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7.1 AIR QUALITY

This analysis of the potential air quality impacts of the Willow Pass Generating Station (WPGS) was conducted according to California Energy Commission (CEC) power plant siting requirements. Air pollutant sources belonging to this project will include two new gas-fired combined-cycle gas turbines with associated heat recovery steam generators (HRSGs), and a single natural-gas–fired fuel gas heater to treat the natural gas fuel stream to the turbines. 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). The assessment of project air quality impacts is presented in nine sections, as summarized below.

Section 7.1.1 describes the local environment surrounding the project site that is relevant to evaluation of the air quality impacts. Section 7.1.2 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 discusses the cumulative impacts analysis. Section 7.1.4 describes mitigation measures and 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 describes all applicable laws, ordinances, regulations, and standards (LORS) pertaining to the project's emissions of air pollutants. Section 7.1.7 lists the agency personnel contacted during preparation of the air quality assessment. Section 7.1.8 lists the air quality permits required for the project and provides a permit schedule. Section 7.1.9 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 contaminants (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.

Figure 7.1-1 shows the WPGS project boundary and surroundings. The proposed project site is located on the southern side of Suisun Bay, approximately 2 miles from the center of the City of Pittsburg. The WPGS site is 26 acres situated within the approximately 1,000-acre Pittsburg Power Plant (PPP) located at 696 West 10th Street, Pittsburg, CA, 94565. The WPGS site will be located on a separate legal parcel to be created by adjusting the lot lines of two existing legal parcels at the PPP site, both of which are identified as Assessor's Parcel Number 085-010-014.

The WPGS site is currently occupied by the existing retired power generation PPP Units 1 through 4, an unused surface impoundment, an administration building, hazardous materials and hazardous waste materials buildings, Tank 7, temporary buildings, and other ancillary facilities. The project includes the demolition of Units 1 through 4, the administration building, and Tank 7 that are on the WPGS site, as well as replacement of the hazardous materials and hazardous waste buildings. The unused surface impoundment on the WPGS site (north of Tank 1) will be left in place. The new generating units will be located on the south 23.5 acres of the WPGS site. No land disturbance will occur within the north 2.5-acre portion of the WPGS site (adjacent to Suisun Bay). Pacific Gas & Electric Company (PG&E) owns a 36-acre switchyard adjacent to the PPP site, directly southwest of the WPGS site (Figure 2.2-1).

Nearby communities include Antioch, Concord, and Martinez. The nearest residences are aligned along Linda Vista Avenue just outside the eastern boundary of the PPP, with the nearest house at a distance of approximately 500 feet from the WPGS boundary. The nearest Class I area is Point Reyes National Seashore, 52 miles to the west of the PPP site.

7.1.1.1 Climate and Meteorology

The climate of the San Francisco Bay Area, 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 fall and continuing through the winter, the high-pressure system weakens and moves southward, allowing storm systems originating from the Alaska 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 at 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.

Average temperature and precipitation data have been collected at Antioch, the long-term 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. Summer precipitation is extremely low due to the strong stationary high-pressure system off the coast that prevents most weather systems from moving through the area. The Antioch station receives an average of 13 inches of rainfall annually. This amount is lower than most of the region because of 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.

Winds measured at the weather station operated within the PPP site (approximately 1.4 miles west of the WPGS site) are predominantly from the west. The wind speed is often quite brisk, averaging about 10 mph annually. Like the annual winds, the spring, summer, and autumn seasons have brisk westerly winds. However, during the winter season, the prevalent wind direction switches to easterly, and is much more variable. Lighter wind speeds also occur in winter. The annual average pattern of joint wind speed and wind direction frequencies in the area is illustrated in the windrose presented in Figure 7.1-2. A detailed discussion of the meteorological data used to support dispersion modeling for evaluation of the WPGS air quality impacts is presented in Section 7.1.2.3.

7.1.1.2 Existing Air Quality

Ambient air quality standards have been established 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 warranted by new health and welfare effects data. Each NAAQS or CAAQS is based on a specific averaging time over which the indicated pollutant concentration is measured. Different averaging times are based upon protection against short-term, high-dosage effects or long-term, low-dosage effects. Most of the 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 2,000 feet south of the existing PPP Tank 6 and the WPGS southernmost site boundary, the Concord station, approximately 9.8 miles southwest of the site, and the Bethel Island Road (Bethel Island) station, approximately 14 miles east of the site. These stations monitor all criteria pollutant concentrations except for lead and the Pittsburg and Bethel Island stations do not monitor $PM_{2.5}$ either. The Concord station is the only air quality monitoring station that monitors $PM_{2.5}$. Because lead monitoring stations are absent in Contra Costa County, the station closest to the project site that measures lead is located in San Francisco County, at the San Francisco-Hunters Point station, about 34 miles southwest of the site.

The criteria pollutants monitored at the monitoring stations described above include ozone (O_3), PM_{10}, $PM_{2.5}$, CO, nitrogen dioxide (NO_2), SO_2, and lead. 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 concentrations during the most recent 3 years for which data are available (2005-2007) 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 3 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 ozone CAAQS of 0.09 ppm was exceeded three times in 2006 at the Pittsburg monitoring station and one time during 2007. The Concord monitoring station exceeded the 1-hour state ozone standard eight times during 2006, and once each in 2005 and 2007. The Bethel Island monitoring station did not exceed the state standard in 2005 or 2007, but recorded values above the 1-hour state ozone standard nine times in 2006.

The federal 8-hour ozone NAAQS has also been exceeded occasionally at all three monitoring stations. The federal standard requires maintaining 0.08 ppm[1] 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, but 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 2007. The highest 8-hour concentration at the Bethel Island station equaled the federal ozone standard for this averaging period once in 2006, but was below the standard in 2005 and 2007. Values in excess of the CAAQS 8-hour standard for ozone occurred in each of the 3 years at all three stations, particularly during 2006 when 10 exceedances were recorded at Pittsburg and 14 each at Concord and Bethel Island. 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, and 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.

The San Francisco Bay Air Basin (the Basin) is designated as nonattainment with respect to the state PM_{10} standards, and unclassified with respect to the federal PM_{10} standards. Concentration data for this pollutant in units of 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 between 6 and 24 times per year at the individual stations between 2005 and 2007. The federal 24-hour average NAAQS of 150 $\mu g/m^3$ for PM_{10} was not exceeded at any time in the last 3 years at the Pittsburg, Concord, or Bethel Island stations, with a maximum recorded 24-hour PM_{10} concentration of 84 $\mu g/m^3$ at Concord 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, have consistently been at or above the CAAQS of 20 $\mu g/m^3$ for PM_{10}. The maximum annual arithmetic mean concentration recorded at the Pittsburg station during the most recent three years was 22 $\mu g/m^3$ in 2004.

Fine particulate ($PM_{2.5}$) sources include combustion in motor vehicles and industrial sources, residential and agricultural burning, and from atmospheric reactions involving emitted NO_X, SO_X, and organics. The

[1] The federal 8-hour standard was lowered to 0.075 ppm earlier in 2008.

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 µg/m^3) became effective on December 17, 2006.

$PM_{2.5}$ data are presented in Table 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 with respect to the federal $PM_{2.5}$ standard. The table shows that the federal 24-hour average NAAQS of 35 µg/m^3 is exceeded frequently in the vicinity of the project. The highest 24-hour $PM_{2.5}$ concentration of 62 µg/m^3 was measured at the Concord monitoring station during 2006. Note that the $PM_{2.5}$ 24-hour standard was changed from 65 µg/m^3 to 35 µg/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 in each of the last 3 years were below the California $PM_{2.5}$ ambient air quality standard of 12 µg/m^3. The maximum annual arithmetic mean concentration recorded at the Concord station was 10 µg/m^3 in 2006.

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 have complied with the NAAQS and CAAQS of 35 and 20 ppm, respectively during each of the last 3 years. The maximum 1-hour concentration of 3.3 ppm was recorded at the Pittsburg monitoring site during both 2005 and 2006. 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 1.9 ppm at the Pittsburg station in 2006.

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 2005. The data in the tables also show that maximum 1-hour average NO_2 levels complied with the CAAQS of 0.25 ppm that was in effect during the 3-year period. The maximum 1-hour concentration was 0.058 ppm at the Pittsburg station in 2005.

On February 23, 2007, the California Air Resources Board (CARB) approved new, more stringent CAAQS for NO_2 that took effect in early 2008. The new 1-hour standard is 0.18 ppm, which is not to be exceeded, and the new annual average standard is 0.030 ppm.

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 from the mercaptan odorant that is added for safety. SO_2 can increase lung disease and breathing problems for asthmatics. It reacts in the atmosphere to form acid rain, which is destructive to crops and vegetation, as well as to 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 is in attainment for all applicable state and federal AAQSs for SO_2.

The SO_2 data in Tables 7.1-7a and 7.1-7b demonstrate that neither the 24-hour average CAAQS of 0.04 ppm nor the federal 24-hour average SO_2 NAAQS of 0.14 ppm were exceeded in the project vicinity between 2005 and 2007. The highest monitored 24-hour SO_2 concentration during this period (0.009 ppm) was measured at the Pittsburg monitoring station in 2005 and 2006. The recorded annual average (arithmetic mean) SO_2 concentrations at the monitoring stations are also presented in the tables, and are well below the federal ambient air quality standard of 0.03 ppm at all three stations in all years. The maximum 1-hour average SO_2 levels comply with the CAAQS of 0.25 ppm, which has not been exceeded at any of the monitoring stations within the last 3 years. The maximum 1-hour concentration was 0.047 ppm at the Pittsburg monitoring station in 2007.

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 San Francisco, California, the closest monitoring station measuring lead, are presented in Tables 7.1-8 for 2005. Data for 2006 and 2007 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 analyses conducted to assess the potential air quality impacts from the proposed project. Impacts due to the proposed 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 proposed project are presented in this section. Detailed information is provided on the dispersion modeling methods that have been conducted to evaluate project impacts, along with presentation of the modeling results.

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 demolition of existing PPP facilities, grading, excavating, erection of facility structures, and vehicle and equipment travel on unpaved and paved surfaces. The projected construction schedule is expected to be 34 months, during which different areas within the existing PPP site and a number of nearby temporary laydown areas will be disturbed at different times. Estimated land disturbance for major construction activities is summarized in Chapter 2, Facility Description and Location.

Construction equipment and vehicle exhaust emissions were estimated using equipment lists and demolition/construction scheduling information provided by the project design engineering firm, which are presented in Chapter 2, Facility Description and Location, and Appendix J. Equipment-specific emissions factors were used to estimate mass emissions for all criteria pollutants from diesel-fueled demolition and construction equipment and vehicles using South Coast Air Quality Management District (SCAQMD) OFFROAD Emission Factors. Emissions from on-road vehicles were estimated using emission factors generated by means of the CARB EMFAC model and approximate travel distances for delivery trucks and commuter vehicle trips to and from the WPGS site. Assumptions used in calculating project construction emissions included a 34-month construction period; 22 construction days per month; a single-shift, 10-hour workday; and a 50-hour work week. 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 SCAQMD CEQA Handbook (SCAQMD, 1993) emission factors for bulldozing and dirt-pushing, travel on unpaved roads, and handling/storage of aggregate materials. A dust control efficiency of 85 percent for project site and temporary construction area activities was assumed to be achieved for these activities, to be achieved by frequent watering and other measures, as 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 for Onroad Vehicles from derived from the EMFAC2007 emissions model. Construction workers were assumed to commute to the proposed project site from locations within the greater San Francisco Bay Area.

The short-term maximum emissions were calculated using Month 6 construction equipment. Activities during this month will include demolition, as well as grading, bulldozing and excavating. Annual emissions were based on the worst 12 consecutive months of the construction period, which were Months 1 through 12.

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 impacts. To apply the OLM option in AERMOD, hourly ozone data are required. Hourly ozone data recorded at the BAAQMD Pittsburg monitoring station for the same years as 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*, October 2000.

Detailed spreadsheets are provided in Appendix J, which show the calculation of emissions from all project construction activities and equipment, and the data and assumptions used in these calculations. Tables 7.1-10 and 7.1-11, respectively, present the estimated maximum daily 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 WPGS site. Estimated emissions of SO_x 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 specified for the PG&E natural gas service area.

Normal Operating Emissions

The only emission sources of the project once it becomes operational will be the two Siemens Flex Plant 10 (FP10) units and a single small fuel gas heater that will itself be fired using natural gas fuel. 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, which is presented in Table 7.1-12.

The criteria pollutant emission rates and stack parameters for the FP10 units have been provided by Siemens for three load conditions (60 percent, 85 percent, and 100 percent at each of three ambient temperatures (94°F, 60°F, and 20°F). These data are presented in Table 7.1-13. 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 7.1-14. Based on vendor information, startup (i.e., the period from initial firing to compliance with emission limits) of the FP10 units is expected to occur within 12 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; thus, shutdown periods and emissions are measured from the time this load is reached.

For the FP10 units, an operating hour that includes a startup event will have higher rates of emissions for some criteria pollutants, compared with either an hour that includes a shutdown event or an hour of normal, full-load operating conditions with fully functioning SCR and CO oxidation catalyst systems. Thus, the hours that include a startup event were used to represent worst-case short-term emission conditions for these units in the air quality dispersion modeling simulations for these pollutants.

Fuel Gas Heater Emissions

A small natural-gas–fired heater will be installed to condition the natural gas fuel to the two FP10 turbines. This unit will be rated at a fuel energy input of 5 MMBtu/hour. Table 7.1-15 lists the stack parameters and criteria pollutant rates used to represent the heater for purposes of this air quality assessment. Although in reality the heater will not be used during some turbine operating periods, it has been conservatively assumed for this analysis that it will operate at maximum capacity for 4,383 hours per year, i.e., the same number of hours as each of the FP10 turbines.

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. 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 that have been 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.

For averaging times between 1 hour and 24 hours, operation of the fuel gas heater at maximum capacity (5 MMBtu/hour) was assumed to occur throughout the period. In calculating annual emissions for modeling, the gas heater was conservatively assumed to operate at maximum capacity whenever the FP10 units are in operation.

Estimated annual pollutant emissions for the turbines 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 7.1-13). 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, the expected maximum natural gas sulfur content of 0.4 grain of sulfur per 100 scf of fuel flow was assumed. However, for short-term (1-hour and 3-hour) emission estimates, 1.0 grain of sulfur per 100 scf was used, which is the upper limit guaranteed by PG&E. The 3-hour SO_X emission rate was calculated based on a scenario with two gas turbines running at 100 percent using the winter minimum temperature of 20°F with three startups for the FP10 units. The 8-hour maximum CO emission rate was calculated assuming two startups and one shutdown of both FP10 units and full operation at 100 percent for the remainder of the period using the winter minimum ambient 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 units and the fuel gas heater. Annual emissions of all pollutants for the FP10 units were calculated for an anticipated 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 gas heater was assumed to operate for 4,383 hours of the year as well.

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;
- Full speed no load (FSNL) and first synchronization;
- Individual HRSG steam blows;
- Combustion turbine load testing;
- Install emission testing equipment;
- STG trip test and load test;
- Combined-cycle testing/drift test;
- 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 the two FP10 units. A minimum of one turbine start would be needed for each test. Additional starts may be necessary. However, the annual number of turbine starts during the year when commissioning occurs is not expected to exceed the maximum number of startups requested for subsequent operating years (see Table 7.1-12). Fuel flow monitoring will be conducted during 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, during which all installed equipment will be run and tested.

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 combustors 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 of the FP10 units will ensure that the impacts of these emissions will be 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.

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, but it is assumed that the oxidation and SCR catalysts will have been installed for the tests after the steam blows are completed. 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 fuel gas heater was assumed to be operating at maximum capacity (see Table 7.1-15) during the commissioning scenarios selected for modeling.

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

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 include the two new CTG units and the fuel gas heater, in addition to potential leakage of sulfur hexafluoride (SF_6) from new circuit breakers that will use this material, are presented in Table 7.1-19. As demonstrated by this table, emissions of carbon dioxide (CO_2) account for the majority of the project related greenhouse gases, with negligibly small contributions of nitrous oxide (N_2O), methane (CH_4) and SF_6. 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 using 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 Pittsburg monitoring station for the years 2002-2005 (i.e., the same years for which meteorological data were input for the AERMOD simulations).

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 Pittsburg meteorological data are discussed in the Meteorological Data section.

Building Wake Effects

The effects of structure 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 structures 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). Structures were evaluated based on size, with those deemed to be of sufficient mass such that downwash effects could result being included in the analysis. The following structures were identified within the project site to be included in the downwash analysis.

Project Structures

- Reverse Osmosis Permeate storage tank
- Wastewater storage tank
- Demineralized water storage tank
- Nitrified water storage tank

Existing PPP Structures

- Unit 5 turbine generator
- Unit 6 turbine generator
- Units 5 and 6 boiler structures
- Unit 7 turbine generator
- Unit 7 boiler structure
- Fuel Oil Tanks 1 through 6

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 DVDs that are being submitted to accompany this AFC.

Meteorological Data

Onsite meteorological data have been collected on the western edge of the PPP property by PG&E for a number of years. Excellent data capture occurred for the years 2002 through 2005, and thus these years were selected to create the AERMET data input file. The PG&E data were collected within the boundary of the PPP at the western end of the cooling tower island in the cooling pond, approximately 2.5 kilometers west of the WPGS turbines, and meet the U.S. EPA criteria for representativeness (U.S. EPA, 1995), as follows:

- **Proximity.** The data were collected within the PPP property boundary, and thus meet the criterion for proximity.

- **Complexity of Terrain and Exposure of Meteorological Monitoring Site.** Both the project site and the meteorological station are located on the southern bank of Suisun Bay and are the same distances from prominent terrain features in the surrounding area.

- **Period of Data Collection.** The 2002 through 2005 data set represents data collection over 4 years. Although only 1 year of onsite data is required for use in regulatory modeling under EPA guidelines, a 4-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 that quality data were collected.

In accordance with the U.S. EPA meteorological monitoring guidance for regulatory modeling applications (U.S. EPA, 2000), meteorological instruments should be sited far enough from obstructions that these obstructions would not influence the meteorological parameter measured. If a meteorological tower is sited too close to a building, aerodynamic effects may influence the wind data collected, and if temperature measurements are too near paving, rooftops, or industrial heat sources, excessively high temperatures may be measured. The PG&E meteorological tower was sited near enough to the project sources to be representative, yet far enough not to be inappropriately influenced by the industrial site.

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

In processing the data for input into AERMOD, additional parameters typically not collected at site-specific stations are required; thus, PPP the onsite data have been 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: 2002 through 2005. This station is approximately 15 kilometers southwest of the project and is surrounded by suburban areas, in rolling terrain. The terrain immediately surrounding the project site can also 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 were used in the WPGS modeling analysis; however, per BAAQMD guidance, Concord surface winds will not be substituted for missing hours in the PPP onsite meteorological data sets.

The Oakland Airport upper air data monitoring station is approximately 45 kilometers southwest of the project. This is the closest upper air station and was determined the most representative data available for use in this modeling analysis. The MODIFY option was used for AERMET processing of the Oakland upper air data to perform some preliminary quality control as the data were extracted.

The AERSURFACE program calculates the surface roughness from the land cover data for a 1-kilometer radius around the meteorological tower and the Albedo and Bowen ratio over a 10- by 10-kilometer area around the meteorological tower, adhering to the recommendations from the AERMOD Implementation Guide (U.S. EPA, 2008). Representative surface moisture input were determined for each month of every year using Antioch Pump Plant 3 meteorological station precipitation data, and use of the percentile method specified in the AERSURFACE User's Guide. The surface moisture determinations are provided by BAAQMD in Table 7.1-20. Months assigned to each season were as follows: Spring – February and March; Summer – April through July; Autumn – August through October; Winter (not receiving continuous snow cover) – November through January. The seasonal output obtained for the surface characteristics for all sectors, dependent on average, wet, or dry surface moisture conditions are presented in Table 7.1-21.

Figure 7.1-2 presents the annual windrose based on the 2002-2005 PPP onsite meteorological data. Seasonal windroses based on the 4 years of onsite meteorological data are provided in 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 WPGS fence line and extending from the fence line out to 100 meters beyond the PPP 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 500-meter and 1,000-meter spacing 3- to 6-km from the property line, it was determined that a tighter 250-meter and 25-meter spaced receptor grid would best cover the hills 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 4 years of hourly meteorological input data, this receptor grid, with the additional dense nested grid points when required, 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 due to 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 34-month construction period. For the purposes of evaluating construction air quality impacts, it is useful to break the construction schedule into a sequence of essentially nonoverlapping 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, as well as heavy trucks and up to four freight trains delivering materials to and from the project site during specific construction phases were also included (see Appendix J).

Demolition of Units 1 through 4, the administration building, Tank 7, and hazardous materials and hazardous waste buildings which are on the WPGS site, will occur during the first 6 months and will overlap with some of the construction activities taking place during these months within other areas of the site. Emissions associated with these demolition activities are specifically included with those from actual construction activities in the evaluation of construction impacts.

Worst-case modeling was conducted for short-term averaging times using all construction equipment from Month 6. Annual emissions were modeled for Months 1 through 12 of the construction schedule. A 10-hour work day was assumed for all phases of demolition and construction. Calculation of annual emissions was based on a summation over all demolition and construction activities for the consecutive 12-month period that would be expected to produce the highest emissions of all pollutants (in this case, Months 1 through 12 of the overall schedule). 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 Pittsburg monitoring station during the same 4 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 would produce the worst-case offsite impacts (i.e., maximum ground-level concentrations for each pollutant and averaging time). Screening modeling was performed for the two FP10 CTGs only, as these are by far the most important emission sources of the operational project. The screening model was accomplished with AERMOD, as described in the previous sections, using the same building wake information, receptor grid, and 4 years of meteorological data described above.

The AERMOD screening model simulation examined impacts due to the CTG emissions from two FP10 combined-cycle CTGs releasing emissions from separate 21.3-foot-diameter (6.5-m), 150.5-foot-tall (45.9-m) stacks.

The stacks were modeled as point sources at their proposed locations within the project site. Table 7.1-22 summarizes the CTG screening results for 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/HRSG 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 7.1-22 were then multiplied by the corresponding turbine mass 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 DVD that is provided separately with this AFC.

1-Hour Startup Scenarios

The worst-case 1-hour NO_2 and CO impacts would occur during an hour that includes startups for both FP10 turbines. Thus, the results of the screening analysis were not used to determine the turbine stack parameters used in the simulations to evaluate maximum 1-hour impacts for these pollutants. The results provided in Table 7.1-22 indicate that maximum hourly NO_2 and CO concentrations during normal operations would occur with the stack parameters corresponding to full-load operations. However, the magnitudes of the emissions for both pollutants during the worst-case 60 minutes of a two-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 1-hour NO_2 and CO concentrations during a startup with reduced stack exhaust velocity and temperature. The emissions and stack parameters used in modeling maximum impacts due to turbine startup conditions are presented in Table 7.1-23.

Refined Operations Modeling

A refined modeling analysis was performed to estimate maximum offsite criteria pollutant impacts from operational emissions of the project. The modeling was performed according to the methods described in the previous sections, using 4 years of hourly meteorological input data. The 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 7.1-16). 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. Fumigation can occur during 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 or aquatic environment to an unstable inland environment (shoreline fumigation). In general, this phenomenon will be transient, seldom persisting up to an hour.

A fumigation analysis was performed using the U.S. EPA model SCREEN3. 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. Because SCREEN3 only models the impacts from one source, the model was run twice; once for the FP10 combined-cycle stack parameters and once for the fuel gas heater 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—was 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 and non-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, 1992) were used to determine the 3-, 8-, and 24-hour average concentrations.

7.1.2.4 Modeling Results – Compliance with Ambient Air Quality Standards

Air dispersion modeling was performed according to the methodology described above 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 4-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., 2005 through 2007). 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 (including demolition activities) 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 combined demolition and construction activities 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 7.1-24, 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 7.1-25 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 7.1-25 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 vary by pollutant and averaging time. The highest annual NO_2 concentration is expected to occur at the southwestern boundary line of the proposed project site. Peak annual average concentrations for PM_{10}, $PM_{2.5}$, and SO_2 are predicted to occur approximately 0.3 mile northeast of the project site.

The 1-hour maximums for NO_2, SO_2, and CO, 3-hour SO_2, 8-hour CO, 24-hour SO_2, and 24-hour PM_{10} are predicted to occur at different locations in the elevated terrain approximately 3.5 miles southwest of the facility. Figure 7.1-5 shows the locations of the maximum predicted operational impacts for all pollutants and averaging times.

Fumigation Impacts

Ground-level concentrations in simple terrain, from nocturnal and shoreline inversion for the FP10 turbines, were estimated using SCREEN3. SCREEN3 was also run to calculate the shoreline fumigation concentrations from the fuel gas heater, but it was determined that the plume height was below the TIBL. Therefore, no shoreline fumigation calculation was made for this source. No inversion fumigation was calculated, because the fuel gas heater stack height is less than 10 meters. Only the ground level concentration in simple terrain was estimated by SCREEN3 for the fuel gas heater. The peak nocturnal inversion concentration and simple terrain concentration for the FP10 turbines were estimated and combined following the U.S. EPA stationary source screening procedures (U.S. EPA, 1992) to determine the 3-, 8-, and 24-hour average concentrations. Then the peak fuel gas heater concentration was added to determine the maximum potential impact due to fumigation from project emissions.

SCREEN3 predicted the peak concentration from nocturnal inversion fumigation from project emissions to be as follows:

- 12.02 $\mu g/m^3$ for NO_2 1-hr;
- 1.62 $\mu g/m^3$ for SO_2 1-hr;
- 1.40 $\mu g/m^3$ for SO_2 3-hour;
- 0.58 $\mu g/m^3$ for SO_2 24-hour;
- 51.34 $\mu g/m^3$ for CO 1-hr;
- 14.67 $\mu g/m^3$ for CO 8-hr; and
- 0.81 $\mu g/m^3$ for $PM_{10}/PM_{2.5}$.

The peak concentrations from the shoreline inversion fumigation analysis from project emissions were predicted to be the following:

- 45.83 $\mu g/m^3$ for NO_2 1-hr;
- 7.47 $\mu g/m^3$ for SO_2 1-hr;
- 4.04 $\mu g/m^3$ for SO_2 3-hour;
- 0.72 $\mu g/m^3$ for SO_2 24-hour;
- 293.62 $\mu g/m^3$ for CO 1-hr;
- 25.87 $\mu g/m^3$ for CO 8-hr; and
- 1.03 $\mu g/m^3$ for $PM_{10}/PM_{2.5}$.

Turbine Commissioning

Each of the project CTGs could be operated for up to 500 hours with partially abated emissions for the 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 with VOCs, which are not modeled) for which emissions would be expected to be significantly higher than during normal operations, owing to the non-operability of the SCR and oxidation catalyst emission control systems during some of the commissioning tests. Emissions of SO_x and particulate matter (PM_{10}, $PM_{2.5}$) 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 operation of the turbines, and separate modeling for commissioning impacts on SO_x and PM levels is unnecessary.

Stack NO_X and CO emission rates during turbine commissioning were presented in Table 7.1-18. 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 were used. Maximum CO impacts were evaluated for the case in Table 7.1-18 labeled “CTG Testing (Full Speed No Load [FSNL] Excitation Test, Dummy Synch Checks).” Startup stack parameters were used (see Table 7.1-23). The fuel gas heater was conservatively assumed to be operating at full capacity to treat the gas fuel to the turbines during all commissioning tests.

Table 7.1-26 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 4 years of hourly meteorological input data. The modeling was conducted conservatively for commissioning of both FP10 turbines concurrently, although in practice commissioning tests may be conducted separately for each unit. Table 7.1-26 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 PPP Units 5, 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 heat exchangers that do not produce moisture plumes.

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

Because 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 that has occurred since the local PSD baseline date would be required. However, as demonstrated by Table 7.1-25, 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 (NPS) administrator for Point Reyes National Seashore, the only Class I area located within 100 km of the project. The NPS has determined that a Class I impact analysis is not required for this project. Specifically, NPS stated, in an e-mail addressed to Ms. Julie Mitchell of URS on April 24, 2008:

> "…based on the small amount of emissions by the proposed Pittsburg New Generation Project and the distance to Point Reyes National Seashore, a Class I area administered by the NPS which is approximately 73 km away, the NPS in not requesting that an increment or Air Quality Related Values analysis be performed for the permit…. You can forward this e-mail to the permitting agency."

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 AAQS.

Additional modeling simulations will be performed to evaluate the combined effects of emissions from the proposed FP10 units with those from existing PPP Units 5, 6, and 7, which will continue to operate when the WPGS facility becomes operational. All three existing units are utility boilers burning natural gas exclusively. Units 5 and 6 have been retrofitted with low NO_X burners and are also equipped with SCR systems for NO_X control. Unit 7 combustion controls have been tuned to minimize NO_X emissions.

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 BAAQMD 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 AAQS.

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 AAQS. Therefore, CO emission offsets are not required.

The inventory emission offsets currently possessed by Mirant California and the estimated ERCs required to offset project operations are shown in Tables 7.1-27 and 7.1-28, respectively. As shown in Table 7.1-28, Mirant California clearly has the capability to provide the required emission offsets for the WPGS project in addition to the Marsh Landing Generating Station (for which an AFC was recently filed by the applicant with CEC).

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 7.1-29. Table 7.1-30 presents the proposed BACT determination for the WPGS emission sources. The rationale for the BACT proposal for each pollutant is provided below.

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. Each combined-cycle power block consists of one Siemens FP10 unit. The steam produced by the each HRSG will be sent to an individual steam turbine generator (STG). 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 BAAQMD considers BACT to be the most stringent level of demonstrated emission control that is feasible.

The BACT for NO_X emissions from the 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 basis. 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 WPGS 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 combustion turbines will meet the BACT requirements for NO_X.

BACT for CO emissions from the FP10 units 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 current BACT level for turbines 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 FP10 turbine/HRSG trains. 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 gas turbine PM_{10} emissions is the exclusive use of pipeline-quality natural gas. The new turbines will exclusively burn pipeline-quality natural gas that will be delivered by PG&E. Therefore, the turbines will meet the BACT requirements for PM_{10}.

BAAQMD BACT Guideline 89.1.6 specifies BACT determination for SO_2 for 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.

According to Rule 2.1-114 of the BAAQMD Rules and Regulations, boilers heaters, steam generators, duct burners, and similar combustion equipment with less than 10 million BTU per hour rated heat input are exempt from the District's permitting process provided if fired exclusively with natural gas. For this reason, a BACT analysis for the WPGS fuel gas heater has not been conducted. However, the unit's NO_X will comply with the BACT requirements listed in the BAAQMD BACT Guideline No. 94.1.1 (Heater – Refinery Process, Natural or Induced Draft – 5 MMBtu/hr to <50 MMBtu/hr heat Input). Specifically, the unit will comply with the NO_X emission limit of 25 ppm at 3 percent oxygen, will employ good combustion practice, and will use only natural gas containing less than 100 ppmv total reduced sulfur.

7.1.6 Laws, Ordinances, Regulations, and Standards

The applicable 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 (AQCR);
- NAAQS;
- Prevention of Significant Deterioration;
- Acid Rain Program, Title IV;
- 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 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 AQCR (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 lead.

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 in 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, U.S. 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 NAAQS. The NAAQS and CAAQS relevant to the project are summarized in Table 7.1-31.

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 7.1-32 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 prevent deterioration of air quality in those areas that already meet NAAQS. 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 WPGS is subject to these requirements.

The incremental project emissions for SO_2, NO_X, PM_{10}, VOC, and CO are as shown in Table 7.1-33 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 7.1-34. 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 7.1-34.

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 0.06 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 WPGS gas turbines will be about 0.009 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, requires a project to list and promulgate national emission standards for hazardous air pollutants (NESHAPS) 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, Rule 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.

BAAQMD 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 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 those 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 that 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 of a stand alone application for an Authority to Construct to BAAQMD.

Pursuant to Regulation 2, Rule 6 ("Major Facility Review"), the existing Pittsburg Power Plant is a major source and holds a current Title V permit. The WPGS will be a separately operated major source, and will be required to obtain its own Title V permit accordingly. The Title V applications must be submitted within 12 months after plant startup. This regulation is discussed in Section 7.1.6.1. 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 use the following practices to minimize the release of particulate matter and diminish the visibility of emissions:

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

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 3 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 3 minutes in any hour (Regulation 6, Section 302); and
- No emission from any of the sources will contain particulate matter in excess of 0.15 grain per dry cubic foot of exhaust gas volume (Regulation 6, Section 310).

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 that 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 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 1 hour results in ground level concentrations of less than 3 ppb. Section 302 ("General Emission Limitation") prohibits emissions from a gas stream containing SO_2 in excess of 300 ppm (dry). 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 state 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 7.1-35 presents the applicable federal, state, and local regulations that the project must adequately address as part of the permitting process.

7.1.6.4 Industry

No industry-based air quality LORS are applicable to the project.

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 7.1-36.

7.1.8 Permits Required and Permitting Schedule

Permits required for the project that are associated with air quality are listed in Table 7.1-37.

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

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

Month	Average Temperatures (°F)[1]		Average Precipitation (Inches)[1]
	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)

[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	State 1-Hour	State 8-Hour
2007	0.100	0.075	1	2
2006	0.105	0.094	3	10
2005	0.094	0.079	1	2

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 was recently lowered to 0.075 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.

O_3 = ozone
ppm = parts per million

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	State 1-Hour	State 8-Hour
2007	0.105	0.081	1	4
2006	0.117	0.093	8	14
2005	0.098	0.081	1	2

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 was recently lowered to 0.075 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.

O_3 = ozone
ppm = parts per million

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	State 1-Hour	State 8-Hour
2007	0.093	0.078	0	4
2006	0.116	0.090	9	14
2005	0.089	0.077	0	2

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 was recently lowered to 0.075 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.

O_3 = ozone
ppm = parts per million

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		Federal 24-Hour	State 24-Hour
2007	56	59	19	0	24
2006	58	59	20	0	12
2005	54	57	20	0	6

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.

$\mu g/m^3$ = micrograms per cubic meter
PM_{10} = particulate matter less than 10 microns in diameter

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		Federal 24-Hour	State 24-Hour
2007	49	52	17	0	12
2006	**84**	81	19	0	18
2005	40	42	16	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: 2975 Treat Boulevard, Concord, CA 94518.

$\mu g/m^3$ = micrograms per cubic meter
PM_{10} = particulate matter less than 10 microns in diameter

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		Federal 24-Hour	State 24-Hour
2007	47	49	19	0	0
2006	82	84	19	0	6
2005	62	64	19	0	6

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.

$\mu g/m^3$ = micrograms per cubic meter
PM_{10} = particulate matter less than 10 microns in diameter

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

Year	Highest 24-Hour Concentration for $PM_{2.5}$ (μg/m^3)	Annual Arithmetic Mean for $PM_{2.5}$ (μg/m^3)	
	Federal	Federal	State
2007	46	8	9
2006	62	9	10
2005	49	9	9

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 μg/m^3) and annual arithmetic mean (15 μg/m^3).
The state $PM_{2.5}$ standard is annual arithmetic mean: 12 μg/m^3.
Monitoring site address: 2975 Treat Boulevard, Concord, CA 94518.

μg/m^3 = micrograms per cubic meter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter

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
2007	2.8	1.5	0	0	0	0
2006	**3.3**	**1.9**	0	0	0	0
2005	3.3	1.7	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.

ppm = parts per million

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
2007	2.2	1.4	0	0	0	0
2006	1.7	1.3	0	0	0	0
2005	2.2	1.5	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.

ppm = parts per million

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
2007	1.1	0.8	0	0	0	0
2006	1.3	1.0	0	0	0	0
2005	1.1	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.

ppm = parts per million

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
2007	0.051	0.010	0	0
2006	0.052	0.011	0	0
2005	0.058	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.

NO_2 = nitrogen dioxide
ppm = parts per million

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
2007	0.049	0.011	0	0
2006	0.047	0.011	0	0
2005	0.055	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.

NO_2 = nitrogen dioxide
ppm = parts per million

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
2007	0.048	0.008	0	0
2006	0.044	0.008	0	0
2005	0.038	0.007	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.

NO_2 = nitrogen dioxide
ppm = parts per million

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
2007	0.047	0.024	0.007	0.002	0	0	0	0	0
2006	0.045	0.025	0.009	0.003	0	0	0	0	0
2005	0.030	0.018	0.009	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.

PPM = parts per million
SO_2 = sulfur dioxide

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
2007	0.021	0.015	0.005	0.001	0	0	0	0	0
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

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.

PPM = parts per million
SO_2 = sulfur dioxide

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
2007	0.018	0.013	0.005	0.002	0	0	0	0	0
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

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.

PPM = parts per million
SO_2 = sulfur dioxide

Table 7.1-8
Concentration Data Summary for Lead at San Francisco-Hunters Point Station

Year	Highest 24-Hour Concentration for Lead ($\mu g/m^3$)	Estimated Number of Days Exceeding Federal and State Standards (days)
2007	–	–
2006	–	–
2005	0.01	0

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

Notes:
The federal lead standard is quarterly average: 1.5 $\mu g/m^3$.
The state lead standard is 30 days average: 1.5 $\mu g/m^3$.
Monitoring site: 100 Whitney Young Circle, San Francisco.

$\mu g/m^3$ = micrograms per cubic meter
– = no data available to determine value.

Table 7.1-9
Estimated Construction Equipment Usage Schedule for Willow Pass Generating Station

Construction Equipment	% Usage	HP	Fuel	Year 2009			Year 2010												Year 2011												Year 2012							Total pieces` Eq
				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	Jul	
On-Road Vehicles																																						
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													1	2	2	2	2	2	2	2	1	1	1	1					23
Dump Truck (30 Ton)	100%	300	Dsl							10	1	1	1																									13
Fuel/Lube Truck	25%	150	Gas	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	32
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	2	82
Water Truck	50%	300	Dsl	1	1	1	1	1	1													1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	22
Off-Road Vehicles																																						0
Air Compressor	80%	50	Gas	1	1	1	1	1	2	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	2	41
Articulating Boom Manlift (120, 80, 60 and 40 Ft.)	70%	75	Gas				2	2	4	4	6	6	6	6	6	8	12	12	10	10	10	12	12	12	12	12	12	8	8	8	8	6	6	6	4	2	2	234
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	1	31
Jumping Jack Compactors	60%	7.5	Gas								2	2	2										1	1	2	2	2	2	2	2	2	2	2					26
150 Ton Crawler Crane	50%	300	Dsl	1	1	1		1	1	1	1	1	1	1	1	1														1	1	1	1	1	1	1	1	20
M2250 Crawler Crane	25%	500	Dsl						1	1	1																			1	1	1	1	1	1			9
Hydraulic Crane (45 Ton)	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	1	26
Hydraulic Crane (55 Ton)	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	2	38
Bull Dozer	80%	300	Dsl																				1	1	1	1	1	1										6
Bull Dozer w/ripper	80%	300	Dsl							1																												1
Hydraulic Excavator	85%	250	Dsl			2	2	2	2	4	2	2	2	1	1							1	1	2	2	2	2	2	2	2	2	1	1					40
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	2	57
Front End Loader	70%	130	Dsl		1	1	1	1	1	2	2	2	2	1	1	1						1	2	2	2	2	2	2	2	2	2	2	2					39
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	1	34
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	1										1	1	2	2	2	2	2	1	1	1	1					23
Welder (Diesel)	70%	25	Dsl	2	2	2	1	1	1	2	2	3	3	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	53
Total per month				**12**	**14**	**22**	**22**	**24**	**28**	**38**	**30**	**28**	**28**	**20**	**20**	**20**	**23**	**23**	**19**	**17**	**16**	**27**	**33**	**34**	**36**	**37**	**37**	**33**	**32**	**33**	**33**	**31**	**33**	**25**	**23**	**18**	**18**	**887**

Table 7.1-10
Daily Maximum Construction Emissions of Criteria Pollutants (lbs/day)

Activity	PM_{10}	$PM_{2.5}$	CO	VOC	NO_X	SO_X
Onsite Combustion Emissions						
Construction Equipment	10.43	9.51	608.06	37.41	212.86	0.23
Worker vehicles and delivery trucks	0.04	0.03	3.12	0.35	0.65	0.003
Trains	0.20	0.18	0.94	0.31	5.57	3.69
Construction Combustion Subtotal (lbs)	**10.7**	**9.7**	**612.1**	**38.1**	**219.1**	**3.9**
Onsite Fugitive Dust Emissions						
Vehicle Travel on Paved Roads and Parking Lot	0.28	0.03	–	–	–	–
Demolition/Bulldozing/ Excavation	13.87	2.91	–	–	–	–
Subtotal of Offsite Emissions (lbs)	**14.2**	**2.9**	–	–	–	–
Offsite On-Highway Emissions						
Worker Passenger Vehicle and delivery trucks – Combustion Emissions	1.30	0.89	103.84	11.62	21.57	0.11
Worker Passenger Vehicle and delivery trucks – Paved Road Dust	9.39	1.07	–	–	–	–
Trains – Combustion Emissions	6.67	6.13	31.43	10.48	186.70	11.06
Subtotal of Offsite Emissions (lbs)	**17.4**	**8.1**	**135.3**	**22.1**	**208.3**	**11.2**
Total Max. Daily Emissions (lbs)	**42.2**	**20.8**	**747.4**	**60.2**	**427.3**	**15.1**

Notes:
CO = carbon monoxide
NO_X = nitrogen oxide(s)
PM_{10} = particulate matter less than 10 micrometers in diameter
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter
SO_X = sulfur oxide(s)
VOC = volatile organic compounds

Table 7.1-11
Maximum Annual Construction Emissions of Criteria Pollutants (ton/year)

Activity	PM_{10}	$PM_{2.5}$	CO	VOC	NO_X	SO_X
Onsite Combustion Emissions						
Construction Equipment	0.72	0.65	61.14	3.44	17.21	0.02
Worker vehicles and delivery trucks	0.004	0.003	0.57	0.03	0.08	0.0003
Trains	0.15	0.13	0.68	0.23	4.07	2.69
Construction Combustion Subtotal (tons)	**0.9**	**0.8**	**62.4**	**3.7**	**21.3**	**2.7**
Onsite Fugitive Dust Emissions						
Vehicle Travel on Unpaved Roads and Parking Lot	0.04	0.004	–	–	–	–
Demolition/Bulldozing/ Excavation	2.53	0.53	–	–	–	–
Subtotal of Offsite Emissions (tons)	**2.6**	**0.5**	–	–	–	–
Offsite On-Highway Emissions						
Worker Passenger Vehicle and delivery trucks – Combustion Emissions	0.14	0.10	9.63	1.10	2.50	0.01
Worker Passenger Vehicle and delivery trucks – Paved Road Dust	1.18	0.15	–	–	–	–
Trains – Combustion Emissions	4.87	4.48	22.95	7.65	136.29	8.07
Subtotal of Offsite Emissions (lbs)	**6.2**	**4.7**	**32.6**	**8.7**	**138.8**	**8.1**
Total Max. Daily Emissions (lbs)	**9.6**	**6.1**	**95.0**	**12.4**	**160.1**	**10.8**

Notes:
CO = carbon monoxide
NO_X = nitrogen oxide(s)
PM_{10} = particulate matter less than 10 micrometers in diameter
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter
SO_X = sulfur oxide(s)
VOC = volatile organic compounds

Table 7.1-12 Maximum Operating Schedule and Stack Parameters	
Operating Conditions	**Annual Numbers**
Number of Starts per Turbine	193
Number of Shutdowns per Turbine	193
Startup Time (minutes)	12
Shutdown Time (minutes)	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 7.1-13
1-Hour Operating Emission Rates for FP10 Combustion Turbines

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
°F = degrees Fahrenheit
fps = feet per second
lb/hr = pounds per hour
NO_X = nitrogen oxide
=
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
Criteria Pollutant Emission Rates During FP10 Startup and Shutdown

	FP10 Emissions Per Turbine			
	Startup (12 min)		Shutdown (7 min)	
Pollutant	1 hr with 1 SU (lb/hr)	Total Emissions (lb/event)	1 hr with 1 SD (lb/hr)	Total Emissions (lb/event)
NO_x (2.0 or 2.5 ppm)	38.7	24.8	25.9	10.5
CO (3 ppm)	279.8	267.1	149.5	135.4
VOC (2 ppm)	17.7	12.7	10.7	5.2
SO_2 (0.4 gr/100 scf)	2.7	0.6	2.4	0.2
SO_2 (1 gr/100 scf)	6.7	1.6	6.1	0.4
PM_{10}	11.1	3.1	9.9	1.1

Notes:

CO = carbon monoxide
lb/hr = pounds per hour
NO_X = nitrogen oxide
PM_{10} = particulate matter 10 microns in diameter
SD = shutdown
SO_2 = sulfur dioxide
SU = start up
VOC = volatile organic compounds

Table 7.1-15
Estimated Stack Parameters and Emission Rates for WPGS Fuel Gas Heater

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	
Emission Rates	**(lb/hr)**	**(lb/yr)**
NO_x Emission Rate	0.15	657
CO Emission Rate	0.170	3,008
VOC Emission Rate	0.014	60.2
PM_{10} Emission Rate	0.015	64.5
SO_2 Emission Rate	0.014 (based on guaranteed gas sulfur content of 1.0 gr S/100 scf)	24.5 (based on expected maximum gas sulfur content of 0.4 gr S/100 scf)

Notes:

Except for SO_2, emissions estimates based on emission factors from FIRE ver 6.25. Using "process heaters from natural gas" (SCC 3-10-004-04).

Annual emissions based on assumed full capacity heater operation for 4,383 hours per year.

CO = carbon monoxide
gr S = grains of sulfur
lb/hr = pounds per hour
lb/yr = pounds per year
MMBtu/hour = million British thermal units per hour
NO_x = nitrogen oxide(s)
ºF = degrees Fahrenheit
PM_{10} = particulate matter less than or equal to 10 microns in diameter
scf = standard cubic feet
SO_2 = sulfur dioxide
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

Averaging Time	Worst-Case Emission Scenarios by Operating Equipment	Pollutant	Emissions in Pounds – Entire Period: Two FP10 Turbines	Emissions in Pounds – Entire Period: Fuel Gas Heater
1-hour	**NO_X:** Startup hour **CO:** Startup hour **SO_2 (1 gr/100 scf):** Startup hour	NO_x	77.4	0.15
		CO	559.6	0.17
		SO_2	13.4	0.014
3-hour	**SO_2 (1 gr/100 scf):** 1 startup. Fuel gas heater operating at maximum capacity throughout period.	SO_2	40.2	0.042
8-hour	**CO:** two startups, one shutdown and remainder of period at full load operation at 20°F ambient temperature. Fuel gas heater operating at maximum capacity throughout period.	CO	1,577.2	1.36
24-hour	**SO_2 (1 gr/100 scf):** continuous full-load turbine operation at 20ºF ambient temperature. Fuel gas heater operating at maximum capacity throughout period.	SO_2	308.6	0.336
	PM_{10}: three startups, three shutdowns, and the remainder of the period at continuous full-load turbine operation at 20ºF ambient temperature. Fuel gas heater operating at maximum capacity throughout period.	PM_{10}	486.0	0.360
Annual	**NO_x, SO_2, PM_{10}:** Operation with power augmentation for 4,000 hours at 59°F, without power augmentation for 322 hours, with 193 startups and 193 shutdowns. Fuel gas heater operating at maximum capacity throughout period.	NO_X	154,206	657
		SO_2	21,041	24.5
		PM_{10}	78,800	64.5

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
ºF = degrees Fahrenheit
FP10 = Flex Plant 10 unit
NO_X = nitrogen oxides
PM_{10} = particulate matter less than 10 micrometers in diameter
scf = standard cubic feet
SO_2 = sulfur dioxide

Table 7.1-17
Total Project Annual Emissions of Criteria Pollutants

Pollutant	Emissions (tons/year)		
	FP10 Units[1]	Fuel Gas Heater[2]	Total Project
NO_X	77.1	0.33	77.43
CO	142.4	0.38	142.78
VOC	28.5	0.03	28.53
SO_2	10.5	0.012	10.51
PM_{10}	39.4	0.03	39.43

Notes:
[1] FP10 emissions based on 4,383 hours of operation (4,000 hours with power augmentation, 322 hours normal operation, 193 startups, and 193 shutdowns).
[2] Fuel gas heater annual emissions based on 4,383 hours of operation at maximum capacity (5 million British thermal units per hour)
CO = carbon monoxide
FP10 = Flex Plant 10 unit
NO_X = nitrogen oxides
PM_{10} = particulate matter less than 10 micrometers in diameter
SO_2 = sulfur dioxide
VOC = volatile organic compounds

Table 7.1-18
Duration and Criteria Pollutant Emissions for Commissioning of a Single FP10 Unit (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 and Bypass Valve Tuning	32	60	60	382	2640	310	270
GT Load Test and 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 and 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 and 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 and 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 7.1-19
Estimated Greenhouse Gas Emissions from the Project

Emission Rate (metric tons/year)				
CO_2	CH_4	N_2O	SF_6	Total CO_2 Equivalent
987,970	72.65	25.34	0.003	997,438

Notes:
CH_4 = methane
CO_2 = carbon dioxide
N_20 = nitrous oxide
SF_6 = sulfur hexafluoride

Table 7.1-20
Surface Moisture Conditions for Years 2002-2005

Surface moisture condition by month for the Antioch Pump Plant 3 Station

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002	dry	dry	avg	dry	dry	dry	dry	dry	dry	dry	avg	wet
2003	avg	dry	avg	wet	wet	dry	dry	wet	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 7.1-21
Land Use Characteristics used in AERMET

Month	Sector	Range	Land Use Characteristics				
			Albedo (α)	Bowen Ratio (β) Average Surface Moisture	Bowen Ratio (β) Dry Surface Moisture	Bowen Ratio (β) Wet Surface Moisture	Surface Roughness (z_o) (m)
Jan	1	90°-270°	0.15	0.35	0.57	0.26	0.023
Jan	2	270°-90°	0.15	0.35	0.57	0.26	0.007
Feb	1	90°-270°	0.14	0.27	0.47	0.23	0.025
Feb	2	270°-90°	0.14	0.27	0.47	0.23	0.007
Mar	1	90°-270°	0.14	0.27	0.47	0.23	0.025
Mar	2	270°-90°	0.14	0.27	0.47	0.23	0.007
Apr	1	90°-270°	0.14	0.31	0.54	0.24	0.026
Apr	2	270°-90°	0.14	0.31	0.54	0.24	0.007
May	1	90°-270°	0.14	0.31	0.54	0.24	0.026
May	2	270°-90°	0.14	0.31	0.54	0.24	0.007
Jun	1	90°-270°	0.14	0.31	0.54	0.24	0.026
Jun	2	270°-90°	0.14	0.31	0.54	0.24	0.007
Jul	1	90°-270°	0.14	0.31	0.54	0.24	0.026
Jul	2	270°-90°	0.14	0.31	0.54	0.24	0.007
Aug	1	90°-270°	0.14	0.35	0.57	0.26	0.026
Aug	2	270°-90°	0.14	0.35	0.57	0.26	0.007
Sep	1	90°-270°	0.14	0.35	0.57	0.26	0.026
Sep	2	270°-90°	0.14	0.35	0.57	0.26	0.007
Oct	1	90°-270°	0.14	0.35	0.57	0.26	0.026
Oct	2	270°-90°	0.14	0.35	0.57	0.26	0.007
Nov	1	90°-270°	0.15	0.35	0.57	0.26	0.023
Nov	2	270°-90°	0.15	0.35	0.57	0.26	0.007
Dec	1	90°-270°	0.15	0.35	0.57	0.26	0.023
Dec	2	270°-90°	0.15	0.35	0.57	0.26	0.007

Table 7.1-22
WPGS Turbine Screening Results FP10 Combined-Cycle Units (Page 1 of 2)

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
	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	346	343.7	340	337	328.7	338	348	333	341	346	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)	21.479	18.752	15.260	19.587	17.378	13.694	19.860	19.059	18.763	17.979	16.282	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)	26.1	22.7	18.0	23.7	20.9	15.0	24.5	22.8	23.0	21.5	19.3	15.0
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	1.623	1.261
CO (g/s)	3.292	2.856	2.270	2.989	2.629	1.892	3.083	2.875	2.894	2.705	2.435	1.892
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

Table 7.1-22
WPGS Turbine Screening Results FP10 Combined-Cycle Units (Page 2 of 2)

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
Model Results – Maximum X/Q concentration (μg/m³/(g/s)) predicted from AERMOD (all receptors)													
1–hour		14.11850	15.01065	17.42864	14.68182	16.18494	18.72308	14.64591	14.76844	15.37029	15.65280	16.68121	19.27467
3–hour		6.86020	8.04961	9.72690	7.80241	8.85959	10.50651	7.72645	7.87138	8.31029	8.49814	9.21476	10.69859
8–hour		3.69092	3.97803	4.65019	3.87081	4.30786	4.94505	3.83739	3.90335	4.08284	4.16433	4.44611	5.02419
24–hour		1.30576	1.33382	1.55034	1.33132	1.43621	1.64866	1.33028	1.33219	1.36119	1.38836	1.48230	1.67505
annual		0.05248	0.06112	0.07999	0.05878	0.06897	0.09598	0.05806	0.05964	0.06332	0.06550	0.07309	0.10451
Maximum Concentration (μg/m³) Predicted per Pollutant Normal Operations (all receptors)													
NO_X	1 hour	**30.98070**	28.58445	26.37534	29.25434	28.37130	23.61188	30.10630	28.30946	29.65697	28.22809	27.07444	24.30750
	annual	0.11516	0.11639	0.12105	0.11712	0.12090	0.12104	0.11935	0.11432	0.12218	0.11812	0.11863	**0.13180**
CO	1 hour	**46.47104**	42.87667	39.56301	43.88151	42.55695	35.41783	45.15944	42.46419	44.48546	42.34213	40.61166	36.46125
	8 hour	**12.14866**	11.36291	10.55593	11.56921	11.32716	9.35439	11.83227	11.22343	11.81676	11.26486	10.82439	9.50409
SO_2	1 hour	**11.44851**	10.65094	9.85488	10.80940	10.52557	9.38774	11.09935	10.43942	10.94531	10.40093	9.97586	9.18441
	3 hour	5.56285	5.71167	5.49999	5.74448	5.76167	5.26796	5.85546	5.56407	**5.91783**	5.64682	5.51070	5.09789
	24 hour	**1.05882**	0.94642	0.87663	0.98018	0.93401	0.82664	1.00815	0.94169	0.96931	0.92253	0.88646	0.79816
	annual	0.01702	0.01735	0.01809	0.01731	0.01794	0.01925	0.01760	0.01686	0.01804	0.01741	0.01748	**0.01992**
PM_{10}	24 hour	1.64671	1.49706	1.56412	1.56142	1.50331	1.66331	1.49309	1.47843	1.45912	1.48824	1.43005	**1.68994**
	annual	0.06618	0.06860	0.08070	0.06894	0.07219	0.09683	0.06517	0.06619	0.06788	0.07021	0.07051	**0.10544**

Note: **Bold type** indicates highest concentration values for each pollutant and averaging time.

Table 7.1-23
NO_x and CO Emission Parameters for Turbine Startup Hours

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)
NO_X 1-hour	All turbines starting up with the remainder of the period at normal operations	334	47.9	38.7
CO 1-hour	All turbines starting up with the remainder of the period at normal operations	334	47.9	279.8

Notes:
CO = carbon monoxide
°F = degrees Fahrenheit
ft/sec = feet per second
lb/hr = pounds per hour
NO_X = nitrogen oxide(s)

Table 7.1-24
Maximum Modeled Criteria Pollutant Impacts Due to Willow Pass 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 (μg/m³)	Background[1] (μg/m³)	Maximum Total Predicted Concentration (μg/m³)	Most Stringent AAQS (μg/m³)	UTM Coordinates NAD27	
						East (m)	North (m)
Construction Impacts							
CO	1 hour	680.86	3,762	4,443	23,000	596,988	4,210,672
	8 hours	256.20	2,166	2,422	10,000	597,176	4,210,231
NO_2	1 hour[2]	228.1	109.04	337	339	597,375	4,210,199
	Annual[2]	3.20	22.56	26	57	597,374	4,210,692
PM_{10}	24 hours	49.73	84	134	50	596,985	4,210,449
	Annual	4.99	20	25	20	597,074	4,210,414
$PM_{2.5}$	24 hours	10.61	62	73	35	596,985	4,210,449
	Annual	1.09	10	11	12	597,074	4,210,414
SO_2	1 hour	36.58	122.67	159	655	596,400	4,207,300
	3 hours	31.18	65.25	96	1300	596,653	4,210,093
	24 hours	10.66	23.49	34	105	596,653	4,210,093
	Annual	0.18	7.83	8	80	596,826	4,209,831

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 with ambient ozone data collected at the Pittsburg monitoring station for the years 2002-2005.
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 μg/m³ (1 hour) and 57 μg/m³ (annual) became effective in March 2008

AAQS = ambient air quality standard
CO = carbon monoxide
μg/m³ = micrograms per cubic meter
NO_2 = nitrogen dioxide
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 7.1-25
AERMOD Modeling Results for WPGS Operations
(All Project Sources Combined)

Pollutant	Averaging Period	Maximum Predicted Impact (µg/m³)	Significant Air Quality Impacts (µg/m³)	Background Concentration (µg/m³)[1]	Total Concentration (µg/m³)	NAAQS (µg/m³)	CAAQS (µg/m³)	Maximum UTMX NAD27 (m)	Maximum UTMY NAD27 (m)
NO_2	1-hour[2]	33.4 (normal operations)	19[6]	109.04	142	NA	339[5]	593,375	4,206,250
		99.9 (startup operations)	NA	109.04	208.94	NA	339[5]	593,770	4,206,725
	Annual[2]	0.2	1.0	22.56	22.76	100	57[5]	597,073	4,210,413
SO_2	1-hour	13.7	NA	122.67	136.37	NA	655	593,375	4,206,250
	3-hour	8.2	25	65.25	73.45	1300	NA	593,400	4,206,250
	24-hour	1.1	5	23.49	24.59	365	105	594,875	4,205,725
	Annual	0.02	1.0	7.83	7.85	80	NA	597,925	4,210,575
CO	1-hour	30.8 (normal operations)	2,000	3,762	3,793	40,000	23,000	593,375	4,206,250
		721.4 (startup operations)	NA	3,762	4,483	40,000	23,000	593,750	4,206,725
	8-hour	51.7	500	2,166	2,218	10,000	10,000	596,050	4,204,550
PM_{10}	24-hour[3,4]	2.3	5	84	86.3	150	50	595,150	4,206,000
	Annual[3,4]	0.06	1.0	20	20.06	NA	20	597,925	4,210,575
$PM_{2.5}$	24-hour[3,4]	2.3	NA	62	64.3	35	NA	595,150	4,206,000
	Annual[3,4]	0.06	NA	10	10.06	15	12	597,925	4,210,575

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 with ambient ozone data collected at the Pittsburg air quality monitoring station for the years 2002-2005.
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 If predicted maximum 1-hour NO_2 concentration due to new sources is below this significant threshold, no further analysis is required. Otherwise, it must be demonstrated that the project's impacts plus background will be below applicable ambient air quality standards.

Table 7.1-26
Turbine 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 ($\mu g/m^3$)
Two FP10 Turbines commissioning with fuel gas heater	CO	1 hour	9,584	3,762	13,346	23,000
		8 hours	2,507	2,166	4,673	10,000
	NO_2[3]	1 hour	217.3	109.04	326.34	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.

CO = carbon monoxide
$\mu g/m^3$ = micrograms per cubic meter
NO_2 = nitrogen dioxide

Table 7.1-27
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
Issued Date	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>

Notes:

CO = carbon monoxide
NO_X = nitrogen oxide(s)
PM_{10} = particulate matter less than 10 microns in diameter
SO_2 = sulfur dioxide
VOC = volatile organic compounds

Table 7.1-28
Estimated Emission Credit Requirements to Offset Project Emissions

Pollutant	Total WPGS Potential Emissions (ton/yr)	New Source Review Offset Ratio	Offsets Required (ton/yr)	Current ERC Holdings (ton/yr)	Holdings After Offsets for Marsh Landing Generating Station are Deducted (ton/yr)	Holdings After Offsets for Marsh Landing and Willow Pass Generating Stations are Deducted (ton/yr)
NO_X	78.6	1.15	90.39	485.7	376.1	285.71
CO	142.78	0	0	579.2	579.2	579.2
VOC	28.53	1.15	32.8095	78.0	38.3	5.49
SO_2	10.51	1	10.51	130.2	117.7	107.19
PM_{10}	39.43	1	39.43	234.2	187.8	148.37

Notes:

CO = carbon monoxide
NO_X = nitrogen oxide(s)
PM_{10} = particulate matter less than 10 microns in diameter
SO_2 = sulfur dioxide
VOC = volatile organic compounds

Table 7.1-29
BACT Determination for the WPGS Emission Sources

Determination #	***BAAQMD BACT Guideline 89.1.6***	
Turbine Category	***Combined-Cycle (≥ 40 Megawatts)***	
Pollutant	**BACT**	**Typical Technology**
	1. Technologically Feasible/Cost Effective	
	2. Achieved in Practice	
POC	1. n/d	1. n/d
	2. 2.0 ppm, Dry at 15%O_2	2. Oxidation Catalyst, or Efficient Dry Low-NO_X Combustors
NO_X	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 (2.0 ppm achieved in practice for 50 MW LM6000 combined cycle unit.)	2. SCR+ Dry Low-NO_X Combustors
SO_2	1. n/d	1. n/d
	1. Natural Gas Fuel (sulfur content not to exceed 1.0 grain/100 scf)	2. Exclusive use of CPUC-regulated grade natural gas
CO	1. n/d	1. n/d
	2. 4.0 ppm, Dry @15% O_2	2.. Oxidation Catalyst
PM_{10}	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
NPOC	1. n/a	1. n/a
	2. n/a	2. n/a

Notes:

BAAQMD	=	Bay Area Air Quality Management District
BACT	=	Best Available Control Technology
CO	=	carbon monoxide
FP10	=	Flex Plant 10 unit
NO_X	=	nitrogen oxide(s)
NPOC	=	non-precursor organic compound
PM_{10}	=	particulate matter less than 10 microns in diameter
POC	=	precursor organic compound
SO_2	=	sulfur dioxide

Table 7.1-30
Summary of Proposed Best Available Control Technology

Pollutant	Control Technology	Concentration
FP10 Combined-Cycle Turbines Units		
NO_X	Ultra low NO_X burner, SCR	2.0 ppmvd (1-hr 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	NA
PM_{10}	Pipeline quality natural gas	NA
Ammonia slip	Operational limitation	5.0 ppmvd at 15 percent O_2

Notes:
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
ppmvd = parts per million by volume, dry basis
SCR = Selective catalytic reduction
SO_2 = sulfur dioxide
VOC = Volatile organic compounds

Table 7.1-31
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 [8]	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)	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 (1300 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 [6]		20 μg/m^3
Fine Particulate Matter ($PM_{2.5}$) [7]	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 a.m. to 6 p.m., Pacific Standard Time)			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.

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. CAAQS 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. 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).
7. 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).
8. 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.

CAAQS = California Ambient Air Quality Standards
μg/m^3 = micrograms per cubic meter
mg/m^3 = milligram per cubic meter
NAAQS = National Ambient Air Quality Standards
ppm = parts per million

Table 7.1-32
Attainment Status of Contra Costa County with Respect to Federal and California Ambient Air Quality Standards

Pollutant	Federal Attainment Status	State Attainment Status
O_3	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
O_3 = ozone
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 7.1-33
PSD Emission Threshold Triggers for New Stationary Sources

Pollutant	Significant Thresholds (tpy)	Project Emissions (tpy)	PSD Triggered by Project?
CO	100	142.78	Yes
SO_2	40	10.51	No
NO_X	40	77.43	Yes
PM_{10}	15	39.43	Yes
VOCs	40	28.53	No

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

Table 7.1-34 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-hr maximum	8
SO_2	Annual arithmetic mean	2
	24-hr maximum	5
	3-hr maximum	25
NO_2	Annual arithmetic mean	2.5
Class II		
PM_{10}	PM_{10} Annual arithmetic mean	17
	PM_{10} 24-hr maximum	30
SO_2	Annual arithmetic mean	20
	24-hr maximum	91
	3-hr 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 7.1-35
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 7.1-35
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 7.1-35
Applicable Air Quality Laws, Ordinances, Regulations, and Standards
(Page 3 of 3)

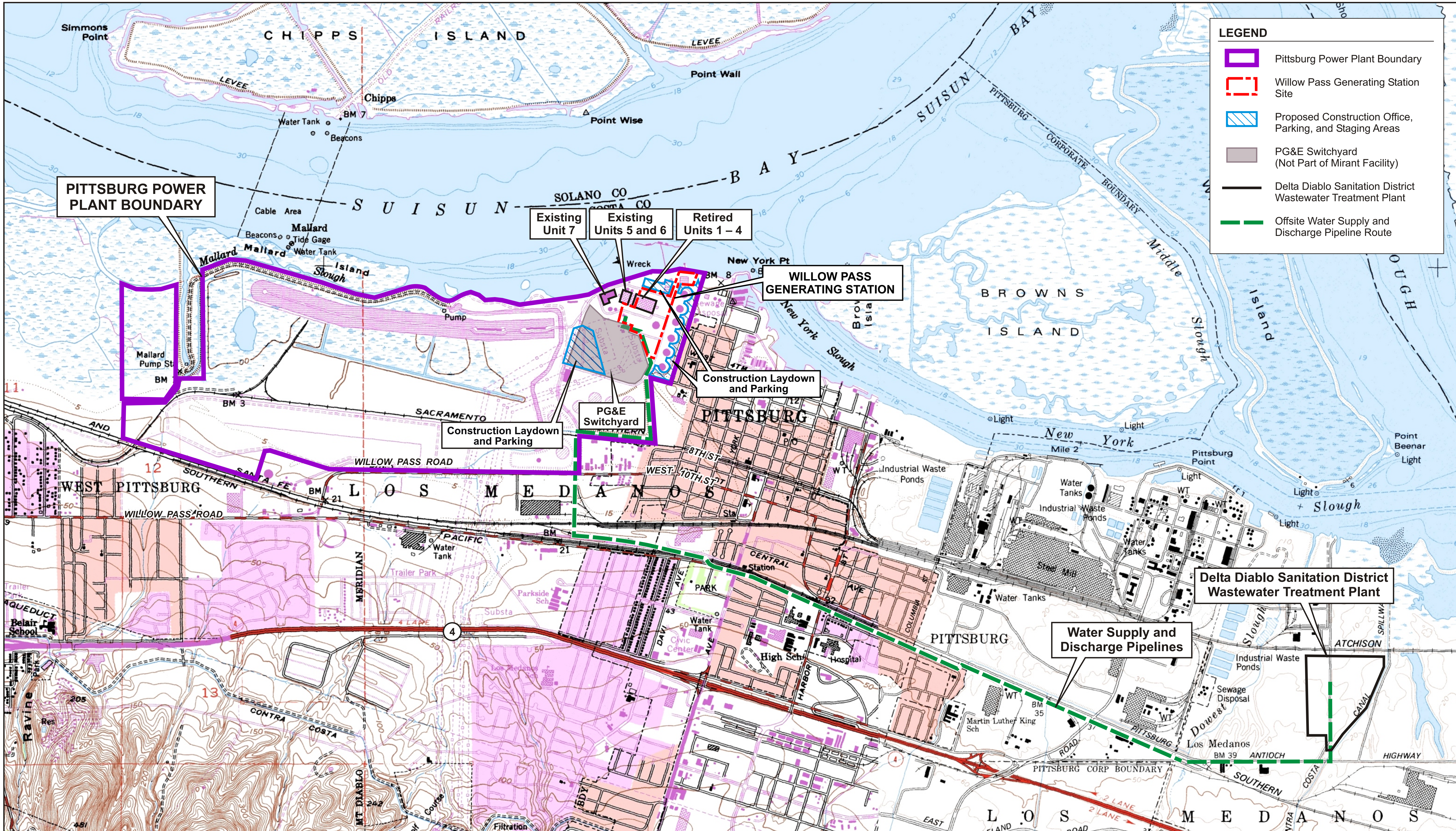
Laws, Ordinances, Regulations, and Standards	Applicability	Administering Agency	AFC Section
BAAQMD Regulation II, Rule 2 New Source Review	Requires pre-construction review for new, modified, or relocated facilities to ensure that the facility does not interfere with progress in attainment of the NAAQS. 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 1 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 7.1-36
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 7.1-37
Permits Required

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



Source:
USGS Topographic Maps, 7.5 Minute Series:
Honker Bay, CA (Rev. 1980) and
Antioch North, CA (1978)

GENERAL VICINITY AND PROJECT BOUNDARY

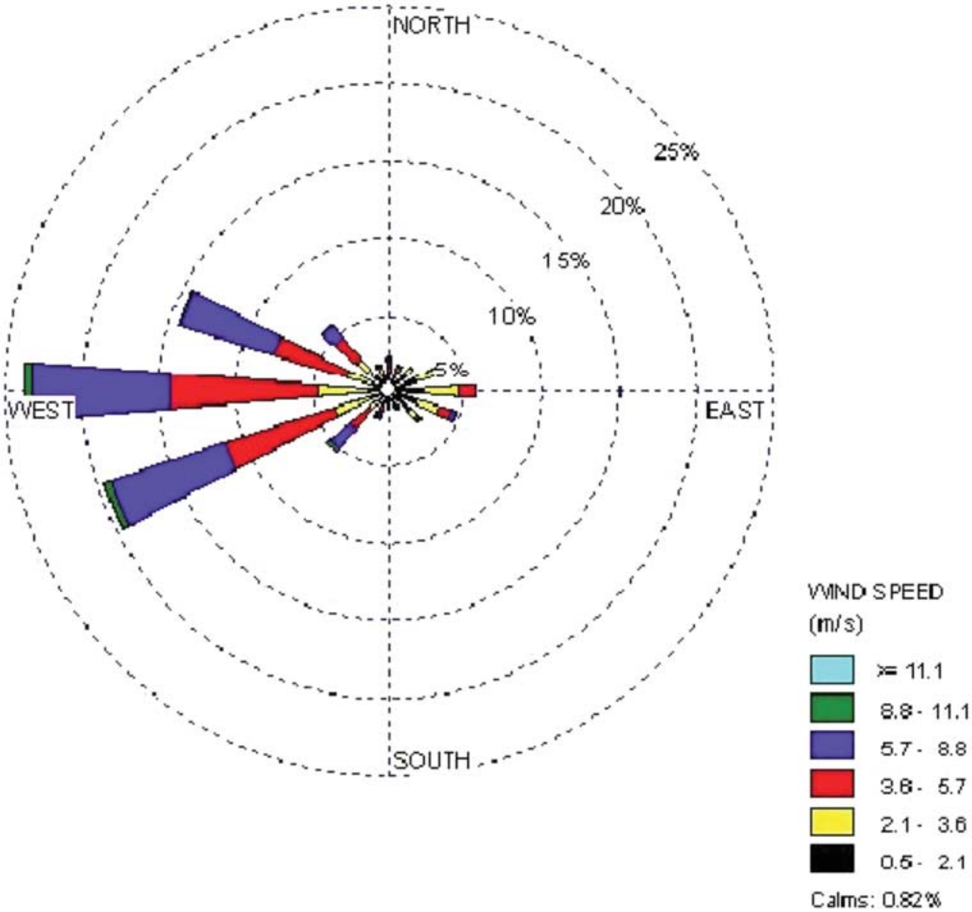
June 2008
28067343

Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

URS

FIGURE 7.1-1

6/26/08 vsa ..T:\Mirant Pittsburg-Willow Pass\Graphics\7.01 Air Quality\7.1-1_gen vicin_11x17.cdr



Annual wind rose for Pittsburg Onsite Meteorological Station
Data taken from 2002-2005 for all months.

Displays wind speed, direction (blowing from)

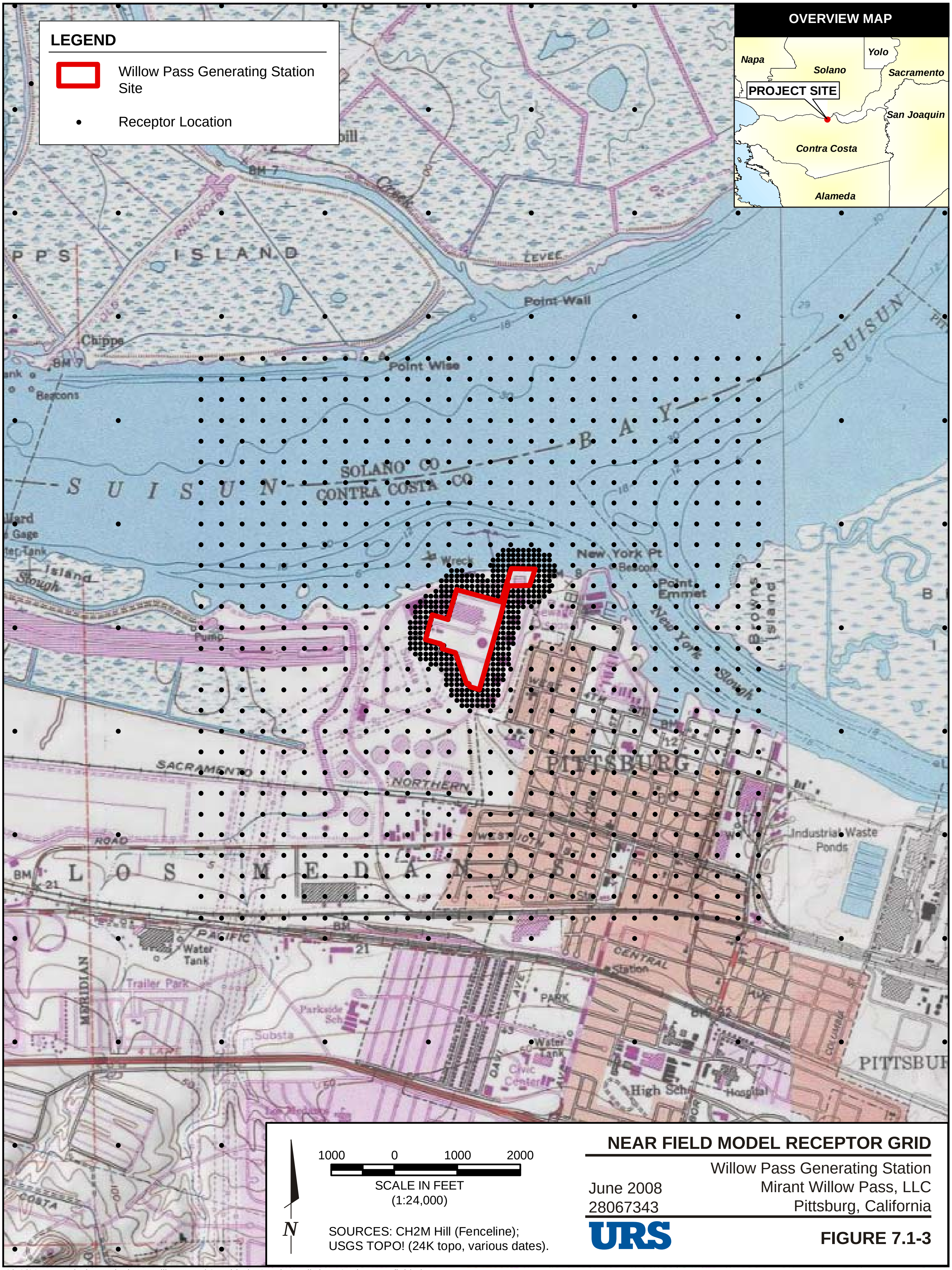
ANNUAL WIND ROSE FOR 2002-2005

Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 7.1-2



1000 0 1000 2000

SCALE IN FEET
(1:24,000)

N

SOURCES: CH2M Hill (Fenceline);
USGS TOPO! (24K topo, various dates).

NEAR FIELD MODEL RECEPTOR GRID

Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

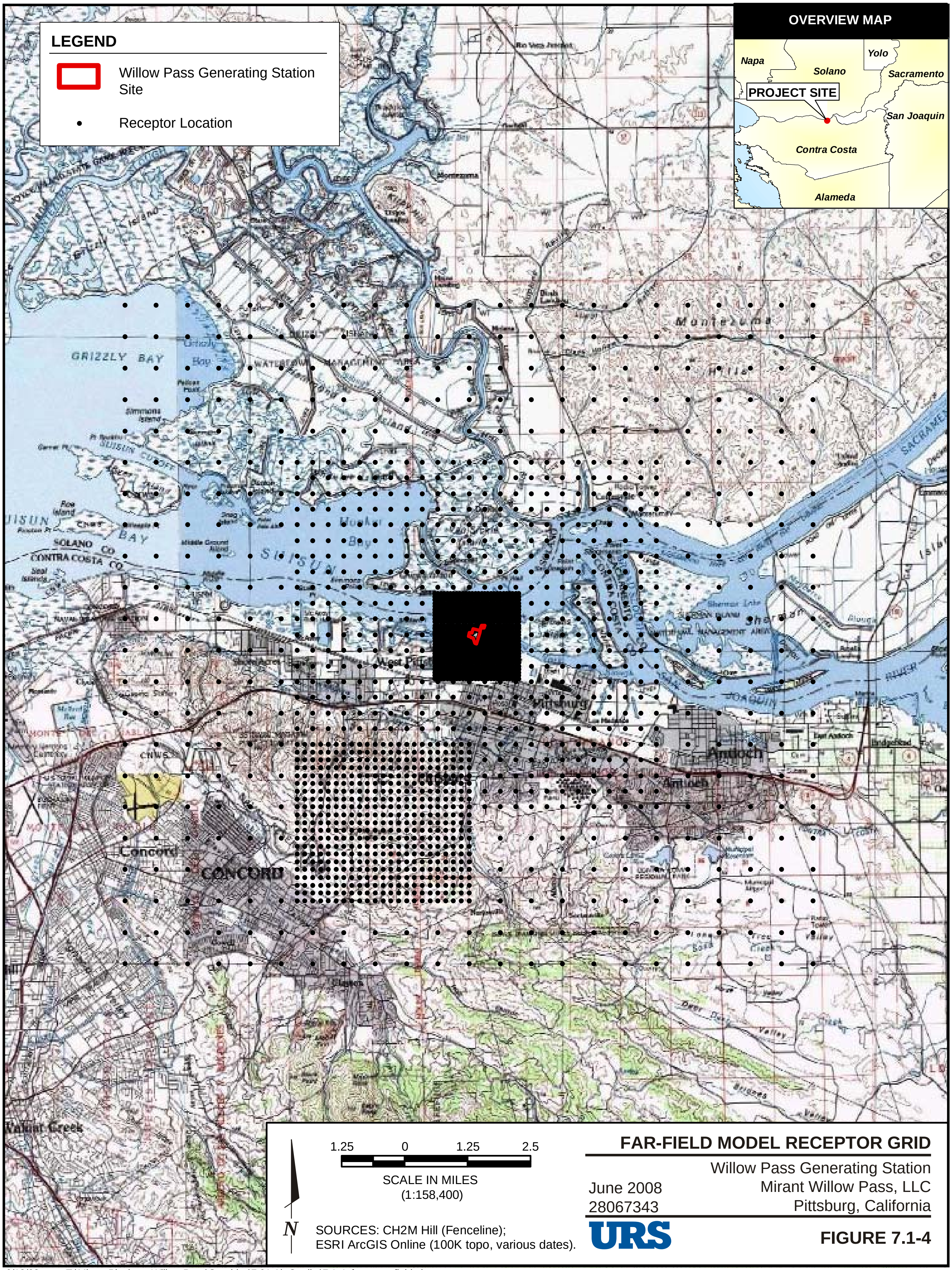
June 2008
28067343

URS

FIGURE 7.1-3

Path: G:\gis\projects\1577\28067343\mxd\air_near_field_.mxd, 06/16/08,

6/18/08 vsa ..T:\Mirant Pittsburg-Willow Pass\Graphics\7.01 Air Quality\7.1-3_air_near_field.ai



SOURCES: CH2M Hill (Fenceline);
ESRI ArcGIS Online (100K topo, various dates).

FAR-FIELD MODEL RECEPTOR GRID

Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

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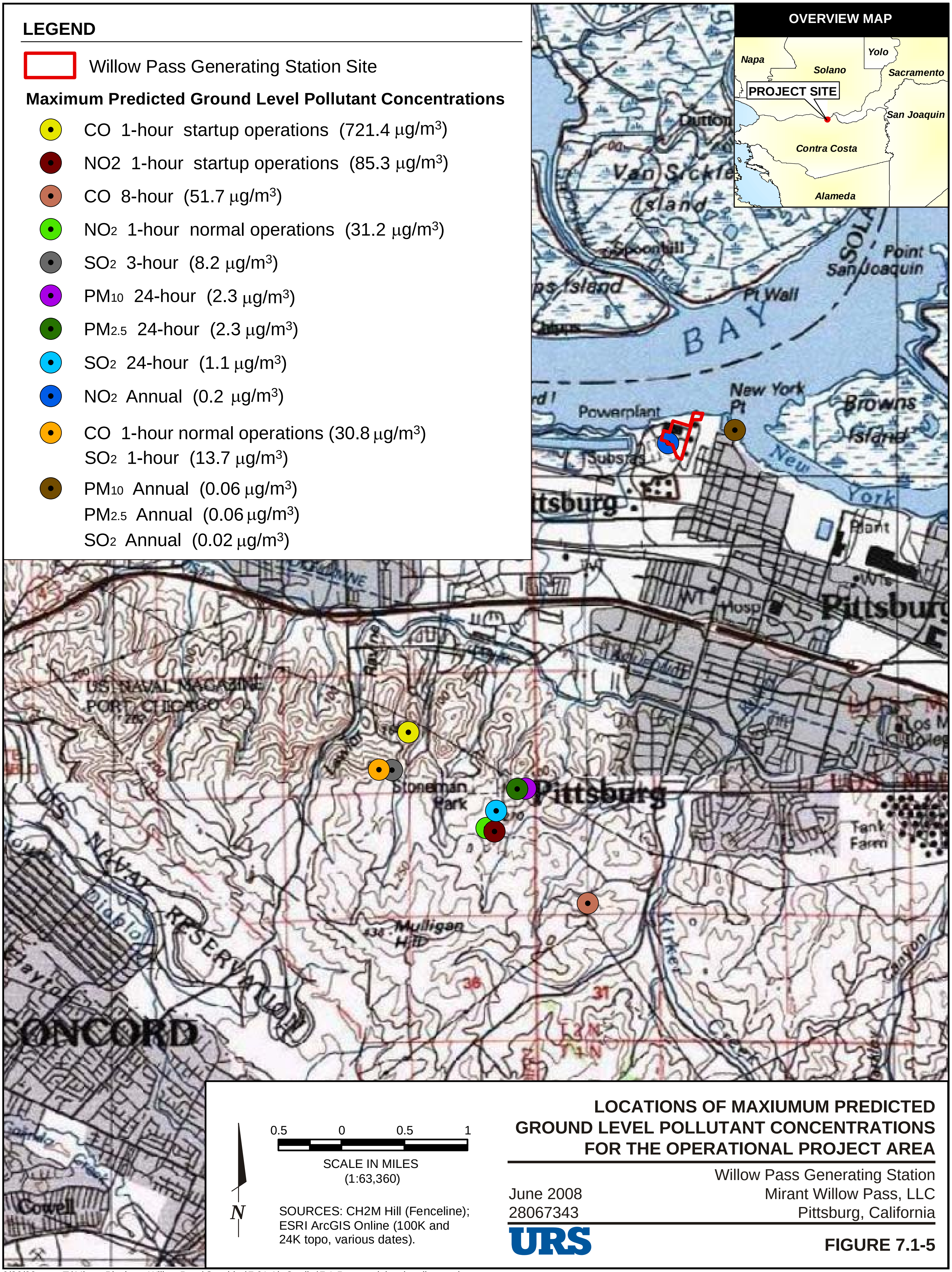
FIGURE 7.1-4

Path: G:\gis\projects\1577\28067343\mxd\air_far_field_.mxd, 06/16/08.

6/18/08 vsa ..T:\Mirant Pittsburg-Willow Pass\Graphics\7.01 Air Quality\7.1-4_far_near_field.ai



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

Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

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FIGURE 7.1-5

Path: G:\gis\projects\1577\28067343\mxd\air_ground_level_pollutant.mxd, 06/16/08,

6/26/08 vsa ..T:\Mirant Pittsburg-Willow Pass\Graphics\7.01 Air Quality\7.1-5_ground_level_pollutant.ai