.S. Environmental Protection Agency, Research Triangle Park, NC. October 1992.

U.S. EPA (U.S. Environmental Protection Agency), 1995a. *Building Profile Input Program-Prime*. Version 98086.

U.S. EPA (U.S. Environmental Protection Agency), 1995b. *Screen3 Model User's Guide*. EPA-454/B-95-004. September 1995.

U.S. EPA (U.S. Environmental Protection Agency), 1998. Interagency Workgroup On Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts (EPA-454/R-98-019), U.S. Environmental Protection Agency, Research Triangle Park, NC. December 1998.

U.S. EPA (U.S. Environmental Protection Agency), 2000. Meteorological Monitoring Guidance for Regulatory Modeling Applications. February 2000.

U.S. EPA (U.S. Environmental Protection Agency), 2003. Guideline on Air Quality Models. 40 CFR51 Appendix W. July 1, 2003 Edition.

U.S. EPA (U.S. Environmental Protection Agency), 2004. User's Guide for the AMS/EPA Regulatory Model-AERMOD. (EPA-454/B-03-001). September 2004.

U.S. EPA (U.S. Environmental Protection Agency), 2005. AERMOD Implementation Guide. September 2005.

U.S. EPA (U.S. Environmental Protection Agency), 2006a. Addendum to User's Guide for the AMS/EPA Regulatory Model-AERMOD. December 2006.

U.S. EPA (U.S. Environmental Protection Agency), 2006b. U.S. EPA AirData.

U.S. EPA (U.S. Environmental Protection Agency), 2008a. AERMOD Implementation Guide. January 2008.

U.S. EPA (U.S. Environmental Protection Agency), 2008b. AERSURFACE User's Guide. January 2008.

U.S. Forest Service and National Park Service, 2005. CALPUFF Reviewer's Guide (DRAFT), prepared by Howard Gebhart. U.S. Department of Agriculture. September 2005.

U.S. Forest Service et al., 2000. Federal Land Managers Air Quality Related Values Workgroup (FLAG) Phase 1 Report. Prepared by U.S. Forest Service Air Quality Program, National Park Service Air Resources Division, U.S. Fish and Wildlife Service Air Quality Branch. December 2000.

Western Regional Climate Center, 2007. Desert Research Institute, Las Vegas, NV (http://www.wrcc.dri.edu/).

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Table 7.1-1
Temperature and Precipitation Data for Antioch, California

Month	Average Temperatures (°F)[1]		Average Precipitation (Inches)
	Low	High	
January	37.0	53.8	2.73
February	41.0	60.2	2.41
March	43.4	65.4	1.96
April	46.3	71.5	0.92
May	51.3	78.6	0.38
June	56.1	86.1	0.09
July	57.4	91.2	0.02
August	56.7	89.9	0.04
September	55.1	86.2	0.2
October	50.1	77.5	0.67
November	42.9	64.2	1.63
December	37.3	54.7	2.2
Annual Average	**47.9**	**73.3**	**13.26 (Total)**

Source: NWS, 2008 (http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca0232)

Note:
1 Average temperature and precipitation data represent 1955-2007.

Table 7.1-2a
Concentration Data Summary for Ozone at Pittsburg Station

Year	Highest Concentration for O_3 (ppm)		Number of Days Exceeding Standards	
	1-hour	8-hour	Federal 8-hour	State 1-hour
2006	0.105	**0.093**	1	3
2005	0.094	0.078	0	0
2004	0.090	0.081	0	0

Source: California Air Resources Board (CARB) – California Air Quality Data website (http://www.arb.ca.gov/aqd/aqdpage.htm)

Notes:
The federal 8-hour average ozone standard is 0.08 ppm. On June 15, 2005, the 1-hour ozone standard (0.12 ppm) was revoked for all areas except the 8-hour ozone nonattainment Early Action Compact (EAC) areas. The project site is not located within one of the EAC areas that are still subject to the 1-hour ozone standard.
The state ozone standards are 1-hour average (0.09 ppm) and 8-hour average (0.07 ppm).
Monitoring site address: 583 W. 10th Street, Pittsburg, CA 94565

Table 7.1-2b
Concentration Data Summary for Ozone at Concord Station

Year	Highest Concentration for O_3 (ppm)		Number of Days Exceeding Standards	
	1-hour	8-hour	Federal 8-hour	State 1-hour
2006	**0.117**	0.092	4	8
2005	0.098	0.080	0	1
2004	0.097	0.083	0	1

Source: California Air Resources Board (CARB) – California Air Quality Data website (http://www.arb.ca.gov/aqd/aqdpage.htm)

Notes:
The federal 8-hour average ozone standard is 0.08 ppm. On June 15, 2005, the 1-hour ozone standard (0.12 ppm) was revoked for all areas except the 8-hour ozone nonattainment Early Action Compact (EAC) areas. The project site is not located within one of the EAC areas that are still subject to the 1-hour ozone standard.
The state ozone standards are 1-hour average (0.09 ppm) and 8-hour average (0.07 ppm).
Monitoring site address: 2975 Treat Boulevard, Concord, CA 94518

Table 7.1-2c
Concentration Data Summary for Ozone at Bethel Island Station

Year	Highest Concentration for O_3 (ppm)		Number of Days Exceeding Standards	
	1-hour	8-hour	Federal 8-hour	State 1-hour
2006	0.116	0.090	1	9
2005	0.089	0.077	0	0
2004	0.103	0.081	0	1

Source: California Air Resources Board (CARB) – California Air Quality Data website (http://www.arb.ca.gov/aqd/aqdpage.htm)

Notes:
The federal 8-hour average ozone standard is 0.08 ppm. On June 15, 2005, the 1-hour ozone standard (0.12 ppm) was revoked for all areas except the 8-hour ozone nonattainment Early Action Compact (EAC) areas. The project site is not located within one of the EAC areas that are still subject to the 1-hour ozone standard.
The state ozone standards are 1-hour average (0.09 ppm) and 8-hour average (0.07 ppm).
Monitoring site address: 5551 Bethel Island Road, Bethel Island, CA 94511

Table 7.1-3a
Concentration Data Summary for PM_{10} at Pittsburg Station

Year	Highest 24-hour Concentration for PM_{10} ($\mu g/m^3$)		Annual Arithmetic Mean for PM_{10} ($\mu g/m^3$)	Number of Days Exceeding Standards	
	Federal	State	State	Federal 24-hour	State 24-hour
2006	58	59	20	0	2
2005	54	57	20	0	1
2004	62	64	22	0	1

Source: California Air Resources Board —California Air Quality Data website (http://www.arb.ca.gov/aqd/aqdpage.htm)

Notes:
The federal PM_{10} standard is 24-hour average: 150 $\mu g/m^3$.
The state PM_{10} standards are annual arithmetic mean: 20 $\mu g/m^3$ and 24-hour average: 50 $\mu g/m^3$.
Monitoring site address 583 W. 10th Street, Pittsburg, CA 94565

Table 7.1-3b
Concentration Data Summary for PM_{10} at Concord Station

Year	Highest 24-hour Concentration for PM_{10} ($\mu g/m^3$)		Annual Arithmetic Mean for PM_{10} ($\mu g/m^3$)	Number of Days Exceeding Standards	
	Federal	State	State	Federal 24-hour	State 24-hour
2006	**84**	81	19	0	3
2005	40	42	16	0	0
2004	48	51	–	0	1

Source: California Air Resources Board –California Air Quality Data website (http://www.arb.ca.gov/aqd/aqdpage.htm)

Notes:
The federal PM_{10} standard is 24-hour average: 150 $\mu g/m^3$.
The state PM_{10} standards are annual arithmetic mean: 20 $\mu g/m^3$ and 24-hour average: 50 $\mu g/m^3$.
Monitoring site address: 2975 Treat Boulevard, Concord, CA 94518
–: data not available

Table 7.1-3c
Concentration Data Summary for PM_{10} at Bethel Island Station

Year	Highest 24-hour Concentration for PM_{10} ($\mu g/m^3$)		Annual Arithmetic Mean for PM_{10} ($\mu g/m^3$)	Number of Days Exceeding Standards	
	Federal	State	State	Federal 24-hour	State 24-hour
2006	82	84	19	0	1
2005	62	64	19	0	1
2004	40	42	20	0	0

Source: California Air Resources Board –California Air Quality Data website (http://www.arb.ca.gov/aqd/aqdpage.htm)
Notes:
The federal PM_{10} standard is 24-hour average: 150 $\mu g/m^3$.
The state PM_{10} standards are annual arithmetic mean: 20 $\mu g/m^3$ and 24-hour average: 50 $\mu g/m^3$.
Monitoring site address: 5551 Bethel Island Road, Bethel Island, CA 94511

Table 7.1-4
Concentration Data Summary for $PM_{2.5}$ at Concord Station

Year	Highest 24-hour Concentration for $PM_{2.5}$ ($\mu g/m^3$)	Annual Arithmetic Mean for $PM_{2.5}$ ($\mu g/m^3$)	
	Federal	Federal	State
2006	62	10	10
2005	49	9	9
2004	**74**	–	12

Source: California Air Resources Board–California Air Quality Data website (http://www.arb.ca.gov/aqd/aqdpage.htm)

Notes:
The federal $PM_{2.5}$ standards are 24-hour average (35 $\mu g/m^3$) and annual arithmetic mean (15 $\mu g/m^3$).
The state $PM_{2.5}$ standard is annual arithmetic mean: 12 $\mu g/m^3$.
Monitoring site address: 2975 Treat Boulevard, Concord, CA 94518
– = There were insufficient data available to determine the value.

Table 7.1-5a
Concentration Data Summary for Carbon Monoxide at Pittsburg Station

Year	Highest Concentration for CO (ppm)		Estimated Number of Days Exceeding Standards (days)			
	1-hour	8-hour	Federal 1-hour	Federal 8-hour	State 1-hour	State 8-hour
2006	3.3	1.9	0	0	0	0
2005	3.3	1.7	0	0	0	0
2004	**4.1**	1.9	0	0	0	0

Source:
EPA AirData (http://www.epa.gov/air/data/index.html)

Notes:
The federal CO standards are 1-hour average (35 ppm) and 8-hour average (9 ppm).
The state CO standards are 1-hour average (20 ppm) and 8-hour average (9 ppm).
Monitoring site: 583 W. 10th Street, Pittsburg, CA 94565

Table 7.1-5b
Concentration Data Summary for Carbon Monoxide at Concord Station

Year	Highest Concentration for CO (ppm)		Estimated Number of Days Exceeding Standards (days)			
	1-hour	8-hour	Federal 1-hour	Federal 8-hour	State 1-hour	State 8-hour
2006	1.7	1.3	0	0	0	0
2005	2.2	1.5	0	0	0	0
2004	2.7	**2.0**	0	0	0	0

Source:
EPA AirData (http://www.epa.gov/air/data/index.html)

Notes:
The federal CO standards are 1-hour average (35 ppm) and 8-hour average (9 ppm).
The state CO standards are 1-hour average (20 ppm) and 8-hour average (9 ppm).
Monitoring site: 2975 Treat Boulevard, Concord, CA 94518

Table 7.1-5c
Concentration Data Summary for Carbon Monoxide at Bethel Island Station

Year	Highest Concentration for CO (ppm)		Estimated Number of Days Exceeding Standards (days)			
	1-hour	8-hour	Federal 1-hour	Federal 8-hour	State 1-hour	State 8-hour
2006	1.3	1.0	0	0	0	0
2005	1.1	0.9	0	0	0	0
2004	1.2	0.9	0	0	0	0

Source: EPA AirData (http://www.epa.gov/air/data/index.html)

Notes:
The federal CO standards are 1-hour average (35 ppm) and 8-hour average (9 ppm).
The state CO standards are 1-hour average (20 ppm) and 8-hour average (9 ppm).
Monitoring site: 5551 Bethel Island Road, Bethel Island, CA 94511

Table 7.1-6a
Concentration Data Summary for Nitrogen Dioxide at Pittsburg Station

Year	Highest 1-hour Concentration for NO_2 (ppm)	Annual Average for NO_2 (ppm)	Estimated Number of Days Exceeding Standards (days)	
			Federal	State
2006	0.052	0.011	0	0
2005	0.058	0.011	0	0
2004	0.048	0.011	0	0

Source: California Air Resources Board – California Air Quality Data website (http://www.arb.ca.gov/aqd/aqdpage.htm)

Notes:
The federal NO_2 standards is annual average: 0.053 ppm
The state NO_2 standards is 1-hour average: 0.25 ppm
Monitoring site: 583 W. 10th Street, Pittsburg, CA 94565

Table 7.1-6b
Concentration Data Summary for Nitrogen Dioxide at Concord Station

Year	Highest 1-hour Concentration for NO_2 (ppm)	Annual Average for NO_2 (ppm)	Estimated Number of Days Exceeding Standards (days)	
			Federal	State
2006	0.047	0.011	0	0
2005	0.055	0.012	0	0
2004	0.065	0.012	0	0

Source: California Air Resources Board – California Air Quality Data website (http://www.arb.ca.gov/aqd/aqdpage.htm)

Notes:
The federal NO_2 standards is annual average: 0.053 ppm
The state NO_2 standards is 1-hour average: 0.25 ppm
Monitoring site: 2975 Treat Boulevard, Concord, CA 94518

Table 7.1-6c
Concentration Data Summary for Nitrogen Dioxide at Bethel Island Station

Year	Highest 1-hour Concentration for NO_2 (ppm)	Annual Average for NO_2 (ppm)	Estimated Number of Days Exceeding Standards (days)	
			Federal	State
2006	0.044	0.008	0	0
2005	0.038	0.007	0	0
2004	0.034	0.008	0	0

Source: California Air Resources Board – California Air Quality Data website (http://www.arb.ca.gov/aqd/aqdpage.htm)

Notes:
The federal NO_2 standards is annual average: 0.053 ppm
The state NO_2 standards is 1-hour average: 0.25 ppm
Monitoring site: 5551 Bethel Island Road, Bethel Island, CA 94511

Table 7.1-7a
Concentration Data Summary for Sulfur Dioxide at Pittsburg Station

Year	Highest Concentration for SO_2 (ppm)			Annual Average for SO_2 (ppm)	Estimated Number of Days Exceeding Standards (days)				
	1-hour	3-hour	24-hour		Federal 3-hour	Federal 24-hour	Federal Annual Mean	State 1-hour	State 24-hour
2006	0.045	0.025	0.009	0.002	0	0	0	0	0
2005	0.030	0.018	0.009	0.002	0	0	0	0	0
2004	0.035	0.019	0.007	0.002	0	0	0	0	0

Source: U.S. EPA AirData (http://www.epa.gov/air/data/index.html)

Notes:
The federal SO_2 standards are annual average (0.03 ppm,) 24-hour average (0.14 ppm), and 3-hour average (0.50 ppm).
The state SO_2 standards are 24-hour average (0.04 ppm) and 1-hour average (0.25 ppm).
Monitoring site: 583 W. 10th Street, Pittsburg, CA 94565

Table 7.1-7b
Concentration Data Summary for Sulfur Dioxide at Concord Station

Year	Highest Concentration for SO_2 (ppm)			Annual Average for SO_2 (ppm)	Estimated Number of Days Exceeding Standards (days)				
	1-hour	3-hour	24-hour		Federal 3-hour	Federal 24-hour	Federal Annual Mean	State 1-hour	State 24-hour
2006	0.025	0.018	0.007	0.001	0	0	0	0	0
2005	0.026	0.017	0.007	0.001	0	0	0	0	0
2004	0.090	0.044	0.010	0.002	0	0	0	0	0

Source: U.S. EPA AirData (http://www.epa.gov/air/data/index.html)

Notes:
The federal SO_2 standards are annual average (0.03 ppm,) 24-hour average (0.14 ppm), and 3-hour average (0.50 ppm).
The state SO_2 standards are 24-hour average (0.04 ppm) and 1-hour average (0.25 ppm).
Monitoring site: 2975 Treat Boulevard, Concord, CA 94518

Table 7.1-7c
Concentration Data Summary for Sulfur Dioxide at Bethel Island Station

Year	Highest Concentration for SO_2 (ppm)			Annual Average for SO_2 (ppm)	Estimated Number of Days Exceeding Standards (days)				
	1-hour	3-hour	24-hour		Federal 3-hour	Federal 24-hour	Federal Annual Mean	State 1-hour	State 24-hour
2006	0.017	0.011	0.007	0.002	0	0	0	0	0
2005	0.017	0.010	0.006	0.002	0	0	0	0	0
2004	0.015	0.009	0.006	0.002	0	0	0	0	0

Source: U.S. EPA AirData (http://www.epa.gov/air/data/index.html)

Notes:
The federal SO_2 standards are annual average (0.03 ppm,) 24-hour average (0.14 ppm), and 3-hour average (0.50 ppm).
The state SO_2 standards are 24-hour average (0.04 ppm) and 1-hour average (0.25 ppm).
Monitoring site: 5551 Bethel Island Road, Bethel Island, CA 94511

Table 7.1-8
Concentration Data Summary for Lead at Parlier Station

Year	Highest 24-hour Concentration for Lead ($\mu g/m^3$)	Estimated Number of Days Exceeding Federal and State Standards (days)
2006	0.02	0
2005	–	–
2004	–	–

Source: U.S. EPA AirData (http://www.epa.gov/air/data/index.html)

Notes:
The federal lead standard is quarterly average: 1.5 µg/m3.
The state lead standard is 30 days average: 1.5 µg/m3.
Monitoring site: 13900 Tuolumne Street, Parlier, CA 93648.
–: denotes no data available to determine value.

Table 7.1-9
Estimated Pieces of Construction Equipment and Schedules

Equipment	% Use	HP	Fuel	2009			2010												2011												2012						TOTAL
				Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	
Construction																																					
On-Road																																					
Concrete Pumper Truck	15	350	Dsl			1	1	1	1													1	1	1	1	1	1	1	1	1	1						14
Dump Truck	35	300	Dsl			1	1	1	1	10												1	2	2	2	2	2	2	2	1	1	1	1				23
Fuel/Lube Truck	25	150	Gas	4	4	4	4	4	4	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	31
Pickup truck	75	150	Gas	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	80
Water Truck	50	300	Dsl	2	2	2	2	2	2													1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
Off-Road																																					
Air Compressor	80	50	Gas	3	3	3	3	3	4	2	2	1	1	1	1	1	1	1	1			1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	39
Articulating Boom Manlift	70	75	Gas	2	2	2	2	2	6	4	6	6	12	12	10	10	10	12	12	6	4						1	3	5	9	9	9	9	12	12	12	189
Backhoe Loader	40	80	Dsl			2	2	2	2	2	1	1	1	1	1							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	30
Jumping Jack Compactor	60	7.5	Gas																				1	1	2	2	2	2	2	2	2	2	2				20
Crane, 150-Ton, Crawler	50	300	Dsl	1	1	1		1	1	1	1	1	1	1	1	1														1	1	1	1	1	1	1	19
Crane, 330-Ton, Crawler, M2250	25	500	Dsl						1	1	1																			1	1	1	1	1	1		9
Crane, 45-Ton Hydraulic	65	250	Dsl	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1									1	1	1	1	1	1	1	25
Crane, 55-Ton Hydraulic	65	300	Dsl	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1				1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	36
Dozer	80	300	Dsl																				1	1	1	1	1	1									6
Excavator, Hydraulic	85	250	Dsl	2	2	2	1	1	1	1	1	1	1	1	1							1	1	2	2	2	2	2	2	2	2	1	1				35
Forklift	75	40	Gas	1	1	1	1	2	2	2	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	2	55
Front End Loader	70	130	Dsl		1	1	1	1	1	1	1	1	1	1	1	1						1	2	2	2	2	2	2	2	2	2	2	2				35
Light Plant	30	25	Gas		1	1	1	1									1	1	1	1																	8
Tractor	50	195	Dsl	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	33
Vibratory Roller	80	125	Gas			1	1	1	1														1	1	1	1	1	1	1	1	1	1	1				15
Walk Behind Vibratory Roller	60	25	Gas			1	1	1	1														1	1	2	2	2	2	2	1	1	1	1				20
Welder (Diesel)	70	25	Dsl	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	47
Total				**24**	**27**	**35**	**33**	**35**	**40**	**34**	**23**	**21**	**27**	**26**	**24**	**22**	**21**	**23**	**21**	**13**	**10**	**15**	**21**	**22**	**24**	**25**	**26**	**28**	**29**	**34**	**34**	**34**	**36**	**31**	**31**	**28**	877

Note:
Dsl = diesel
HP = Horsepower

Table 7.1-10
Maximum Monthly and 12-Month Total Emissions

	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	VOC
Construction Emissions						
Monthly Emissions (tons)	11.23	3.69	0.16	0.15	0.0043	0.69
12-Month (tons)	85.02	28.7	1.25	1.14	0.034	5.33
Onsite Fugitive Dust Emissions						
Yearly Emissions (tons)	0	0	1.70	0.35	0	0

Notes:

CO = carbon monoxide
CO_2 = carbon dioxide
CH_4 = methane
N_2O = nitrous oxide
N/A = not applicable
$PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter
PM_{10} = particulate matter less than or equal to 10 microns in diameter
VOC = volatile organic compounds
SO_x = sulfur oxides

Table 7.1-11
Maximum FP10 Unit Operating Schedule and Stack Parameters

Operating Conditions	Annual Numbers
Number of Starts per Turbine	193
Number of Shutdowns per Turbine	193
Startup Time (min)	12
Shutdown Time (min)	6
Turbine Operation with Power Augmentation (hours)	4,000
Normal Turbine Operation (hours)	322
Total Turbine Operation (hours)	4,383
Stack Height (feet)	150.5
Stack Diameter (feet)	21.33

Table 7.1-12
Maximum Simple Cycle Unit Operating Schedule and Stack Parameters

Operating Conditions	Annual Numbers
Number of Cold Starts per Turbine	100
Number of Shutdowns	100
Startup Time (min)	11
Shutdown Time (min)	6
Turbine Operation (hours)	849
Total Operation (hours)	877
Stack Height (feet)	150.25
Stack Diameter (feet)	31.33

Table 7.1-13
1-Hour Operating Emission Rates for FP10 Units

Case	Units	1A	1B	1C	2A	2B	2C	3A	3B	3C	3D	3E	3F
Ambient Temperature	**°F**	**Winter Extreme Minimum: 20°F**			**Average: 59°F**			**Summer Design: 94°F**					
CTG Load Level	%	100%	85%	60%	100%	85%	60%	100%	100%	100%	100%	85%	60%
Evaporative Cooling Status	off/on	Off	Off	Off	Off	Off	Off	On	On	Off	Off	Off	Off
Power Augmentation Status	off/on	Off	Off	Off	Off	Off	Off	On	Off	On	Off	Off	Off
Stack Outlet Temperature	°F	350	346	344	340	337	329	338	348	333	341	346	323
Exit Velocity	fps	70.5	61.5	50.1	64.3	57.0	44.9	65.2	62.5	61.6	59.0	53.4	42.8
NO_X (at 2.0 ppm)	lb/hr	17.4	15.1	12.0	15.8	13.9	10.0	16.3	15.2	15.3	14.3	12.9	10.0
CO (at 3 ppm)	lb/hr	15.9	13.8	10.7	14.6	12.8	9.5	15.0	14.0	14.1	13.1	11.7	9.0
VOC (at 2.0 ppm)	lb/hr	6.2	5.4	4.1	5.6	5.0	3.6	5.8	5.4	5.4	5.0	4.5	3.5
PM_{10}	lb/hr	10.0	8.9	8.0	9.3	8.3	8.0	8.9	8.8	8.5	8.5	7.7	8.0
SO_2 (1 gr/100 scf)	lb/hr	6.4	5.6	4.5	5.8	5.2	4.0	6.0	5.6	5.6	5.3	4.7	3.8

Notes:
CO = carbon monoxide
CTG = combustion turbine generator
fps = feet per second
lb/hr = pounds per hour
NO_X = nitrogen oxide
O_2 = oxygen
PM_{10} = particulate matter 10 microns in diameter
ppm = parts per million
scf = standard cubic feet
SO_2 = sulfur dioxide
VOC = volatile organic compounds

Table 7.1-14
1-Hour Operating Emission Rates for Simple Cycle Units

Case	Units	1A	1B	1C	2A	2B	2C	3A	3B	3C
Ambient Temperature	**°F**	**Winter Extreme: 20°F**			**Yearly Average: 60°F**			**Summer Design: 94°F**		
CTG Load Level	%	100%	75%	60%	100%	75%	60%	100%	75%	60%
Evap Cooling Status	off/on	Off	Off	Off	85%	OFF	OFF	On	Off	Off
Gas Turbine Outlet Temperature	ºF	1,065	1,065	1,065	1,090	1,090	1,091	1,123	1,123	1,122
Stack Outlet Temperature	ºF	750	750	750	750	750	750	750	750	750
Exit Velocity	fps	70.9	57.6	50.8	68.3	56.6	37.2	65.9	55.4	49.1
NO_X as NO_2 (at 2.5 ppm)	lb/hr	20.83	16.39	13.89	18.89	15.00	12.78	16.94	13.89	11.67
CO (at 3.0 ppm)	lb/hr	15.00	12.00	10.20	13.50	11.25	9.30	12.75	9.75	8.70
VOC (at 2.0 ppm)	lb/hr	5.80	4.60	3.87	5.20	4.20	3.60	4.80	3.80	3.27
PM_{10}	lb/hr	9	8	8	8	8	8	8	8	8
SO_2 (1 gr/100 scf)	lb/hr	6.21	4.90	4.17	5.63	4.51	3.84	5.08	4.11	3.52

Notes:
CO = carbon monoxide
CTG = combustion turbine generator
fps = feet per second
lb/hr = pounds per hour
NO_X = nitrogen oxide
O_2 = oxygen
PM_{10} = particulate matter 10 microns in diameter
ppm = parts per million
scf = standard cubic feet
SO_2 = sulfur dioxide
VOC = volatile organic compounds

Table 7.1-15
Criteria Pollutant Emission Rates During Startup and Shutdown

Pollutant	FP10 Units				Simple Cycle Units			
	Startup (12 min)		Shutdown (7 min)		Startup (11 min)		Shutdown (6 min)	
	1 hr w/ 1 SU (lb/hr)	Total Emissions (lb/event)	1 hr w/1 SD (lb/hr)	Total Emissions (lb/event)	1 hr w/1 SU (lb/hr)	Total Emissions (lb/event)	1 hr w/1 SD (lb/hr)	Total Emissions (lb/event)
NO_X (2.0 or 2.5 ppm)	38.7	24.8	25.9	10.5	29	12	28.8	10
CO (3 ppm)	279.8	267.1	149.5	135.4	225.25	213	124	110
VOC (2 ppm)	17.7	12.7	10.7	5.2	15.7	11	10.2	5
SO_2 (0.4 gr/100 scf)	2.7	0.6	2.4	0.2	2.19	0.17	2.4	0.15
SO_2 (1 gr/100 scf)	6.7	1.6	6.1	0.4	5.49	0.42	5.7	0.37
PM_{10}	11.1	3.1	9.9	1.1	8.4	1	9.1	1

Notes:

Startup/shutdown duration defined as operation of CTG below 60 percent load for the FP10s or 60 percent load for the Simple Cycle units when gaseous emission rates (lb/hr basis) exceed the controlled rates defined as normal operation

Startup and shutdown SO_2 emissions are calculated based on the total amount of fuel used for each and the emission rate of SO_2 at a winter extreme of 20°F; 100% load

CO = carbon monoxide
NO_X = nitrogen oxide
PM_{10} = particulate matter 10 microns in diameter
SD = shutdown
SO_2 = sulfur dioxide
SU = startup
VOC = volatile organic compounds

Table 7.1-16
Criteria Pollutant Sources and Emission Totals for the Worst-Case Project Emissions Scenarios for All Averaging Times for Each Turbine
(Page 1 of 2)

Averaging Time	Worst-Case Emission Scenarios by Operating Equipment	Pollutant	Emissions in pounds – Entire Period	
			FP10 Units/ Turbine	Simple Cycle Units /Turbine
1-hour	**NO_X:** Startup hour **CO:** Startup hour **SO_2 (1 gr/100 scf): (FP10)** Startup hour **(Simple Cycle Units)** operation at 20°F ambient temperature **PM_{10}: (FP10)** Startup hour **(Simple Cycle Units** Shutdown hour	NO_X	38.7	29.0
		CO	279.8	225.3
		SO_2	6.7	6.2
		PM_{10}	11.1	9.1
3-hour	**SO_2 (1 gr/100 scf): (FP10)** 3 startups. **(Simple Cycle Units)** 3 startups, 2 shutdowns	SO_2	20.1	18.6
8-hour	**CO: (FP10)** two startups, one shutdown and remainder of period at full load operation at 20°F ambient temperature **(Simple Cycle Units)** three startups, two shutdown and remainder of period at full load operation at 20°F ambient temperature	CO	788.6	967.8
24-hour	**SO_2 (1 gr/100 scf):** continuous full-load turbine operation at 20ºF ambient temperature	SO_2	154.3	149.0
	PM_{10}: (FP10) three startups, three shutdowns, and the remainder of the period at continuous full-load turbine operation at 20ºF ambient temperature. **(Simple Cycle Units)** three startups, two shutdowns, and the remainder of the period at continuous full-load turbine operation at 20ºF ambient temperature.	PM_{10}	243.0	214.3

Table 7.1-16
Criteria Pollutant Sources and Emission Totals for the Worst-Case Project Emissions Scenarios for All Averaging Times for Each Turbine
(Page 2 of 2)

Averaging Time	Worst-Case Emission Scenarios by Operating Equipment	Pollutant	Emissions in pounds – Entire Period	
			FP10 Units/ Turbine	Simple Cycle Units/Turbine
Annual	**NO_X, SO_2, PM_{10}: (FP10)** Operation with power augmentation for 4,000 hours at 59°F, without power augmentation for 322 hours, with 193 startups and 193 shutdowns **(Simple Cycle Units)** Operation for 877 hours at 59°F, with 100 startups and 100 shutdowns	NO_X	77,103	19,881
		SO_2	10,520.6	2,139
		PM_{10}	39,400.4	7,838

Notes:
Maximum impact scenarios for NO_X and CO are predicted to occur during a portion of the turbine startup sequence with less than full-load emissions and correspondingly reduced stack exhaust velocity and temperature (see discussion under Turbine Impact Screening Modeling in Section 7.1.2.3.

CO = carbon monoxide
°F = degrees Fahrenheit
NO_X = nitrogen oxides
SO_2 = sulfur dioxide
PM_{10} = particulate matter less than 10 micrometers in diameter

Table 7.1-17a
Total Project Annual Emissions of Criteria Pollutants for Turbines

Pollutant	Emissions (tons/year)	
	FP10 Units[1]	Simple Cycle Units[2]
NO_X	77.1	18.2
CO	142.4	43.76
VOC	28.5	6.01
SO_2	10.5	1.94
PM_{10}	39.4	6.99

Notes:
[1] FP10 Unit emissions based on 4,383 hours of operation (4,000 hours with power augmentation, 322 hours normal operation, 193 startups, and 193 shutdowns)
[2] Simple Cycle Units emissions based on 877 hours of operation (849 hours of operation with 100 startups and 100 shutdowns) at average annual temperature.
CO = carbon monoxide
NO_X = nitrogen oxides
PM_{10} = particulate matter less than 10 micrometers in diameter
VOC = volatile organic compounds
SO_2 = sulfur dioxide

Table 7.1-17b
Annual Emissions of Criteria Pollutants for Fuel Gas Preheaters

Pollutant	Emissions (tons/year)			
	Serving FP10 Units		Serving Simple Cycle Units	
	lbs/yr/unit	tons/yr/unit	lbs/yr/unit	tons/yr/unit
NO_X	657	0.329	131.6	0.066
CO	752	0.376	150.5	0.075
VOC	60.2	0.030	12.0	0.006
SO_2*	24.5	0.012	4.9	0.0002
PM_{10}	64.5	0.032	12.9	0.006

Notes:
CO = carbon monoxide
NO_X = nitrogen oxides
PM_{10} = particulate matter less than 10 micrometers in diameter
VOC = volatile organic compounds
SO_2 = sulfur dioxide
* based on 0.4 grams total sulfur/100 scf

Table 7.1-17c Estimated Stack Parameters and Emission Rates for MLGS Fuel Gas Heaters (Each of Two)	
Capacity (MMBtu/hour)	5.0
Stack Height (feet above grade)	26.0
Stack Inside Diameter (inches)	8.0
Exhaust Temperature (ºF)	415
Exhaust Gas Velocity (feet/min)	3,000

Table 7.1-18
Duration and Criteria Pollutant Emissions for Commissioning of a Single Simple Cycle Unit (9 ppm ULN) on Natural Gas at 59°F

Activity	Duration (hours)	GT Load (%)	Modeling Load (%)	Total Emission			
				NO_X (lb)	CO (lb)	VOC (lb)	PM_{10} (lb)
CTG Testing (Full Speed No Load, FSNL, Excitation Test, Dummy Synch Checks)	8	0	0	339	19,240	1,181	71
CTG 1 Testing at 40% load	8	0-40	40	1,507	11,662	636	91
CTG 1 Load Test	68	50-100	50-101	6,615	25,673	1,620	624
Install Emissions Test Equipment	0	0	0	0	0	0	0
Emissions Tuning/Drift Testing	24	50-100	100	1,988	5,344	286	234
RATA/Pre-performance Testing/Source Testing/Drift Testing	60	100	100	4,970	13,360	715	585
Remove emissions test equipment/install performance test equipment, followed by Water Wash & Performance preparation	0	0	0	0	0	0	0
Performance Testing	40	100	100	3,035	5,628	328	365
CAISO Certification	12	50-100	100	994	2,672	143	117
CAISO Certification if required	12	100	100	994	2,672	143	117

Notes:
SO_X emission during commissioning will not be higher than normal operation
CTG = combustion turbine generator
FSNL = full speed, no load
GT = gas turbine

Table 7.1-19
Duration and Criteria Pollutant Emissions for Commissioning of a Single Flex Plant 10 (20 ppm ULN) on Natural Gas at 62°F

Activity	Duration (hours)	GT Load (%)	Modeling Load (%)	Total Emission			
				NO_X (lb)	CO (lb)	VOC (lb)	PM_{10} (lb)
GT Testing (FSNL, Excitation Test, Dummy Synch Checks)	8	0	FSNL	366	29,743	1275	75
GT Testing at 40% load	8	0-40	40	1,444	16,091	612	86
Steam Blow/HRSG Tuning	24	0-25	25	2,701	51,960	1637	222
Steam Blow	12	0-50	50	964	8,745	682	107
Steam Blow restoration, install SCR/CO Catalyst	0	0	0	0	0	0	0
HRSG Tuning/BOP Tuning	16	60	60	191	1,320	155	135
BOP Tuning	16	60	60	191	1,320	155	135
GT Load Test & Bypass Valve Tuning	32	60	60	382	2640	310	270
GT Load Test & Bypass Valve Tuning/ Safety Valve Testing	12	75	75	179	1,160	95	105
GT Base Load/Commissioning of Ammonia system	12	100	100	365	1,189	104	117
GT Load Test & Bypass Valve Tuning	12	100	100	365	1,189	104	117
Install Emissions Test Equipment	0	0	0	0	0	0	0
Bypass Operation/STG Initial Roll & Trip Test	10	0-60	60	149	1,227	123	87
Bypass Operation/STG Load Test	32	0-60	60	647	2,545	269	285
Combined-Cycle testing/Drift Test	48	0-100	100	1,184	1,513	199	415
Emissions Tuning/Drift Test	24	50-100	100	730	2,378	208	234
Pre-performance Testing/Drift Test	36	100	100	1,095	3,567	312	351
RATA/Pre-performance Testing/Source Testing	15	100	100	433	1,216	112	142
Pre-performance/Source Testing	26	50-100	100	776	2,396	213	250
Remove Emissions Test Equipment followed by Water Wash & Performance preparation	0	0	0	0	0	0	0
Performance Testing	48	100	100	1,276	2,594	272	432
CAISO Certification	24	50-100	100	730	2,378	208	234
GT Testing (FSNL, Excitation Test, Dummy Synch Checks)	8	0	FSNL	366	2,9743	1,275	75

Notes:
SO_X emission during commissioning will not be higher than normal operation
CT = combustion turbine
CTG = combustion turbine generator
FSNL = full speed, no load

Table 7.1-20
Estimated Greenhouse Gas Emissions from the Project

Emission Rate (metric tons/year)			
CO_2	CH_4	N_2O	Total CO_2 Equivalent
1,302,000	90	30	1,313,200

Note:
CO_2 = carbon dioxide
CH_4 = methane
N_20 = nitrous oxide

Table 7.1-21
Surface Moisture Conditions at the Antioch Pump Plant 3 Station for Years 2000-2002, 2004-2005

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	wet	wet	dry	wet	wet	avg	dry	dry	avg	wet	avg	dry
2001	avg	wet	dry	avg	avg	wet	dry	wet	dry	dry	avg	wet
2002	dry	dry	avg	dry	dry	dry	dry	dry	dry	dry	avg	wet
2004	avg	wet	dry	dry	avg	dry	dry	dry	dry	wet	avg	wet
2005	wet	avg	wet	avg	avg	wet	dry	dry	dry	dry	dry	wet

Note:
Surface moisture conditions provided by BAAQMD.

Table 7.1-22
Land Use Characteristics used in AERMET
(Page 1 of 2)

Month	Sector	Range	Land Use Characteristics				
			Albedo (α)	Bowen Ratio (β) Avg. sfc moisture	Bowen Ratio (β) Dry sfc moisture	Bowen Ratio (β) Wet sfc moisture	Surface Roughness (Z_o) (m)
Jan	1	62°-150°	0.16	0.49	0.93	0.33	0.41
Jan	2	150°-182°	0.16	0.49	0.93	0.33	0.483
Jan	3	182°-243°	0.16	0.49	0.93	0.33	0.442
Jan	4	243°-274°	0.16	0.49	0.93	0.33	0.529
Jan	5	274°-62°	0.16	0.49	0.93	0.33	0.02
Feb	1	62°-150°	0.15	0.34	0.69	0.27	0.469
Feb	2	150°-182°	0.15	0.34	0.69	0.27	0.518
Feb	3	182°-243°	0.15	0.34	0.69	0.27	0.498
Feb	4	243°-274°	0.15	0.34	0.69	0.27	0.536
Feb	5	274°-62°	0.15	0.34	0.69	0.27	0.021
Mar	1	62°-150°	0.15	0.34	0.69	0.27	0.469
Mar	2	150°-182°	0.15	0.34	0.69	0.27	0.518
Mar	3	182°-243°	0.15	0.34	0.69	0.27	0.498
Mar	4	243°-274°	0.15	0.34	0.69	0.27	0.536
Mar	5	274°-62°	0.15	0.34	0.69	0.27	0.021
Apr	1	62°-150°	0.16	0.41	0.83	0.3	0.523
Apr	2	150°-182°	0.16	0.41	0.83	0.3	0.546
Apr	3	182°-243°	0.16	0.41	0.83	0.3	0.544
Apr	4	243°-274°	0.16	0.41	0.83	0.3	0.542
Apr	5	274°-62°	0.16	0.41	0.83	0.3	0.021
May	1	62°-150°	0.16	0.41	0.83	0.3	0.523
May	2	150°-182°	0.16	0.41	0.83	0.3	0.546
May	3	182°-243°	0.16	0.41	0.83	0.3	0.544
May	4	243°-274°	0.16	0.41	0.83	0.3	0.542
May	5	274°-62°	0.16	0.41	0.83	0.3	0.021
Jun	1	62°-150°	0.16	0.41	0.83	0.3	0.523
Jun	2	150°-182°	0.16	0.41	0.83	0.3	0.546
Jun	3	182°-243°	0.16	0.41	0.83	0.3	0.544
Jun	4	243°-274°	0.16	0.41	0.83	0.3	0.542
Jun	5	274°-62°	0.16	0.41	0.83	0.3	0.021
Jul	1	62°-150°	0.16	0.41	0.83	0.3	0.523

Table 7.1-22
Land Use Characteristics used in AERMET
(Page 2 of 2)

Month	Sector	Range	Land Use Characteristics				
			Albedo (α)	Bowen Ratio (β) Avg. sfc moisture	Bowen Ratio (β) Dry sfc moisture	Bowen Ratio (β) Wet sfc moisture	Surface Roughness (Z_o) (m)
Jul	2	150°-182°	0.16	0.41	0.83	0.3	0.546
Jul	3	182°-243°	0.16	0.41	0.83	0.3	0.544
Jul	4	243°-274°	0.16	0.41	0.83	0.3	0.542
Jul	5	274°-62°	0.16	0.41	0.83	0.3	0.021
Aug	1	62°-150°	0.16	0.49	0.93	0.33	0.523
Aug	2	150°-182°	0.16	0.49	0.93	0.33	0.546
Aug	3	182°-243°	0.16	0.49	0.93	0.33	0.544
Aug	4	243°-274°	0.16	0.49	0.93	0.33	0.542
Aug	5	274°-62°	0.16	0.49	0.93	0.33	0.021
Sep	1	62°-150°	0.16	0.49	0.93	0.33	0.523
Sep	2	150°-182°	0.16	0.49	0.93	0.33	0.546
Sep	3	182°-243°	0.16	0.49	0.93	0.33	0.544
Sep	4	243°-274°	0.16	0.49	0.93	0.33	0.542
Sep	5	274°-62°	0.16	0.49	0.93	0.33	0.021
Oct	1	62°-150°	0.16	0.49	0.93	0.33	0.523
Oct	2	150°-182°	0.16	0.49	0.93	0.33	0.546
Oct	3	182°-243°	0.16	0.49	0.93	0.33	0.544
Oct	4	243°-274°	0.16	0.49	0.93	0.33	0.542
Oct	5	274°-62°	0.16	0.49	0.93	0.33	0.021
Nov	1	62°-150°	0.16	0.49	0.93	0.33	0.41
Nov	2	150°-182°	0.16	0.49	0.93	0.33	0.483
Nov	3	182°-243°	0.16	0.49	0.93	0.33	0.442
Nov	4	243°-274°	0.16	0.49	0.93	0.33	0.529
Nov	5	274°-62°	0.16	0.49	0.93	0.33	0.02
Dec	1	62°-150°	0.16	0.49	0.93	0.33	0.41
Dec	2	150°-182°	0.16	0.49	0.93	0.33	0.483
Dec	3	182°-243°	0.16	0.49	0.93	0.33	0.442
Dec	4	243°-274°	0.16	0.49	0.93	0.33	0.529
Dec	5	274°-62°	0.16	0.49	0.93	0.33	0.02

Table 7.1-23
Marsh Landing Turbine Screening Results FP10 Combined-Cycle Units

Normal Operations – New Siemens Peaker Flex-Plant 10 Emissions and stack parameters per Turbine												
Case	**Case 1A**	**Case 1B**	**Case 1C**	**Case 2A**	**Case 2B**	**Case 2C**	**Case 3A**	**Case 3B**	**Case 3C**	**Case 3D**	**Case 3E**	**Case 3F**
Ambient Temperature	**Winter Minimum: 20°F**			**Yearly Average: 59°F**			**Summer Maximum: 94°F**					
CTG Load Level	**100%**	**85%**	**60%**	**100%**	**85%**	**60%**	**100%**	**100%**	**100%**	**100%**	**85%**	**60%**
Evaporative Cooler Status/Effectiveness	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
Power Augmentation Status	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	OFF
Stack Outlet Temperature (°F)	350.0	346.0	343.7	340.0	337.0	328.7	338.0	348.0	333.0	341.0	346.0	323.3
Stack Outlet Temperature (°K)	449.82	447.59	446.32	444.26	442.59	437.98	443.15	448.71	440.37	444.82	447.59	434.98
Stack Exit Velocity (ft/s)	70.5	61.5	50.1	64.3	57.0	44.9	65.2	62.5	61.6	59.0	53.4	42.8
Stack Exit Velocity (m/s)	21.488	18.745	15.270	19.599	17.374	13.694	19.873	19.050	18.776	17.983	16.276	13.054
NO_X as NO_2 (at 2.0 ppm) (lb/hr)	17.4	15.1	12.0	15.8	13.9	10.0	16.3	15.2	15.3	14.3	12.9	10.0
CO (at 3.0 ppm) (lb/hr)	15.9	13.8	10.7	14.6	12.8	9.5	15.0	14.0	14.1	13.1	11.7	9.0
SO_2 (lb/hr) (based on 0.4 gr total S/100 scf)	2.6	2.3	1.8	2.3	2.1	1.6	2.4	2.2	2.3	2.1	1.9	1.5
SO_2 (lb/hr) (based on 1.0 gr total S/100 scf)	6.4	5.6	4.5	5.8	5.2	4.0	6.0	5.6	5.6	5.3	4.7	3.8
PM_{10} (lb/hr)	10.0	8.9	8.0	9.3	8.3	8.0	8.9	8.8	8.5	8.5	7.7	8.0
NO_X (g/s)	2.194	1.904	1.513	1.993	1.753	1.261	2.056	1.917	1.930	1.803	1.627	1.261
CO (g/s)	2.005	1.740	1.343	1.835	1.608	1.192	1.892	1.759	1.778	1.646	1.481	1.135
SO_2 (g/s) (based on 0.4 gr total S/100 scf)	0.324	0.284	0.226	0.294	0.260	0.201	0.303	0.283	0.285	0.266	0.239	0.191
SO_2 (g/s) (based on 1.0 gr total S/100 scf)	0.811	0.710	0.565	0.736	0.650	0.501	0.758	0.707	0.712	0.664	0.598	0.477
PM_{10} (g/s)	1.261	1.122	1.009	1.173	1.047	1.009	1.122	1.110	1.072	1.072	0.965	1.009
Model Results – Maximum X/Q concentration ($\mu g/m^3/(g/s)$) predicted from AERMOD (all receptors)												
1–hour	5.55965	6.39021	7.33176	6.21427	6.88479	7.66238	6.15996	6.27236	6.54808	6.67282	7.07871	8.00202
3–hour	2.52533	2.62658	2.79198	2.60721	2.68459	3.12694	2.60129	2.61327	2.64530	2.66044	2.70648	3.27204
8–hour	1.79462	2.02509	2.36680	1.96750	2.18828	2.52911	1.95020	1.98885	2.07011	2.11589	2.26384	2.57534
24–hour	0.68286	0.78855	0.91603	0.76601	0.85165	0.96573	0.75916	0.77407	0.80698	0.82415	0.87921	0.97548
annual	0.06662	0.07814	0.09798	0.07541	0.08658	0.11383	0.07461	0.07644	0.08031	0.08268	0.09104	0.12129
Maximum Concentration ($\mu g/m^3$) Predicted per Pollutant Normal Operations (all receptors)												
NO_X 1 hour	12.19973	12.16873	11.09540	12.38228	12.06865	9.66311	12.66248	12.02342	12.63452	12.03369	11.51588	10.09144
NO_X annual	0.14619	0.14880	0.14828	0.15026	0.15177	0.14355	0.15337	0.14653	0.15496	0.14910	0.14811	0.15296
CO 1 hour	11.14802	11.12110	9.84716	11.40267	11.07017	9.13164	11.65259	11.03465	11.64358	10.98179	10.48481	9.08229
CO 8 hour	3.59851	3.52433	3.17881	3.61020	3.51857	3.01407	3.68913	3.49888	3.68100	3.48223	3.35314	2.92301
SO_2 1 hour	4.50825	4.53423	4.14568	4.57522	4.47739	3.84191	4.66830	4.43377	4.66294	4.43394	4.23328	3.81297
SO_2 3 hour	2.04776	1.86371	1.57870	1.91954	1.74587	1.56785	1.97138	1.84725	1.88374	1.76780	1.61856	1.55913
SO_2 24 hour	0.55372	0.55952	0.51796	0.56397	0.55385	0.48422	0.57533	0.54717	0.57466	0.54763	0.52579	0.46482
SO_2 annual	0.02161	0.02218	0.02216	0.02221	0.02252	0.02283	0.02262	0.02161	0.02288	0.02198	0.02178	0.02312
PM_{10} 24 hour	0.86116	0.88506	0.92417	0.89840	0.89144	0.97431	0.85207	0.85905	0.86504	0.88344	0.84822	0.98415
PM_{10} annual	0.08402	0.08770	0.09885	0.08844	0.09063	0.11484	0.08374	0.08483	0.08609	0.08863	0.08783	0.12237
	Case 1A	**Case 1B**	**Case 1C**	**Case 2A**	**Case 2B**	**Case 2C**	**Case 3A**	**Case 3B**	**Case 3C**	**Case 3D**	**Case 3E**	**Case 3F**

Table 7.1-24
Marsh Landing Turbine Screening Results Simple Cycle Units

Normal Operations – New Siemens SSC6-5000F Simple Cycle Gas Turbines

Case		Case A1	Case A2	Case A3	Case B1	Case B2	Case B3	Case C1	Case C2	Case C3
Ambient Temperature		**Winter Minimum: 20°F/90% RH**			**Yearly Average: 60°F/64% RH**			**Summer Maximum: 94°F**		
CTG Load Level		100%	75%	60%	100%	75%	60%	100%	75%	60%
Evaporative Cooler Status/Effectiveness		OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF
Gas Turbine Outlet Temperature (ºF)		1,065	1,065	1,065	1,090	1,090	1,091	1,123	1,123	1,122
Stack Outlet Temperature (°F)		750	750	750	750	750	750	750	750	750
Stack Outlet Temperature (°K)		672.04	672.04	672.04	672.04	672.04	672.04	672.04	672.04	672.04
Stack Exit Velocity (ft/s)		70.9	57.6	50.8	68.3	56.6	37.2	65.9	55.4	49.1
Stack Exit Velocity (m/s)		21.600	17.544	15.498	20.814	17.256	11.347	20.086	16.900	14.965
NO_X as NO_2 (at 2.5 ppm)		20.83	16.39	13.89	18.89	15.00	12.78	16.94	13.89	11.67
CO (at 3.0 ppm)		15.00	12.00	10.20	13.50	11.25	9.30	12.75	9.75	8.70
SO_2 (lb/hr) (based on 0.4 gr total S/100 scf)		2.48	1.96	1.67	2.25	1.80	1.54	2.03	1.65	1.41
SO_2 (lb/hr) (based on 1.0 gr total S/100 scf)		6.21	4.90	4.17	5.63	4.51	3.84	5.08	4.11	3.52
PM_{10} (lb/hr)		9.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
NO_X (g/s)		2.627	2.067	1.752	2.382	1.892	1.611	2.137	1.752	1.471
CO (g/s)		1.892	1.513	1.286	1.703	1.419	1.173	1.608	1.230	1.097
SO_2 (g/s) (based on 0.4 gr total S/100 scf)		0.313	0.247	0.210	0.284	0.227	0.194	0.256	0.208	0.178
SO_2 (g/s) (based on 1.0 gr total S/100 scf)		0.783	0.617	0.526	0.710	0.569	0.485	0.641	0.519	0.444
PM_{10} (g/s)		1.135	1.009	1.009	1.009	1.009	1.009	1.009	1.009	1.009
Model Results – Maximum X/Q concentration ($\mu g/m^3/(g/s)$) predicted from AERMOD (all receptors)										
1-hour		3.81519	4.29956	4.52619	3.90087	4.32415	5.53626	3.98518	4.34822	4.6149
3-hour		2.56074	3.18069	3.59731	2.66051	3.24175	4.40488	2.73866	3.31427	3.66946
8-hour		1.96712	2.4339	2.71571	2.00873	2.47382	3.49552	2.05926	2.52664	2.78208
24-hour		0.65725	0.90202	1.00427	0.67116	0.91683	1.46597	0.75893	0.93587	1.02869
annual		0.01714	0.02108	0.02459	0.01754	0.02151	0.03774	0.01794	0.02208	0.02575
Maximum Concentration ($\mu g/m^3$) predicted per Pollutant Normal Operations (all receptors)										
NO_X	**1 hour**	10.02371	8.88642	7.92782	9.29226	8.17985	8.92124	8.51586	7.61610	6.78989
	annual	0.04503	0.04357	0.04307	0.04178	0.04069	0.06081	0.03834	0.03867	0.03789
CO	**1 hour**	7.21707	6.50667	5.82219	6.64123	6.13489	6.49311	6.40784	5.34650	5.06331
	8 hour	3.72114	3.68330	3.49331	3.41986	3.50973	4.09966	3.31112	3.10671	3.05241
SO_2	**1 hour**	2.98626	2.65465	2.38030	2.77032	2.45845	2.68451	2.55331	2.25583	2.04826
	3 hour	2.00436	1.96384	1.89181	1.88944	1.84306	2.13591	1.75466	1.71943	1.62864
	24 hour	0.51445	0.55693	0.52814	0.47665	0.52125	0.71084	0.48625	0.48552	0.45657
	annual	0.00537	0.00521	0.00517	0.00498	0.00489	0.00732	0.00460	0.00458	0.00457
PM_{10}	**24 hour**	0.74598	0.91004	1.01320	0.67713	0.92498	1.47900	0.76568	0.94419	1.03783
	annual	0.01945	0.02127	0.02481	0.01770	0.02170	0.03808	0.01810	0.02228	0.02598
		Case A1	**Case A2**	**Case A3**	**Case B1**	**Case B2**	**Case B3**	**Case C1**	**Case C2**	**Case C3**

Table 7.1-25
Maximum Hourly NO_2 and CO Emissions

Pollutant and Averaging Time	Description: Turbine Load	FP10 Unit Exhaust Temperature (ºF)	FP10 Unit Exhaust Velocity (ft/s)	Emission Rate per FP10 Unit Turbine (lb/hr)	Simple Cycle Unit Exhaust Temperature (ºF)	Simple Cycle Unit Exhaust Velocity (ft/s)	Emission Rate per Simple Cycle Unit Turbine (lb/hr)
NO_X 1-hour	All turbines starting up with the remainder of the period at normal operations	334	47.9	38.7	750	37.2	29.0
CO 1-hour	All turbines starting up with the remainder of the period at normal operations	334	47.9	279.8	750	37.2	225.3

Table 7.1-26
Criteria Pollutant Sources and Emission Totals for the Worst-Case Project Emissions Scenarios for All Averaging Times (Page 1 of 2)

Averaging Time	Pollutant	Two FP10 Unit turbines (lbs. entire period)	Two Simple Cycle Unit turbines (lbs. entire period)	Two Fuel Gas Preheaters (lbs. entire period)	FP10 Turbines	Simple Cycle Turbines
1-hour	NO_X	32.6 (normal operations)	41.7 (normal operations)	0.30	NO_X and CO normal operations: 100% load operation (both FP10s) at 94°F ambient temperature NO_X and CO startup operations: One startup (both FP10s) with remainder of period at normal operations (100%, 20°F) SO_2: 100% load operation (both FP10s) at 20°F ambient temperature based on 1.0 gr total S/100 scf	NO_X and CO normal operations: 100% load operation (both SCs) at 20°F ambient temperature NO_X and CO startup operations: One startup (both SCs) with remainder of period at normal operations (100%, 20°F) SO_2: 100% load operation (both SCs) at 20°F ambient temperature based on 1.0 gr total S/100 scf
		77.4 (startup operations)	58.0 (startup ops)			
	CO	30.0 (normal operations)	30.0 (normal operations)	0.34		
		559.6 (startup operations)	450.6 (startup operations)			
	SO_2	13.4	12.4	0.028		
3-hour	SO_2	40.2	37.2	0.084	SO_2: 100% load operation (both FP10s) at 20°F ambient temperature based on 1.0 gr total S/100 scf	SO_2: 100% load operation (both FP10s) at 20°F ambient temperature based on 1.0 gr total S/100 scf
8-hour	CO	1,577.20	1,935.60	2.72	CO: Two startups, one shutdown (both FP10s) with remainder of period at 100% load operation at 20°F ambient temperature	CO: Three startups, two shutdown (both SCs) with remainder of period at 100% load operation at 20°F ambient temperature

Table 7.1-26
Criteria Pollutant Sources and Emission Totals for the Worst-Case Project Emissions Scenarios for all Averaging Times (Page 2 of 2)

Averaging Time	Pollutant	2 FP10 Unit turbines (lbs entire period)	Two Simple Cycle Unit turbines (lbs. entire period)	Two Fuel Gas Preheaters (lbs. entire period)	FP10 Turbines	Simple Cycle Turbines
24-hour	PM_{10}	486.00	428.60	0.720	PM_{10}: Three startups, three shutdowns (both FP10s) with remainder of period at 100% load operation at 20°F ambient temperature	PM_{10}: Three startups, two shutdowns (both FP10s) with remainder of period at 100% load operation at 20°F ambient temperature
	SO_2	308.60	292.60	0.672	SO_2: 100% load operation (both FP10s) at 20°F ambient temperature based on 1.0 gr total S/100 scf	SO_2: Three startups, two shutdowns (both SCs) with remainder of period at 100% load operation at 20°F ambient temperature based on 1.0 gr total S/100 scf
Annual	NO_X	154,206.00	39,762.00	1,314	All: Both FP10 units operate for 4,000 hours with power augmentation and evaporative cooling on at 94°F, 322 hours at full load at 59°F, with 193 startups and shutdowns. SO_2 emissions are based on 0.4 gr total S/100 scf.	All: Both SC units operate at full load for 849 hours at 59°F, with 100 startups and shutdowns. SO_2 emissions are based on 0.4 gr total S/100 scf.
	PM_{10}	78,800.80	15,676.00	129		
	SO_2	21,041.20	4,278.00	49		

Table 7.1-27
Maximum Modeled Criteria Pollutant Impacts Due to Marsh Landing Site Demolition, Grading, Laydown, Building, and Pipeline Excavation Emissions (Short-Term Impact Estimates Based on Month 6 Construction Activities)

Pollutant	Averaging Period	Maximum Modeled Impact ($\mu g/m^3$)	Background[1] ($\mu g/m^3$)	Maximum Total Predicted Concentration ($\mu g/m^3$)	Most Stringent AAQS ($\mu g/m^3$)	UTM Coordinates NAD27	
						East (m)	North (m)
Construction Impacts							
CO	1 hour	1,076.4	4,715	5,791	23,000	609,022	4,208,107
	8 hours	251.3	2,222	2,473	10,000	608,556	4,208,465
NO_2	1 hour[2]	209.9	122.1	332.0	339[4]	608,756	4,208,065
	Annual[2]	5.4	22.4	27.8	57[4]	609,006	4,208,165
PM_{10}	24 hours	45.9	84[3]	129.9	50	608,346	4,208,251
	Annual	3.7	22[3]	25.7	20	608,473	4,208,118
$PM_{2.5}$	24 hours	9.9	74[3]	83.9	35	608,346	4,208,251
	Annual	0.87	12[3]	12.9	12	608,473	4,208,118
SO_2	1 hour	1.2	235.8	237	655	609,022	4,208,107
	3 hours	0.8	114.4	115.2	1,300	609,036	4,207,981
	24 hours	0.15	26.3	26.5	105	609,036	4,207,981
	Annual	0.01	5.3	5.3	80	609,156	4,208,090

Notes:
1 Background represents the maximum values measured at the monitoring stations described in previous sections, for 2004-2006.
2 Results for NO_2 during construction used ozone limiting method (OLM) with ambient ozone data collected at the Bethel Island monitoring station for the years 2000-2002, 2004-2005.
3 PM_{10} and $PM_{2.5}$ background levels exceed ambient standards.
4 In February 2007, the CARB approved new, more stringent CAAQS for NO_2. The new standards of 339 $\mu g/m^3$ (1 hour) and 57 $\mu g/m^3$ (annual) became effective in March 2008.

AAQS = Most stringent ambient air quality standard for the averaging period
CO = carbon monoxide
$\mu g/m^3$ = micrograms per cubic meter
NO_2 = nitrogen dioxide
OLM = ozone limiting method
PM_{10} = particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter.
SO_2 = sulfur dioxide
UTM = Universal Transverse Mercator

Table 7.1-28
AERMOD Modeling Results for Project Operations
(All Project Sources Combined)

Pollutant	Averaging Period	Maximum Predicted Impact ($\mu g/m^3$)	Significant Air Quality Impacts[6] ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)[1]	Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	CAAQS ($\mu g/m^3$)	Maximum UTMX NAD27 (m)	Maximum UTMY NAD27 (m)
NO_2	1-hour[2]	31.7 (normal operations)	19	122.1	154	NA	339[5]	608,569	4,208,310
		48.1 (startup operations)	NA	122.1	170	NA	339[5]	601,075	4,203,000
	Annual[2]	0.3	1.0	22.4	23	100	57[5]	608,593	4,208,311
SO_2	1-hour	6.6	NA	235.8	242	NA	655	601,700	4,200,525
	3-hour	3.4	25	114.4	118	1300	NA	608,569	4,208,485
	24-hour	1.1	5	26.3	27	365	105	608,569	4,208,485
	Annual	0.02	1.0	5.3	5	80	NA	609,106	4,208,140
CO	1-hour	36.3 (normal operations)	2,000	4,715	4,751	40,000	23,000	608,569	4,208,311
		352.3 (startup operations)	NA	4,715	5,067	40,000	23,000	601,075	4,203,000
	8-hour	53.3	500	2,222	2,275	10,000	10,000	608,556	4,208,465
PM_{10}	24-hour[3,4]	1.78	5	84.0	86	150	50	602,200	4,201,325
	Annual[3,4]	0.08	1.0	22.0	22	NA	20	609,131	4,208,140
$PM_{2.5}$	24-hour[3,4]	1.78	NA	74.0	76	35	NA	602,200	4,201,325
	Annual[3,4]	0.08	NA	12.0	12	15	12	609,131	4,208,140

Notes:
[1] Background represents the maximum values measured at the monitoring stations identified in Section 7.1.1.2.
[2] Results for NO_2 during operations used ozone limiting method (OLM) with ambient ozone data collected at the Bethel Island monitoring station for the years 2000-2002 and 2004-2005.
[3] PM_{10} and $PM_{2.5}$ background levels exceed ambient standards.
[4] All PM_{10} emissions from project sources were also considered to be $PM_{2.5}$.
[5] In February 2007, CARB approved new, more stringent CAAQS for NO_2 as shown in the table above. These changes became effective in March 2008.
[6] Significant Air Quality Impact is applicable only for normal operations.

Table 7.1-29
Project Commissioning Modeling Results

Modeling Scenario[4]	Pollutant	Averaging Period	Maximum Estimated Impact ($\mu g/m^3$)	Background[1] ($\mu g/m^3$)	Total Predicted Concentration ($\mu g/m^3$)	Most Stringent Standard ($\mu g/m^3$)
Simple Cycle Turbines commissioning only	CO	1 hour	1,678.4	4,715	6,393.4	23,000
		8 hours	1,060.6	2,222	3,282.6	10,000
	NO_2[3]	1 hour	88.9	122.1	211.0	339[2]
FP10 Turbines commissioning with fuel gas heater while Simple Cycle turbines running at startup operations with fuel gas heater	CO	1 hour	3,662.1	4,715	8377.1	23,000
		8 hours	1,349.2	2,222	3,571.2	10,000
	NO_2[3]	1 hour	177.4	122.1	299.5	339[2]

Notes:
1 Background represents the maximum values measured at the monitoring stations presented in Section 7.1.1.2.
2 In February 2007, the CARB approved new, more stringent CAAQS for NO_2. The new standards of 339 $\mu g/m^3$ (1 hour) and 57 $\mu g/m^3$ (annual) became effective in March 2008.
3 NO_2 modeling for Commissioning was conducted with the OLM algorithm.
The SC units are expected to be operational by July 2011, while the FP10 units are expected to be operational by June 2012.
CO = carbon monoxide
$\mu g/m^3$ = micrograms per cubic meter
NO_2 = nitrogen dioxide

Table 7.1-30
Emission Reduction Credit Certificates Owned by Mirant California

Certificate No.	**756**	**831**	**863**	**918**	**Total**
VOC (tons/yr)	0.390	72.280	5.300	0.000	77.970
NO_X (tons/yr)	1.173	66.060	247.500	171.000	485.733
SO_2 (tons/yr)	0.000	0.000	130.179	0.000	130.179
CO (tons/yr)	14.602	450.600	114.000	0.000	579.202
PM_{10} (tons/yr)	6.443	202.530	25.270	0.000	234.243
Date Issued	19-Jul-01	28-Aug-02	16-Jan-03	17-Mar-04	
Application No.	1000	5800	6925	9283	
Source Location	Hudson ICS	Crown Zellerbach Corporation	Pacific Gas & Electric Company	Crown Zellerbach Corporation	
	San Leandro, CA	Antioch, CA	Martinez, CA	Antioch, CA	

Source: BAAQMD Emission Bank Status Web Page <http://www.baaqmd.gov/pmt/emissions_banking/banking.htm>

Table 7.1-31
Estimated Emission Credit Requirements to Offset Project Emissions

Pollutant	**Total Marsh Landing Turbine Potential Emissions (ton/yr)**	**New Source Review Offset Ratio**	**Offsets Required (ton/yr)**	**Current ERC Holdings (ton/yr)**	**Holdings After Offsets are Deducted (ton/yr)**
NO_X	95.7	1.15	110.0	485.7	375.7
CO	186.5	0	0.0	579.2	579.2
VOC	34.5	1.15	39.7	78.0	38.3
SO_2	12.5	1	12.5	130.2	117.7
PM_{10}	46.4	1	46.4	234.2	187.8

Notes:
Offset ratios are 1.15 : 1 for NO_X and VOC emissions on a pollutant specific basis, for each pollutant (facility wide) over 35 tons per year.
Below 35 tons is 1 : 1.
Offset ratios are 1 : 1 for remaining criteria pollutants.
0.4 gr/100 scf annual average natural gas sulfur.

Table 7.1-32
BACT Determination for the MLGS Emission Sources
(Page 1 of 2)

Determination #	***89.1.3***		***89.1.6***	
Turbine Category	***Simple Cycle (> = 40 Megawatts)***		***FP10 (≥ 40 Megawatts)***	
Pollutant	**BACT**	**Typical Technology**	**BACT**	**Typical Technology**
	1. Technologically Feasible/ Cost Effective		**1. Technologically Feasible/ Cost Effective**	
	2. Achieved in Practice		**2. Achieved in Practice**	
VOC	1. n/d	1. n/d	1. n/d	1. n/d
	2. 2.0 ppmv, Dry at 15%O_2	2. Oxidation Catalyst	2. 2.0 ppm, Dry at 15%O_2	2. Oxidation Catalyst, or Efficient Ultra Low NO_X Combustors
NO_X	1. n/d	1. n/d	1. 2.0 ppm, Dry at 15% O_2	1. SCR+ Low NO_X Combustors, or Water or Steam Injection, or a SCONOX System
	2. 2.5 ppmv, Dry at 15%O_2	2. High Temperature SCR + Water or Steam Injection		2. SCR+ Dry Low-NO_X Combustors
SO2	1. Natural Gas Fuel	1. Exclusive use of CPUC-regulated grade natural gas		
		2. Exclusive use of CPUC-regulated grade natural gas	2. 2.5 ppm, Dry at 15% O_2	
	2. Natural Gas Fuel		1. n/d	1. n/d

Table 7.1-32
BACT Determination for the MLGS Emission Sources
(Page 2 of 2)

Determination #	***89.1.3***		***89.1.6***	
Turbine Category	***Simple Cycle (> = 40 Megawatts)***		***Combined-Cycle (≥ 40 Megawatts)***	
Pollutant	**BACT**	**Typical Technology**	**BACT**	**Typical Technology**
	1. Technologically Feasible/ Cost Effective		**1. Technologically Feasible/ Cost Effective**	
	2. Achieved in Practice		**2. Achieved in Practice**	
CO	1. n/d	1. n/d	2. Natural Gas Fuel (sulfur content not to exceed 1.0 grain/100 scf)	2. Exclusive use of PUC-regulated grade natural gas
	2. 6.0 ppmv, Dry @15% O_2	2. Oxidation Catalyst	1. n/d	1. n/d
PM_{10}	1. Natural Gas Fuel	1. Exclusive use of CPUC-regulated grade natural gas	2. 4.0 ppm, Dry @15% O_2	2. Oxidation Catalyst
		2. Exclusive use of CPUC-regulated grade natural gas	1. n/d	1. n/d
	2. Natural Gas Fuel		2. Natural Gas Fuel (sulfur content not to exceed 1.0 grain/100 scf)	2. Exclusive use of PUC-regulated grade natural gas
NPOC	1. n/a	1. n/a	1. n/a	1. n/a
	2. n/a	2. n/a	2. n/a	2. n/a

Notes:
n/a = not applicable
n/d = no determination

Table 7.1-33
Summary of Proposed BACT

Pollutant	Control Technology	Concentration
FP10 Units		
NO_X	Ultra low NO_X burner, SCR	2.0 ppmvd (1-hour average) at 15 percent O_2
CO	Catalytic oxidation	3.0 ppmvd at 15 percent O_2
VOC	Catalytic oxidation	2.0 ppmvd at 15 percent O_2
SO_2	Pipeline quality natural gas	N/A
PM_{10}	Pipeline quality natural gas	N/A
Ammonia slip	Operational limitation	5.0 ppmvd at 15 percent O_2
Simple Cycle Units		
NO_X	Ultra low NO_X burner	2.5 ppmvd (1-hour average) at 15 percent O_2
CO	Catalytic oxidation	3.0 ppmvd at 15 percent O_2
VOC	Catalytic oxidation	2.0 ppmvd at 15 percent O_2
SO_2	Pipeline quality natural gas	N/A
PM_{10}	Pipeline quality natural gas	N/A
Ammonia slip	Operational limitation	10.0 ppmvd at 15 percent O_2

Notes:

BACT = Best Available Control Technology
CO = carbon monoxide
NA = not applicable
NO_X = nitrogen oxides
O_2 = oxygen
PM_{10} = particulate matter less than or equal to 10 microns in diameter
ppm = parts per million
SCR = Selective catalytic reduction
VOC = Volatile organic compounds
SO_2 = sulfur dioxide

Table 7.1-34
National and California Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS[1]		CAAQS[2]
		Primary[3,4]	Secondary[3,5]	Concentration[3]
Ozone (O_3)	1-Hour	Revoked [6]	Same as Primary Standard	0.09 ppm (180 µg/m^3)
	8-Hour	0.075 ppm		0.07 ppm (137 µg/m^3)
Carbon Monoxide (CO)	8-Hour	9 ppm (10 mg/m^3)	None	9.0 ppm (10 mg/m^3)
	1-Hour	35 ppm (40 mg/m^3)		20 ppm (23 mg/m^3)
Nitrogen Dioxide (NO_2)[7]	Annual Average	0.053 ppm (100 µg/m^3)	Same as Primary Standard	0.030 ppm (57 µg/m^3)
	1-Hour	-		0.18 ppm (339 µg/m^3)
Sulfur Oxides (SO_2)	Annual Average	0.03 ppm (80 µg/m^3)	-	-
	24-Hour	0.14 ppm (365 µg/m^3)	-	0.04 ppm (105 µg/m^3)
	3-Hour	-	0.5 ppm (1,300 µg/m^3)	-
	1-Hour	-	-	0.25 ppm (655 µg/m^3)
Suspended Particulate Matter (PM_{10})	24-Hour	150 µg/m^3	Same as Primary Standard	50 µg/m^3
	Annual Arithmetic Mean	Revoked [7]		20 µg/m^3
Fine Particulate Matter ($PM_{2.5}$) [8]	24-Hour	35 µg/m^3	Same as Primary Standard	-
	Annual Arithmetic Mean	15 µg/m^3		12 µg/m^3
Lead (Pb)	30-Day Average	-	-	1.5 µg/m^3
	Quarterly Average	1.5 µg/m^3	Same as Primary Standard	-
Hydrogen Sulfide (HS)	1-Hour	No Federal Standards		0.03 ppm (42 µg/m^3)
Sulfates (SO_4)	24-Hour			25 µg/m^3
Visibility Reducing Particles	8-Hour (10 am to 6 pm, PST)			

µg/m^3 = micrograms per cubic meter; mg/m^3 – milligram per cubic meter; ppm – parts per million; PST = Pacific Standard Time
Source: U.S. EPA-NAAQS (http://www.epa.gov/air/criteria.html); CARB-CAAQS (http://www.arb.ca.gov/aqs/aaqs2.pdf)

1. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.
2. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM_{10}, $PM_{2.5}$, and visibility-reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
5. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
6. On June 15, 2005, the 1-hour ozone standard (0.12 ppm) was revoked for all areas except the 8-hour ozone nonattainment Early Action Compact Areas (EAC) areas.
7. Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the agency revoked the annual PM_{10} standard in 2006 (effective December 17, 2006).
8. To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006).

In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.

Table 7.1-35
Attainment Status for Contra Costa County with Respect to Federal and California Ambient Air Quality Standards

Pollutant	Federal Attainment Status	State Attainment Status
Ozone	Nonattainment	Nonattainment
CO	Unclassified/Attainment	Attainment
NO_2	Unclassified/Attainment	Attainment
SO_2	Attainment	Attainment
PM_{10}	Unclassified	Nonattainment
$PM_{2.5}$	Unclassified/Attainment	Nonattainment
Lead	Unclassified	Attainment

Source: National Area Designations and Proposed 2006 State Area Designations, CARB (http://www.arb.ca.gov/desig/adm/adm.htm)
Notes:
CO = carbon monoxide
NO_2 = nitrogen dioxide
SO_2 = sulfur dioxide
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter

Table 7.1-36
PSD Emission Threshold Triggers for New Stationary Sources

Pollutant	Significant Thresholds (tpy)	Project Emissions (tpy)	PSD Triggered by Project?
CO	100	186.5	Yes
SO_2	40	12.5	No
NO_X	40	95.7	Yes
PM_{10}	15	46.4	Yes
VOCs	40	34.5	No

Source: BAAQMD rule 2 (http://www.baaqmd.gov/dst/regulations/rg0202.pdf)
Project emissions include all emissions from natural gas.
Notes:
CO = carbon monoxide
NO_X = nitrogen oxide(s)
PM_{10} = particulate matter less than 10 microns in diameter
SO_2 = sulfur dioxide
tpy = tons per year
VOCs = volatile organic compounds

Table 7.1-37
Allowable PSD Increments for SO_2, NO_2 and PM_{10}

Pollutant	Averaging Times	Maximum Allowable Increase (Micrograms Per Cubic Meter)
Class I		
PM_{10}	PM_{10} Annual arithmetic mean	4
	PM_{10} 24-hour maximum	8
SO_2	Annual arithmetic mean	2
	24-hour maximum	5
	3-hour maximum	25
NO_2	Annual arithmetic mean	2.5
Class II		
PM_{10}	PM_{10} Annual arithmetic mean	17
	PM_{10} 24-hour maximum	30
SO_2	Annual arithmetic mean	20
	24-hour maximum	91
	3-hour maximum	512
NO_2	Annual arithmetic mean	25

Source: BAAQMD rule 2 (http://www.baaqmd.gov/dst/regulations/rg0202.pdf)
Notes:
NO_2 = nitrogen dioxide
PM_{10} = particulate matter less than 10 microns in diameter
SO_2 = sulfur dioxide

Table 7.1-38
Applicable Air Quality Laws, Ordinances, Regulations, and Standards
(Page 1 of 3)

Laws, Ordinances, Regulations, and Standards	Applicability	Administering Agency	AFC Section
Federal			
Clean Air Act 160-169A and implementing regulations, Title 42 U.S. Code (USC) 7470-7491 (42 USC 7470-7491; Title 40 Code of Federal Regulations (CFR) Parts 51 and 52 (40 CFR Parts 51 and 52) Prevention of Significant Deterioration Program)	Requires prevention of significant deterioration (PSD) review and facility permitting for construction of new or modified major stationary sources of air pollution. PSD review applies to pollutants for which ambient concentrations are lower than NAAQS.	BAAQMD, with EPA Region IX oversight	7.1
CAA 171-193, 42 USC 7501 et seq. (New Source Review)	Requires new source review (NSR) facility permitting for construction or modification of stationary sources. NSR applies to pollutants for which ambient concentrations are higher than NAAQS.	BAAQMD, with EPA Region IX oversight	7.1
CAA 401 (Title IV), 42 USC 7651 (Acid Rain Program)	Requires reductions in NO_X and SO_2 emissions.	BAAQMD, with EPA Region IX oversight	7.1.5
CAA 501 (Title V), 42 USC 7661 (Federal Operating Permits Program)	Establishes comprehensive permit program for major stationary sources.	BAAQMD, with EPA Region IX oversight	7.1.6 7.1.8
CAA 111, 42 USC 7411, 40 CFR Part 60 (New Source Performance Standards, or NSPS)	Establishes national standards of performance for new stationary sources.	BAAQMD, with EPA Region IX oversight	7.1
State			
H&SC 44300-44384; Title 17 of the California Code of Regulations (17 CCR 93300-93347 (Toxic "Hot Spots" Act)	Requires preparation and biennial updating of facility emission inventory of hazardous substances; health risk assessments.	BAAQMD, with CARB oversight	7.6

Table 7.1-38
Applicable Air Quality Laws, Ordinances, Regulations, and Standards
(Page 2 of 3)

Laws, Ordinances, Regulations, and Standards	Applicability	Administering Agency	AFC Section
H&SC 41700 (Nuisance)	Provides that no person shall discharge from any source quantities of air contaminants or material which cause injury, detriment, nuisance, or annoyance to considerable number of persons or to the public which endanger the comfort, repose, health or safety or which can cause injury or damage to business or property.	BAAQMD, with CARB oversight	7.1 7.6
California Public Resources Code 25523(a); 20 CCR 1752, 2300-2309 and Div. 2, Chap. 5, Art. 1, Appendix B, Park (k) (CEC and CARB Memorandum of Understanding)	Requires that CEC's decision on the AFC include requirements to assure protection of environmental quality; AFC is required to address air quality protection.	CEC	7.1.2 7.1.3
Local			
BAAQMD Regulation I, Section 301 Public Nuisance	Prohibits the discharge from any source of any air contaminant that may cause injury, detriment, nuisance, or annoyance to any considerable number of persons or the public, or which endangers such persons or public or which may cause injury or damage to business or property.	BAAQMD	7.1 7.6
BAAQMD Regulation II, Rule 1, Section 301 Authority to Construct	Requires submittal of an application to obtain an Authority to Construct before construction of an emission source occurs	BAAQMD with CARB and U.S. EPA Region IX oversight	7.1.6
BAAQMD Regulation II, Rule 1, Section 302 Permit to Operate	Prohibits operation of any equipment that emits or controls air pollutants without first obtaining a permit to operate.	BAAQMD	7.1.6

Table 7.1-38
Applicable Air Quality Laws, Ordinances, Regulations, and Standards
(Page 3 of 3)

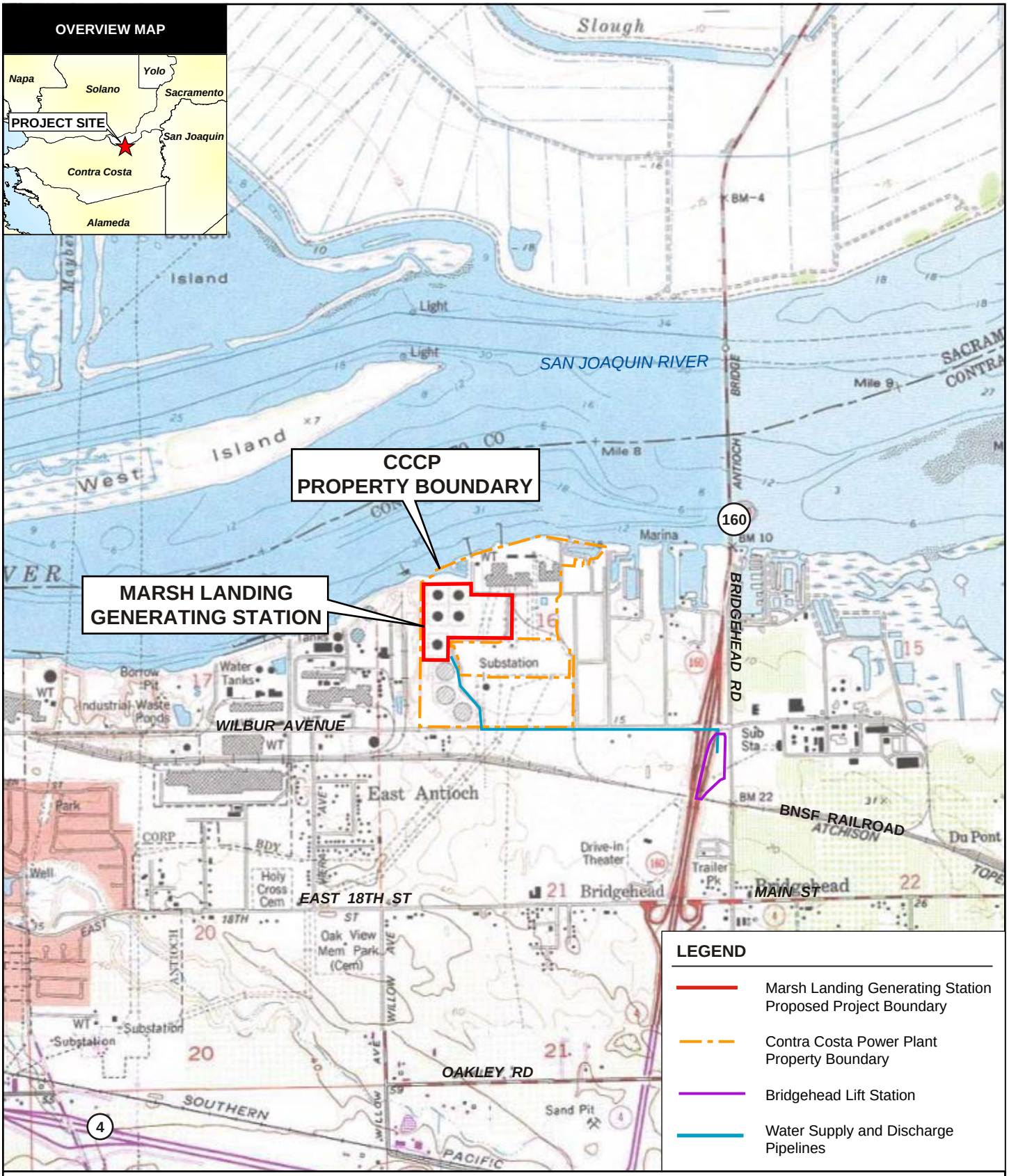
Laws, Ordinances, Regulations, and Standards	Applicability	Administering Agency	AFC Section
BAAQMD Regulation II, Rule 2 New Source Review	Requires pre-construction review for new, modified or relocated facilities to ensure that the facility does not interfere with progress in attainment of the NAAQS. Limits emissions of non-attainment contaminants and their precursors, ozone depleting compounds and ammonia; requires BACT, modeling, emission offsetting, and compliance verification. States PSD requirements, major facility review, and acid rain requirements.	BAAQMD, with CARB and U.S. EPA Region IX oversight	7.1
BAAQMD Regulation III, Fees	Identifies fees that are applicable to permit modifications, new facilities, and permitted emissions.	BAAQMD	7.1.8
BAAQMD Regulation VI, Particulate Matter and Visible Emissions	Prohibits the discharge of any air contaminant from a single source for more than 3 minutes in any one hour that produces visible emissions of specified opacity or shade designed on the Ringlemann Chart.	BAAQMD	7.1.2
BAAQMD Regulation VII, Odorous Substances	Prohibits discharge of odorous substances that remain odorous at the property line and prohibits discharge of ammonia in concentrations greater than 5,000 ppm.	BAAQMD	7.1.6
BAAQMD Regulation VIII, Organic Compounds	Limits emissions of organic compounds into the atmosphere.	BAAQMD	7.1.6
BAAQMD Regulation IX, Inorganic Gaseous Pollutants	Limits various inorganic compounds.	BAAQMD	7.1.2 7.1.6
Industry			
None Applicable	None Applicable		None Applicable

Table 7.1-39
Involved Agencies and Contacts

Agency/Address	Contact/Title	Telephone
Air Quality – California Energy Commission 1519 Ninth Street Sacramento, CA 95814	Joe Loyer, Associate Mechanical Engineer	(916) 654-4287
Air Quality – Bay Area Air Quality Management District 939 Ellis Street, San Francisco, CA 94109	Brian Bateman, Engineering Director	(415) 749-4653
Air Quality – U.S. Environmental Protection Agency 75 Hawthorne Street San Francisco, CA 94105	Carol Bohnenkamp, Regional Modeler Gerardo Rios, Chief, New Source Review Section	(415) 744-1500
Air Quality – California Air Resources Board P.O. Box 2815 Sacramento, CA 95812	Michael Tollstrup, Chief, Project Assessment Branch Stationary Source Division	(916) 322-6026

Table 7.1-40
Permits Required

Responsible Agency	Permit/Approval	Schedule
Bay Area Air Quality Management District (BAAQMD)	Authority to Construct/Permit to Operate	Application to be filed concurrent with AFC filing. 180-day application review period will be requested.



SOURCES: ESRI (base features);
USGS (7.5' quads: Antioch North 1978, Jersey Island 1978, Brentwood 1978, Antioch South 1980).

0 2000 4000

Scale in Feet
1:24,000

N

GENERAL VICINITY PROJECT BOUNDARY

Marsh Landing Generating Station
Mirant Marsh Landing, LLC
Contra Costa County, California

May 2008
28067344

URS

FIGURE 7.1-1

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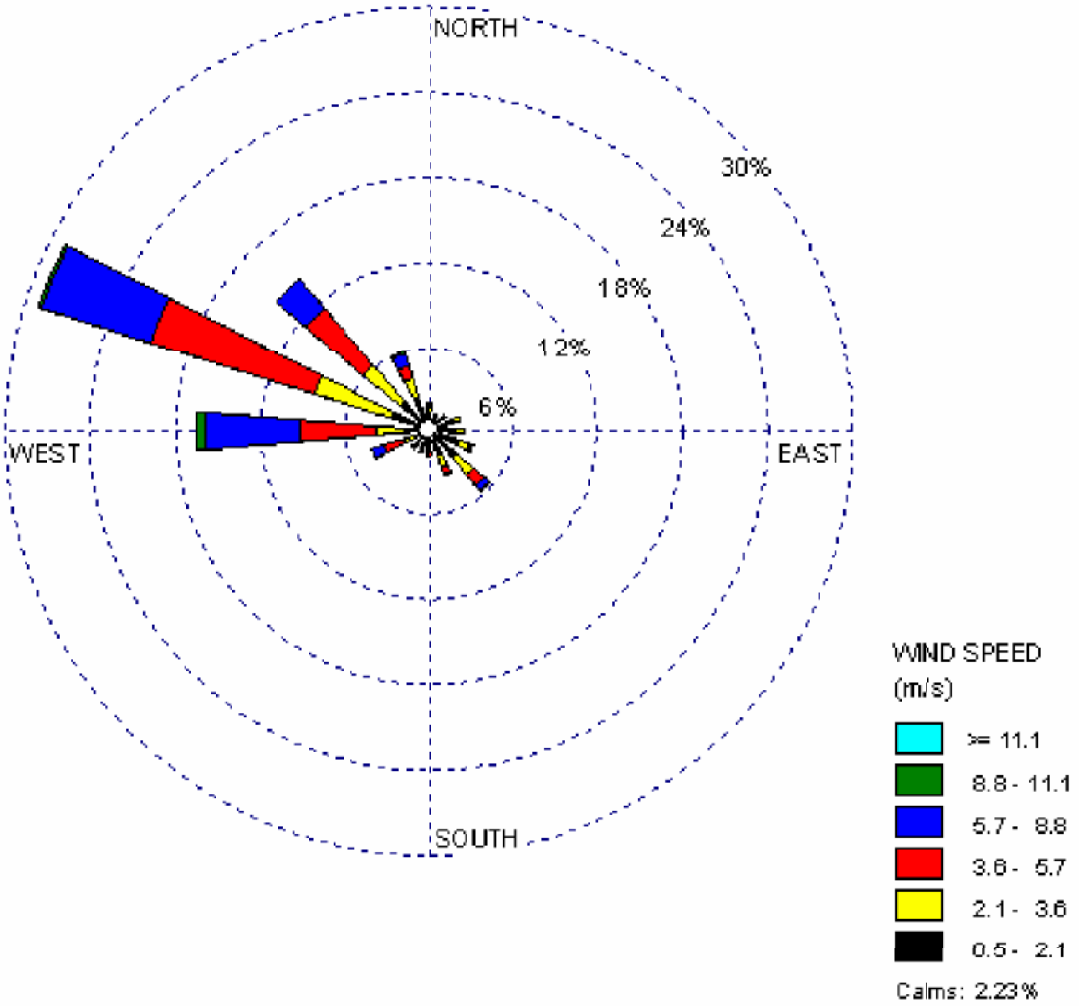

Annual windrose for Contra Costa Power Plant onsite meteorological station
Data taken from 2000-2002 and 2004-2005 for all months.

Displays wind speed, direction (blowing from)

ANNUAL WIND ROSE FOR 2000-2002 AND 2004-2005

Marsh Landing Generating Station
Mirant Marsh Landing, LLC
Contra Costa County, California

May 2008
28067344

URS

FIGURE 7.1-2

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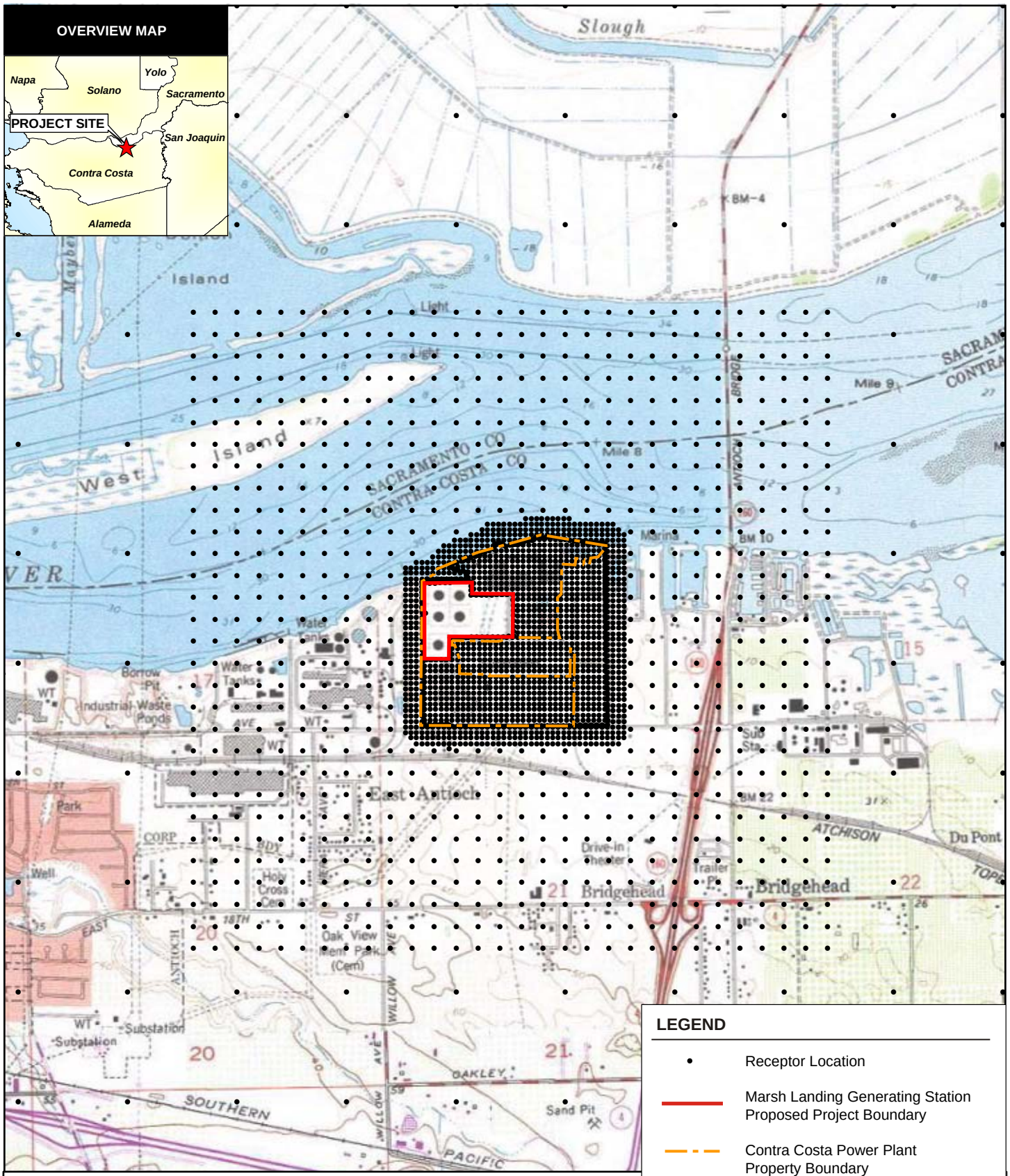

SOURCES: ESRI (base features);
USGS (7.5' quads: Antioch North 1978, Jersey Island 1978, Brentwood 1978, Antioch South 1980).

0 2000 4000

Scale in Feet
1:24,000

N

NEAR-FIELD MODEL RECEPTOR GRID

Marsh Landing Generating Station
Mirant Marsh Landing, LLC
Contra Costa County, California

May 2008
28067344

URS

FIGURE 7.1-3

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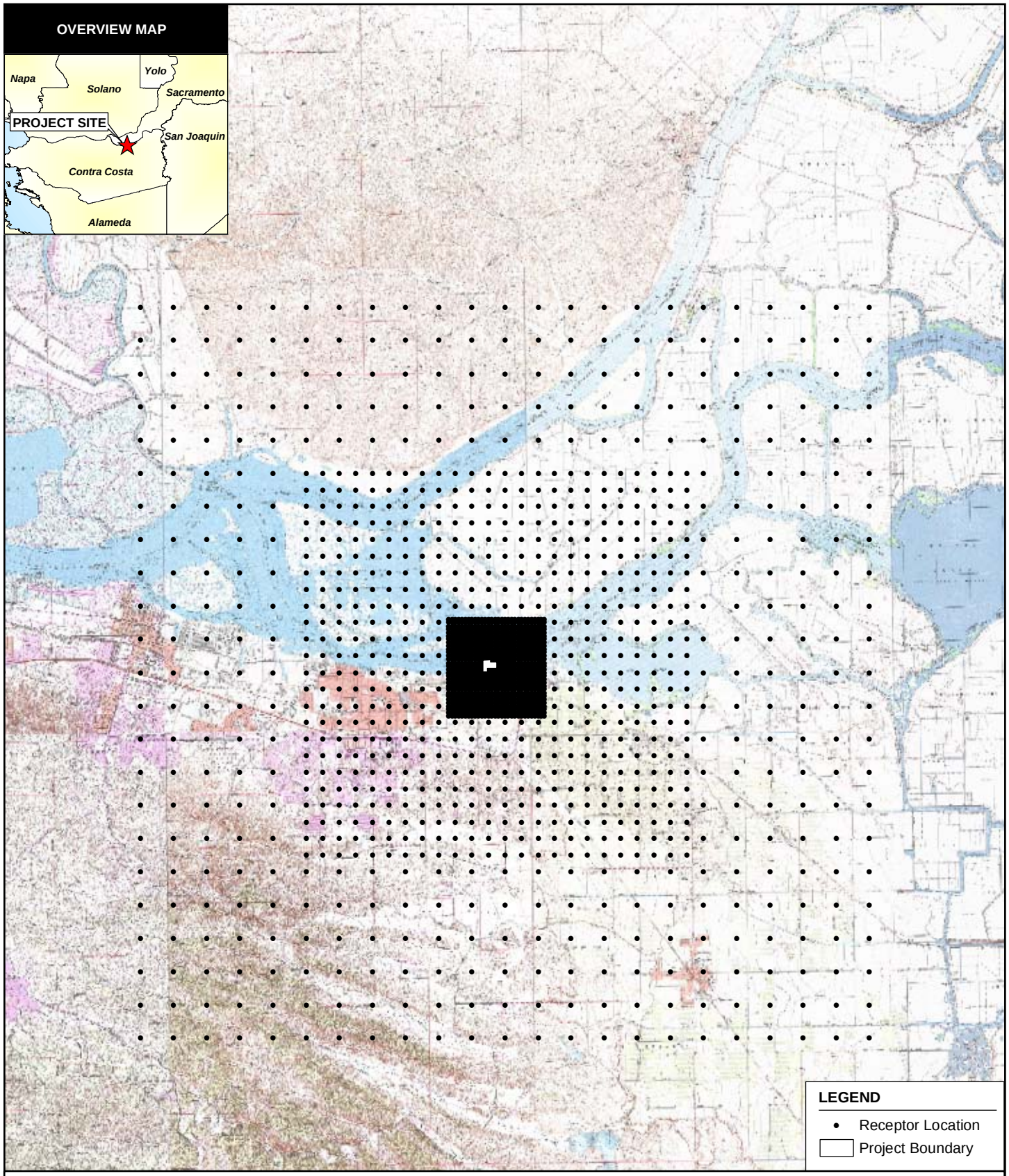

SOURCES: ESRI (base features);
USGS (multiple 7.5' quads various dates).

1.25 0 1.25 2

Scale in Miles
1"=2.5 Miles (1:158,400)

N

FAR-FIELD MODEL RECEPTOR GRID

Marsh Landing Generating Station
Mirant Marsh Landing, LLC
Contra Costa County, California

May 2008
28067344

URS

FIGURE 7.1-4

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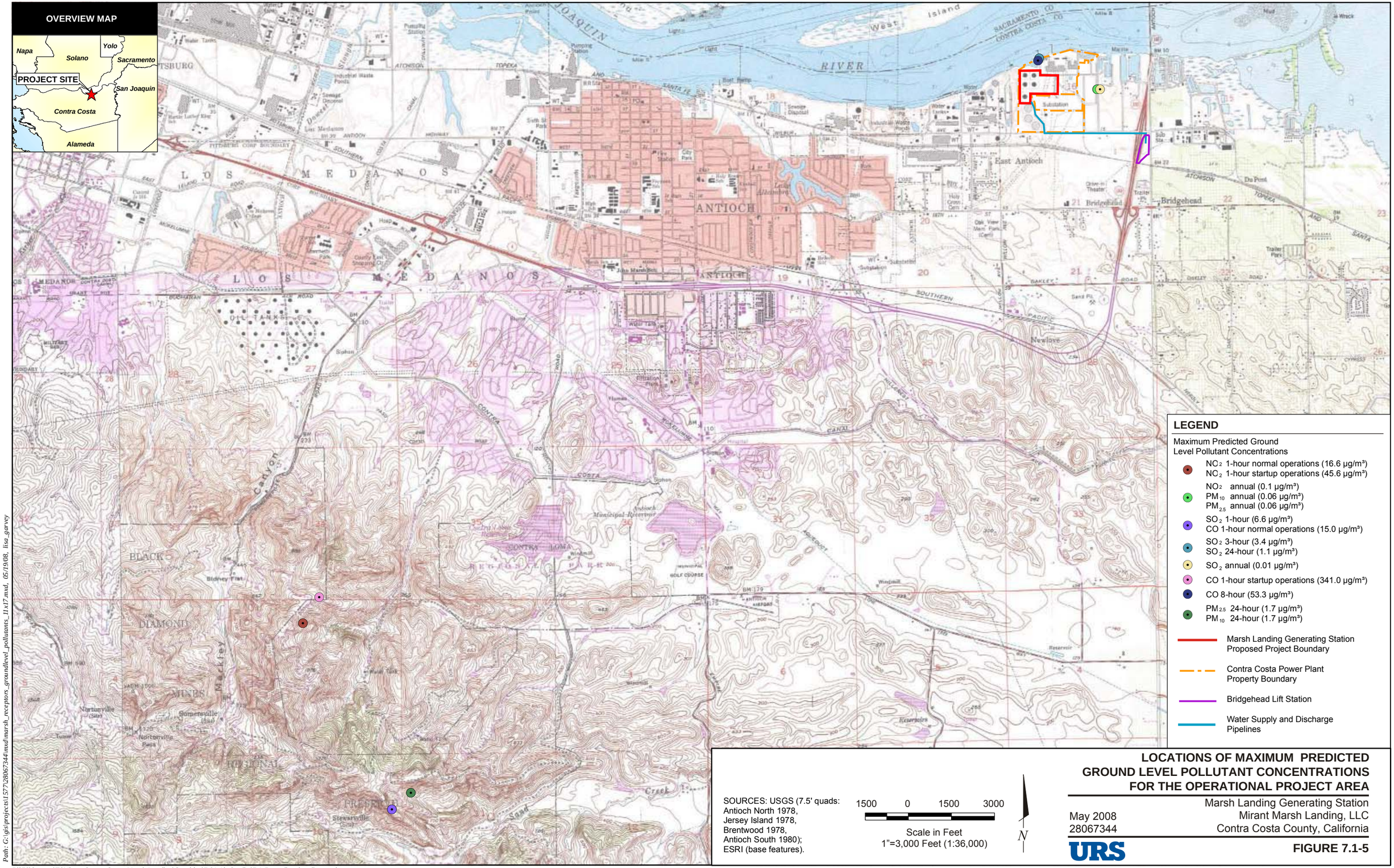

LOCATIONS OF MAXIMUM PREDICTED GROUND LEVEL POLLUTANT CONCENTRATIONS FOR THE OPERATIONAL PROJECT AREA

Marsh Landing Generating Station
Mirant Marsh Landing, LLC
Contra Costa County, California

May 2008
28067344

URS

FIGURE 7.1-5

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