5.2 AIR QUALITY

This section describes the analysis of the potential air quality impacts of SJS 1&2. The analysis has been conducted according to CEC power plant siting requirements, and also addresses San Joaquin Valley Air Pollution Control District (SJVAPCD) permitting requirements for Determination of Compliance/Authority to Construct (DOC/ATC). The details of the air quality assessment of the project are contained in the following subsections:

- Section 5.2.1, Affected Environment, describes elements of the local environment that are relevant to evaluation of the Project's potential air quality impacts. These include topography, climate, and existing air quality. The most representative meteorological data, including wind speed and direction, temperature, relative humidity, and precipitation, and the most representative recent measurements of ambient air pollutant concentrations in the Project vicinity are summarized. Air pollutants emitted by the Project may travel in the atmosphere over long distances, but for practical purposes, the Project air quality study area can be considered to be the southern portion of Fresno County.
- Section 5.2.2, Environmental Consequences, evaluates the maximum potential air quality impacts due to the Project's emissions of nitrogen oxides (NO_x), carbon monoxide (CO), sulfur oxides (SO_x), volatile organic compounds (VOC), particulate matter less than 10 microns in diameter (PM_{10}), and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). Estimated emissions of these pollutants are presented for the construction and operational phases of the Project. The modeling analyses conducted for the emissions of nitrogen dioxide (NO_2), CO, sulfur dioxide (SO_2), and particulate matter ($PM_{2.5}$ and PM_{10}) are presented. The results show that the Project will neither cause an exceedance of the California and/or National Ambient Air Quality Standards (CAAQS and NAAQS), nor contribute significantly to an existing exceedance.
- Section 5.2.3, Cumulative Impact Analysis, addresses the cumulative impacts of the Project emissions with other potential new sources of air pollution in the area around SJS 1&2.
- Section 5.2.4, Mitigation Measures, describes the emission mitigation measures proposed for the Project construction and the operational project emission offsets strategy, including emission reduction credits (ERCs) that are proposed to offset project sources.
- Section 5.2.5, Best Available Control Technologies (BACT), describe the BACT requirement and the proposed BACT to minimize the emissions from the equipment of the proposed project.
- Section 5.2.6, LORS Compliance, describe applicable Laws, Ordinances, Regulations, and Standards pertaining to air quality aspects of the project. This section also provides an analysis of BACT for all project sources. This section includes lists of the agency personnel contacted during preparation of the air quality assessment and the permits required by the project and their anticipated schedule.
- Section 5.2.7, References, list the references used to conduct the air quality assessment.

The focus of this assessment of the Project's potential air quality impacts is on criteria pollutants, *i.e.,* those pollutants for which federal and California ambient standards have been promulgated. Information on the Project's emissions of toxic air contaminants and the associated health risks are presented in Section 5.16,

Public Health and Safety. In addition, Section 3.0, Facility and Project Description, presents information relating to the fuel characteristics, heat rate and operating limits.

5.2.1 Affected Environment

This section describes the regional climate and meteorological conditions that influence transport and dispersion of air pollutants and the existing air quality within the Project region. The data presented in this section are considered to be reasonably representative of the Project Site.

The SJS 1&2 site is located in an undeveloped area of the southwestern Fresno County, California. The Project site is approximately 6 miles (9.6 kilometers [km]) east of City of Coalinga, and approximately 3 miles (4.8 km) west of the intersection of Interstate 5 (I-5) and West Jayne Avenue. The Project site will encompass approximately 640 fenced acres. The Project site is generally flat and presently zoned agricultural. The surrounding area is devoted almost exclusively to agricultural uses, including farming and rangeland activities. Recent developments include the construction of the Pleasant Valley State Prison and the Coalinga State Hospital, both located on the section of land immediately west of the Project site.

Few residences exist near the Project site, with the closest located approximately 1,300 feet (400 meters) northeast of the site boundary. Figure 5.2-1 shows the general vicinity of the proposed Project; Figure 5.2-2 shows the proposed facility layout, and fence line defining the proposed Project site.

5.2.1.1 Climate and Meteorology

Fresno County is classified as having a mild climate characterized by low precipitation, warm summers, mild winters, and temperature inversions. It is separated from the coastal regions by the Diablo and Coastal mountain ranges to the northwest, southwest, and west. The area's climatic conditions are strongly influenced by the large-scale sinking and warming of air in the semi-permanent subtropical high-pressure center over the eastern Pacific. This high pressure system effectively blocks out most mid-latitude storms, except in winter when the ridge is weaker and farther south. The coastal mountains on the western edge of the San Joaquin Valley also have a major influence on local climate, serving as a barrier that effectively removes moisture from the marine air flowing inland from the Pacific. An annual wind rose representing data collected at Hanford Municipal Airport during 2004 is presented on Figure 5.2-3. Seasonal wind roses are provided in Appendix B-1.

The generally flat terrain of the valley floor in the San Joaquin Valley area and the strong temperature differentials created by intense solar heating, produce moderate winds and deep thermal convection currents. Subsiding air, protective mountains, and distance from the ocean all combine to severely limit precipitation. The valley area frequently experiences surface inversions in the early morning hours throughout the year, causing air stagnation. These inversions are usually broken by noon due to solar heating of the earth's surface.

Temperature and precipitation means and extremes from the nearest long-term National Climatic Data Center (NCDC) in Coalinga over a 30-year period (1971 through 2000) are presented in Table 5.2-1. The coordinates of this weather station are: latitude 36°09'N, longitude 120°21'W. The hottest month, July, has a highest mean temperature of 86.8 degrees Fahrenheit (ºF) and a lowest mean temperature of 77.3°F. The

coldest month, December, has a highest mean temperature of 52.2°F, and a lowest mean temperature of 42.3°F.

Table 5.2-1
Climatological Normals – Historical Temperature and Precipitation Data in Coalinga (National Climate Data Center 1971-2000 Monthly Normals)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Highest Mean Temperature (°F)	54.3	58.3	62.3	68.3	77.2	81.3	86.8	85.0	81.7	72.8	61.4	52.2	86.8
Lowest Mean Temperature (°F)	42.4	49.5	51.9	55.7	62.3	72.3	77.3	75.8	71.0	62.8	50.7	42.3	42.3
Mean Precipitation (in.)	1.78	1.75	1.55	0.46	0.24	0.06	0.01	0.04	0.32	0.38	0.64	1.07	8.30

Source: COALINGA (COOP041864), from NCDC Station Historical Listing for NWS Cooperative Network, Western Regional Climate Center (WRCC) Web site.

Note:

°F = degrees Fahrenheit
in = inches

During winter, the semi-permanent, subtropical high pressure system over the Pacific Ocean moves south, allowing the passage of frontal systems that bring most of the area's annual precipitation, which totals 8.3 inches on average. Monthly mean precipitation amounts measured in Coalinga range from 1.78 inches in January to 0.01 inches in July. During summer, migrating storm systems are blocked by the semi-permanent Pacific high, and local rain associated with these storms is scarce. Relative humidity levels are generally moderate. The nearest meteorological station that measures relative humidity is in Fresno. In the summer, relative humidity averages 60 to 70 percent in the early morning and about 20 percent in the afternoon. In winter, relative humidity averages 90 percent in the early morning and 50 to 70 percent in the afternoon.

During the winter months the surface heating is less intense, and the rapid cooling of the surface layers at night retards the exchange of momentum between vertical atmospheric layers. As a result, winds are generally calmer in winter, except during the passage of frontal storm systems. During all seasons, the prevailing wind direction is from the northwest.

5.2.1.2 Existing Air Quality

Ambient air quality standards have been set by both the federal government and the state of California to protect public health and welfare with an adequate margin of safety. Pollutants for which NAAQS or CAAQS have been set are often referred to as "criteria" air pollutants. This term is derived from the comprehensive review of health and damage effects that culminates in pollutant-specific air quality criteria documents that precede and form the basis for establishment of NAAQS. California has promulgated its

own standards, the CAAQS, which are generally more stringent than the NAAQS. These standards are reviewed on a prescribed frequency and revised as warranted by the emergence of new data on the effects of specific air pollutants on health and welfare. Each NAAQS or CAAQS specifies a concentration and an averaging time over which the concentration is measured. Different averaging times are based on protection against short-term, high-dosage effects versus longer-term, low-dosage effects. NAAQS, other than the annual standards, may be exceeded no more than once per year. CAAQS are not to be exceeded.

The ambient air quality near the Project is monitored at a number of permanent air quality monitoring stations operated by the SJVAPCD and CARB. The closest monitoring station to the Project site is the Hanford-S Irwin Street Station, located in Kings County about 35 miles northeast of the Project site. This station measures ozone (O_3), PM_{10}, and NO_2. The nearest CO monitoring station to the Project site is the Fresno-Drummond Street Station, located about 48 miles northeast of the Project site. The nearest $PM_{2.5}$ monitoring station is the Corcoran- Patterson Station, located about 37 miles east of the Project site, and it also measures PM_{10}. The closest SO_2 monitoring station to the Project site is the Fresno-Fremont School Station, located about 50 miles northeast of the Project site. The closest lead monitoring station to the Project site is the Fresno-Parlier Station, located about 52 miles northeast of the Project site. The other monitoring stations nearest to the Project site are: Hanford-NWS/NOAA (35 miles to the northeast), Fresno-Hamilton and Winery (50 miles to the northeast), and Visalia-N Church Street (54 miles to the northeast). Air quality measurements taken at these stations are presented in Tables 5.2-2 through 5.2-8.

For the air quality impact analysis described in Section 5.2.2.4, the maximum recorded concentrations from the most recent 3 years (2005 to 2007) at the nearest three monitoring stations were reviewed and the most representative data were selected to characterize peak background air quality levels for purposes of the air quality impact modeling analysis.

5.2.1.2.1 Ozone (O3)

Ozone is an end product of complex reactions involving atmospheric VOC and NO_x in the presence of ultraviolet radiation. VOC and NO_x emissions from mobile and stationary sources, combined with light daytime wind flow, mountain barriers, temperature inversions, and intense sunlight, generally result in the highest O_3 concentrations within the San Joaquin Valley. For purposes of both state and federal air quality planning, the entire San Joaquin Valley air basin is classified as a non-attainment area with respect to both state and national ambient standards for ozone.

On 15 June 2005 the 1-hour federal ozone standard was revoked for all areas except the 8-hour O_3 nonattainment Early Action Compact (EAC) areas. EAC areas are those areas that do not yet have an effective date for their 8-hour designations pursuant to Section 40 of the Code of Federal Regulations (CFR) 50.9(b). Since there are no EAC areas in California, the 1-hour federal O_3 standard is no longer in effect within any California air basin.

Table 5.2-2 summarizes peak O_3concentration measurements recorded during the most recent three years of data collection [2005 through 2007] at the nearest monitoring stations (Hanford-S Irwin Street and Parlier). As seen in this table, the 1-hour O_3 California Ambient Air Quality Standards (CAAQS) of 0.09 parts per million (ppm) has been exceeded several times each year from 2005 through 2007 at both stations, with much more frequent exceedances at the Parlier Station.

The current federal 8-hour average O_3 standard of 0.075 ppm was announced by the Environmental Protection Agency (EPA) on March 12, 2008 to replace the previous 0.08 ppm standard, and became effective on May 27, 2008. The current federal standard requires maintaining 0.075 ppm as a 3-year average of the fourth-highest daily maximum values. Therefore, the number of days that the maximum concentration exceeds the standard concentration is not the number of violations of the standard for the year. The federal 8-hour O_3 NAAQS has been exceeded many times at the two nearest monitoring stations. As supported by the data in Table 5.2-2, the Project site is located in an area that is designated nonattainment with respect to both the federal 8-hour and state 1-hour O_3 standards.

The maximum recorded 1-hour and 8-hour O_3 concentration during the most recent three years of data collection are 0.131 and 0.108 ppm, respectively. Both values were recorded in 2006 at the Parlier station.

Table 5.2-2
Concentration Data Summary for Ozone

Year	Highest Concentration for O_3 (ppm)		Estimated Number of Days Exceeding Standards	
	1-Hour	8-Hour	State 1-Hour	State 8-Hour
Hanford-S Irwin Street Station				
2007	0.102	0.091	2	20
2006	0.127	0.102	7	57
2005	0.120	0.098	6	38
Parlier Station				
2007	0.113	0.096	18	54
2006	0.131	0.108	52	85
2005	0.125	0.100	36	66

Source: California Air Resources Board (CARB) – California Air Quality Data Web site (http://www.arb.ca.gov/aqd/aqdpage.htm); EPA AirData (http://www.epa.gov/air/data/index.html).

Notes:

EPA strengthened the 8-hour average ozone standard from 0.08 to 0.075 ppm on 12 March 2008. The new standard became effective on 27 May 2008. However, exceedances of the standard from 2004 to 2007 were based on the previous standard of 0.08 ppm.
The state ozone standards are 1-hour average (0.09 ppm) and 8-hour average (0.07 ppm).
Monitoring site address: Hanford-S Irwin Street Station (807 S Irwin St., Hanford CA 93230); Parlier Station (13900 tuolumne street, Parlier ca 93648)

O_3 = ozone
ppm = parts per million
EPA = Environmental Protection Agency

5.2.1.2.2 Particulate Matter

PM_{10} in the air occur as windblown fugitive dust (*e.g.,* road dust), particles emitted from combustion sources [primarily carbon particles]; and organic, sulfate, and nitrate aerosols formed in the air from emitted hydrocarbons, SO_x, VOC and NO_x). Respirable particulate matter is referred to as PM_{10}, which consists of particles with a diameter equal to or less than 10 microns.

PM_{10} can contribute to increased respiratory disease, lung damage, cancer, premature death, reduced visibility, and surface soiling. In 1987, the EPA adopted standards for PM_{10} and phased out the total suspended particulate (TSP) standards that had previously been in effect.

Table 5.2-3 shows the maximum daily PM_{10} levels recorded at the Hanford-S Irwin Street, Hanford-NWS/NOAA, and Corcoran- Patterson stations during the period from 2005 through 2007. The table also provides information on arithmetic annual averages for the same period (the arithmetic annual average is simply the arithmetic mean of all daily observations within a calendar year). PM_{10} is monitored based on differing state and federal protocols in California. 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. Table 5.2-3 shows that the state 24 hour average PM_{10} Ambient Air Quality Standards (AAQS) of 50 micrograms per cubic meter ($\mu g/m^3$) was frequently exceeded at the Hanford-S Irwin Street and Corcoran- Patterson stations within the last 3 years. The federal 24-hour average PM_{10} AAQS of 150 $\mu g/m^3$ was not exceeded during the last 3 years at the Hanford-S Irwin Street and Hanford-NWS/NOAA stations. The Corcoran- Patterson station, with a maximum recorded 24-hour PM_{10} concentration of 255 $\mu g/m^3$ in 2006, exceeded the NAAQS 13 times of in 2006.

Similar to the maximum recorded 24-hour PM_{10} concentration, the highest annual arithmetic mean for a PM_{10} concentration of 46.8 $\mu g/m^3$ in 2006 at the Hanford-S Irwin Street station was selected to represent a conservatively representative background concentration in the air quality impact analysis. The Project site is designated nonattainment area with respect to state PM_{10} standards, but the SJVAPCD was redesignated as attainment with respect to the federal standards in September 2008.

Table 5.2-3
Concentration Data Summary for Coarse Particulate Matter (PM_{10})

Year	Highest 24-Hour Concentration for PM_{10} ($\mu g/m^3$)		Annual Arithmetic Mean for PM_{10} ($\mu g/m^3$)	Estimated Number of Days Exceeding Standards	
	Federal	State		Federal 24-Hour	State 24-Hour
Hanford-S Irwin Street Station					
2007	100	106	44.4	0	145
2006	142	150	46.8	0	125
2005	117	118	41	0	110
Hanford-NWS/NOAA					
2007	111	111	*	*	*

Table 5.2-3
Concentration Data Summary for Coarse Particulate Matter (PM_{10})
(Continued)

Year	Highest 24-Hour Concentration for PM_{10} (µg/m³)		Annual Arithmetic Mean for PM_{10} (µg/m³)	Estimated Number of Days Exceeding Standards	
	Federal	State		Federal 24-Hour	State 24-Hour
2006	*	*	*	*	*
2005	*	*	*	*	*
Corcoran- Patterson Station					
2007	123	125	45.7	0	134
2006	254	**255**	42.8	13	123
2005	131	137	42.6	0	126

Source: California Air Resources Board -California Air Quality Data Web site (http://www.arb.ca.gov/aqd/aqdpage.htm); EPA AirData (http://www.epa.gov/air/data/index.html).

Notes:

The federal PM_{10} standard is 24-hour average (150 µg/m³).

The state PM_{10} standards are annual arithmetic mean (20 µg/m³) and 24-hour average (50 µg/m³).

Monitoring site address: Hanford-S Irwin Street Station (807 S Irwin St., Hanford CA 93230); Hanford-NWS/NOAA Station (900 Foggy Bottom Road, Hanford, CA 93230-5236); Corcoran- Patterson Station (1520 Patterson Av.; Corcoran CA 93212).

µg/m³ = micrograms per cubic meter

PM_{10} = particulate matter less than 10 microns in diameter

5.2.1.2.3 Fine Particulates ($PM_{2.5}$)

Fine particulates in the atmosphere result from fuel combustion in motor vehicles and industrial processes, residential and agricultural burning, and atmospheric reactions involving NO_x, SO_x, and organics. Fine particulates are referred to as $PM_{2.5}$ and have a diameter equal to or less than 2.5 microns, and thus constitute a portion of PM_{10} pollution. The potential health effects of $PM_{2.5}$ are considered more serious than those of PM_{10}. In 1997, EPA established annual and 24-hour NAAQS for $PM_{2.5}$ for the first time. The most recent revision to the original standard regulating the 3-year average of the 98th percentile of 24-hour $PM_{2.5}$ concentrations (35 µg/m^3) became effective on December 17, 2006.

The $PM_{2.5}$ data presented in Table 5.2-4 for the Corcoran- Patterson, Fresno-Hamilton and Winery, and Parlier stations show that the federal 24-hour average NAAQS of 35 µg/m^3 was exceeded several times in each year from 2005 to 2007 at the Corcoran- Patterson and Fresno-Hamilton and Winery stations. The highest 24-hour $PM_{2.5}$ concentration of 143.2 µg/m^3 was measured during 2007 at the Corcoran- Patterson station. No separate California standard for this pollutant has been established for the 24-hour averaging time.

The annual average $PM_{2.5}$ data are also presented in Table 5.2-4. The methods for measuring the annual arithmetic mean for $PM_{2.5}$ differ between federal and state standards. The state standard uses gravimetric

or beta attenuation, while the federal standard is based on inertial separation and gravimetric analysis. The maximum annual arithmetic mean concentration recorded was 21.2 µg/m^3 in 2007 at the Corcoran-Patterson Station, which is above both the federal annual $PM_{2.5}$ NAAQS of 15 µg/m^3 and the California $PM_{2.5}$ ambient air quality standard of 12 µg/m^3. The Project site is in a nonattainment area with respect to both the federal and state $PM_{2.5}$ standards.

Table 5.2-4
Concentration Data Summary for Fine Particulate Matter ($PM_{2.5}$)

Year	Highest 24-hour Concentration for $PM_{2.5}$ (µg/m^3)	Annual Arithmetic Mean for $PM_{2.5}$ (µg/m^3)		Estimated Number of Days Exceeding Standards
	Federal	Federal	State	Federal
Corcoran- Patterson Station				
2007	143.2	18.4	21.2	4
2006	74.2	16.9	*	3
2005	92.5	17.5	17.5	9
Fresno-Hamilton and Winery Station				
2007	65.1	16.8	16.8	0
2006	87.0	17.6	*	3
2005	79.0	16.9	16.9	9
Parlier Station				
2007	70.5	*	*	*
2006	69.0	*	*	*
2005	*	*	*	*

Source: California Air Resources Board-California Air Quality Data Web site (http://www.arb.ca.gov/aqd/aqdpage.htm); EPA AirData (http://www.epa.gov/air/data/index.html).

Notes:

*There was insufficient (or no) data available to determine the value.

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: Corcoran- Patterson Station (1520 Patterson Av.; Corcoran, CA 93212); Fresno-Hamilton and Winery Station (E Hamilton Ave & S Winery Ave. Fresno, CA 93727); Parlier Station (13900 tuolumne street, Parlier ca 93648).

µg/m^3 = micrograms per cubic meter

$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter

5.2.1.2.4 Carbon Monoxide

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 in some areas. 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 Fresno-Drummond Street are summarized in Table 5.2-5. The data in the table indicate that maximum 1-hour average CO levels comply with the NAAQS (35.0 ppm) and CAAQS (20.0 ppm). The maximum 1-hour CO concentration was 4.4 ppm in 2007 at the Fresno-Drummond Street station. This was used as the highest and most representative background concentration in the air quality impact analysis. The table also shows that maximum recorded 8-hour average CO levels comply with the NAAQS and CAAQS of 9.0 ppm the entire period from 2005 through 2007. The maximum 8-hour CO concentration recorded at the Fresno-Drummond Street station was 3.31 ppm in 2006. As supported by the table, the Project site is in an unclassified/attainment area with respect to both federal and state CO standards.

Table 5.2-5
Concentration Data Summary for Carbon Monoxide at Fresno-Drummond Street Station

Year	Highest Concentration for CO (ppm)		Number of Days Exceeding Standards			
	1-Hour	8-Hour	Federal 1-Hour	Federal 8-Hour	State 1-Hour	State 8-Hour
2007	4.4	2.37	0	0	0	0
2006	4.0	3.31	0	0	0	0
2005	2.8	2.33	0	0	0	0

Source: California Air Resources Board-California Air Quality Data Web site (http://www.arb.ca.gov/aqd/aqdpage.htm); 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 address: 4706 E Drummond Ave. Fresno, CA 93725.

CO = carbon monoxide

ppm = parts per million

5.2.1.2.5 Nitrogen Dioxide

Nitrogen Dioxide (NO_2)missions are primarily generated from the combustion of fuels and include both nitric oxide (NO) and nitrogen dioxide (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 also important because of this pollutant's role in the atmospheric formation of O_3, the principal component of smog. It also can provoke lung irritation and damage.

The CARB approved staff recommendations to amend the NO_2 standard on 22 February 2007. On February 19, 2008, the Office of Administrative Law approved amendments to the regulations for the CAAQS for NO_2. The new standards became effective on March 20, 2008. The new 1-hour standard of 0.18 ppm is not to be exceeded, and the new annual average standard is 0.030 ppm. The annual average

NAAQS for NO_2 is 0.053 ppm (not to be exceeded). Note that there is no 1-hour NAAQS for this pollutant.

Recorded NO_2 concentration monitoring data for the Hanford-S Irwin Street and Parlier stations are summarized in Table 5.2-6. Maximum annual average (arithmetic mean) NO_2 levels comply with both the NAAQS of 0.053 ppm and the new CAAQS of 0.030 ppm at both of the stations. The maximum annual average concentration was 0.012 ppm in 2005 and 2006 at the Hanford-S Irwin Street station. This value was selected as a conservatively representative background NO_2 concentration for purposes of the air quality impact analysis. The data in the table also shows that maximum 1-hour levels consistently complied with the new CAAQS of 0.18 ppm during the most recent 3 years of monitoring. The highest recorded 1-hour NO_2 concentration was 0.073 ppm in 2006 at the Hanford-S Irwin Street station.

As supported by the table, the Project area has been in attainment of NO_2 for many years.

Table 5.2-6
Concentration Data Summary for Nitrogen Dioxide

Year	Highest 1-Hour Concentration for NO_2 (ppm)	Annual Average for NO_2 (ppm)	Estimated Number of Days Exceeding Standards (days)	
			Federal	State
Hanford-S Irwin Street Station				
2007	0.058	0.011	0	0
2006	0.073	0.012	0	0
2005	0.072	0.012	0	0
Parlier Station				
2007	0.055	0.011	0	0
2006	0.062	0.011	0	0
2005	0.063	0.011	0	0

Source: California Air Resources Board-California Air Quality Data Web site (http://www.arb.ca.gov/aqd/aqdpage.htm); EPA AirData (http://www.epa.gov/air/data/index.html).

Notes:

The federal NO_2 standard is the annual average (0.053 ppm).

The state NO_2 standardsare 1-hour average (0.18 ppm) and annual average (0.030 ppm).

Monitoring site address: Hanford-S Irwin Street Station (807 S Irwin St., Hanford CA 93230); Parlier Station (13900 tuolumne street, Parlier ca 93648).

NO_2 = nitrogen dioxide

ppm = parts per million

5.2.1.2.6 Sulfur Dioxide (SO_2)

Sulfur Dioxide (SO_2) is produced when any fuel containing sulfur is burned. It is also emitted by chemical plants that treat or refine sulfur or sulfur-containing chemicals. Natural gas contains trace

amounts of sulfur, while fuel oils may contain much higher amounts. 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, materials, and works of art.

Summaries of monitored SO_2 concentration data for the Fresno-Fremont School Station and the Fresno 1st Street Station are presented in Table 5.2-7. The Fresno-Fremont School Station is the closest station that monitored for SO_2 from the proposed Project site. However, this station measured the SO_2 only in 2003.

The Fresno 1st Street Station is the second closest SO_2 station from the proposed Project site. The SO_2 data in Table 5.2-7 indicate that the 24-hour SO_2 CAAQ was exceeded once at the Fresno 1st Street Station in the year 2007. The maximum 24-hour SO_2 monitored concentration of 0.067 ppm was recorded in 2007. A consultation with CARB and SJVAPCD revealed that this exceedance reflects a multi-hour spike in hourly values starting on hour 20 of July 4 through hour 1 of July 5. The anomalously high SO_2 concentration during this period is believed to have been caused by fireworks displays occurring on the night of July 4th, and is thus not considered to be representative of the background SO_2 levels at the Project site.

Accordingly, the monitored SO_2 data at the Fresno-Fremont School Station in 2003 was selected as a conservatively representative background SO_2 concentration for the air quality impact analysis presented later in this section. The measured annual value during 2003 is well below the NAAQS of 0.03 ppm. The maximum 1-hour average SO_2 level was 0.009 ppm in 2003, which is compliant with the CAAQS of 0.25 ppm. For a number of years the SJVAPCD has been in attainment with all applicable state and federal ambient standards for SO_2.

Table 5.2-7
Concentration Data Summary for Sulfur Dioxide

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
Fresno-Fremont School Station									
2003	0.009	0.006	0.004	0.002	0	0	0	0	0
Fresno 1st Street Station									
2007	0.24	0.216	0.067	0.007	0	0	0	0	1
2006	*	*	*	*	*	*	*	*	*
2005	*	*	*	*	*	*	*	*	*

Source: California Air Resources Board-California Air Quality Data Web site (http://www.arb.ca.gov/aqd/aqdpage.htm); EPA AirData (http://www.epa.gov/air/data/index.html).

Notes:

*There was insufficient (or no) data available to determine the value.

Table 5.2-7
Concentration Data Summary for Sulfur Dioxide
(Continued)

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
Fresno-Fremont School Station									
2003	0.009	0.006	0.004	0.002	0	0	0	0	0
Fresno 1st Street Station									

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 address: Fresno-Fremont School Station: 1005 W. Weldon Avenue, Fresno, CA 93705; Fresno 1st Street Station: 3425 N 1st St, Fresno, CA 93726

SO_2 = sulfur dioxide

ppm = parts per million

5.2.1.2.7 Airborne Lead (Pb)

Airborne Lead (Pb) 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, 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.

Measured lead concentration levels at the nearest lead monitoring station, which is located at the Fresno-Parlier station, are presented in Table 5.2-8. The data in this table supports the attainment status of the SJVAPCD for lead.

Table 5.2-8
Summary of Recent Lead Concentration Data at Fresno-Parlier Station

Year	Highest 24-Hour Concentration for Lead ($\mu g/m^3$)	Estimated Number of Days Exceeding Federal and State Standards (days)
2007	0.02	0
2006	*	*
2005	*	*

Table 5.2-8
Summary of Recent Lead Concentration Data at Fresno-Parlier Station
(Continued)

Year	Highest 24-Hour Concentration for Lead (μg/m³)	Estimated Number of Days Exceeding Federal and State Standards (days)

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

Notes:

The federal lead standard is 0.15 μg/m³ on a quarterly average basis (US EPA strengthened the lead standard from 1.5 μg/m³ to 0.15 μg/m³on October, 2008.).
The state lead standard is 1.5 μg/m³ on a 30 days average basis.

Monitoring site address: 13900 Tuolumne Street, Parlier CA (52 miles NE. of the Project site)

μg/m³ = micrograms per cubic meter

5.2.1.2.8 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 SJVAPCD is in attainment with the state standard for sulfates; and there is no federal standard for this pollutant.

5.2.1.2.9 Other State-Designated Criteria Pollutants

Along with sulfates, California has promulgated CAAQS for hydrogen sulfide and visibility-reducing particles. The entire state is in attainment with respect to the standard for visibility-reducing particles, and the SJVAPCD is in attainment with the hydrogen sulfide standard. Lists of all applicable federal and California ambient standards are provided in Section 5.2.6

5.2.2 Environmental Consequences

The potential air quality impacts of the SJS 1&2 are evaluated in this subsection. Impacts would be considered significant if the pollutant concentrations resulting from the Project, when combined with background concentrations, exceed an ambient air quality standard. However, the Project emissions of non-attainment pollutants and their precursors will be offset at a ratio of more than 1 to 1 to ensure that the Project will result in a net air quality benefit. Emissions estimates for all aspects of the Project construction and operation are presented. Dispersion model selection and the development of appropriate model input data are also described (*i.e.,* emissions scenarios and release parameters, building wake effects, meteorological data, and receptor locations), and analysis results are presented. Documentation demonstrating that the Project will comply with applicable local, state and federal air quality regulatory requirements is provided.

5.2.2.1 Construction Emissions

The primary emission sources during construction of the Project would include exhaust from heavy construction equipment and vehicles and fugitive dust generated in areas disturbed by grading, excavating, erection of Project solar pylons, and construction of biomass combustion units and associated structures. The projected construction schedule has a total duration of 15 months for full buildout of both Plants. Different areas within the Project site and the construction laydown areas would be disturbed at different times over this period. Estimated land disturbance for major construction activities is summarized in Section 3.6. For purposes of this analysis, the assumed project construction area would be 640 acres for the Project site and includes one staging area.

Fugitive dust emissions from the construction of SJS 1&2 will result from:

- site grading/excavation activities at the construction site;
- installation of new transmission lines and waterlines;
- installation of solar pylon foundations;
- construction of solar pylon facilities, roads, and substation;
- on-site travel of vehicles and moble equipment on unpaved surfaces; and,
- off-site travel of worker vehicles and trucks on paved roads.

Fuel combustion exhaust emissions of gases and particulates during construction will result from:

- exhaust from the off-road construction equipments, including diesel construction equipment used for site grading, excavation, and construction of on-site structures, and water trucks used to control construction dust emissions;
- exhaust from on-road construction vehicles, including pickup trucks and diesel trucks used to transport workers and materials within the construction site, and from diesel trucks used to deliver concrete, equipment, and construction supplies to the construction site; and,
- exhaust from vehicles used by workers to commute to the construction site.

Construction equipment and vehicle exhaust emissions were estimated using equipment lists and construction scheduling information provided by the Project design-engineering firm (see Table 5.2-9, Estimated Construction Equipment Usage Schedule).

Table 5.2-9
Estimated Construction Equipment Usage Schedule

SJS 1&2	Horsepower	Utilization Load Factor	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15
Scraper	250	0.72	4	4	3	2	2	2	1	1							
Grader	120	0.61	3	3	2	2	2	2	2	1							
Dozer	175	0.65	3	3	3	3	3	3	2	1							
Loaders	120	0.54	3	3	1	1	1	1	1	1	1	1	1	1			
Augers	120	0.75			6	6	6	6	6	6	6	6	6	6	3	3	3
Cement Trucks	250	0.5			6	6	6	7	7	7	7	6	6	6	5	4	4
Excavator	175	0.57	3	2	1	1	1	1	1	1	1	1	1				
Backhoe	120	0.55	2	2	2	1	1	1	1	1	1	1	1				
Water Truck	250	0.57	4	4	3	3	3	3	2	2	2	2	2	2	2	2	2
Dump Truck	250	0.57	4	4	2	2	2	1	1	1	1				1	1	
Crane (20 Ton)	120	0.43				1	1	1	2	4	4	6	4	3	3	3	2
Crane (90 Ton)	250	0.43						1	1	1	1	1	1				
Boom Truck	250	0.57	1	1	1	2	2	2	3	3	4	6	4	3	3	2	2
ATVs	50	0.5	5	5	5	5	5	5	5	5	5	5	5	1	1	1	5
Pick Up trucks	120	0.5	2	2	2	2	2	2	2	2	2	2	4	4	4	3	2
Pavers	175	0.62													2	2	1
Rollers	175	0.56													2	2	1
Plate Compactors	15	0.25						1	1	1	1						
Forklift	50	0.6			1	2	2	2	2	2	2	2	2	2	2	2	
Welder	50	0.45						1	1	1	1	1	1	1	1	1	1
Generator	50	0.75				1	1	1	1	1	2	2	3	3	3	3	2
Aerial Lift	50	0.46						1	1	1	1	1	1	1	1	1	1
	Total		**34**	**33**	**38**	**40**	**40**	**44**	**43**	**43**	**42**	**43**	**42**	**33**	**33**	**30**	**26**

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Mass emissions of all criteria pollutants from fueled construction equipment and vehicles were estimated using equipment-specific emissions factors obtained by means of the OFFROAD model for Fresno County. Diesel equipment emissions were calculated by means of an Excel Workbook (presented in Appendix B-2, Construction Emission Calculations), and were represented for modeling purposes as point sources. Generic stack parameters (exhaust temperatures and flow rates) for diesel internal combustion engines were obtained from the *Risk Management Guidance for the Permitting of New Stationary Source Diesel-Fueled Engine* (CARB 2000). Fugitive dust emissions resulting from on-site soil disturbances were estimated using the *SCAQMD California Environmental Quality Act (CEQA) Air Quality 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 the Project site and construction area activities was assumed to be achieved for these activities by frequent watering. Emissions of fugitive dust (PM_{10} and $PM_{2.5}$) were represented as area sources for purposes of the construction impacts modeling discussed later in this section. Emissions from on-road delivery trucks and worker commute trips were estimated using trip generation information presented in Section 3.0, Project Description and Location, and emission factors for on-road vehicles from the EMFAC2007 model for Fresno County.

Assumptions used in calculating the Project construction emissions included a 15-month construction period; 5 construction days per week; and a 10-hour workday (22 construction days per month). The list of fueled equipment needed during each month of the construction effort 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. Detailed spreadsheets are provided in Appendix B-2, Construction Emission Calculations, which show the calculation of emissions from all Project construction equipment and activities, along with the data and assumptions used in these calculations. Construction workers were assumed to commute to the Project site from locations within a 50-mile radius.

The short-term maximum combustion and fugitive dust emissions were calculated using the equipment listed in Table 5.2-9 for Month 6 of the construction schedule, which is anticipated to have the highest emissions from the equipment usage and earthmoving activities of any month. Based on the equipment usage and earthmoving schedules, emissions during Months 1 through 12 are expected to be the highest of any consecutive 12-month period during the overall 15-month construction effort.

Tables 5.2-10 and 5.2-11 present the estimated maximum daily and annual emissions of air pollutants due to Project construction, respectively, including information on the contributions from specific activities.

Table 5.2-10
Estimated Daily Maximum Construction Emissions (lb/day)

Activity	Emission Type	Maximum Daily Emissions (lb/day)					
Onsite Emission Sources		**PM_{10}**	**$PM_{2.5}$**	**CO**	**VOC**	**NO_x**	**SO_x**
Site Grading, Transmission Line, Power Block, and Solar Field Construction	Combustion exhaust	14.2	13.0	185.0	35.8	279.4	0.3
	Fugitive dust	39.8	8.4				
Total Onsite Emissions		*54.0*	*21.4*	*185.0*	*35.8*	*279.4*	*0.3*
Offsite Emission Sources							
Commuter Vehicles & Delivery Trucks (offsite travel to site)	Combustion exhaust	22.4	18.7	414.7	99.5	322.3	0.7
	Fugitive dust	177.9	30.1				
Total Offsite Emissions		200.3	48.8	414.7	99.5	322.3	0.7
Total Construction Emissions		254.3	70.2	599.6	135.4	601.7	1.0

Table 5.2-11
Estimated Maximum Annual Construction Emissions (tons/year)

Activity	Emission Type	Maximum Annual Emissions (ton/yr)					
Onsite Emission Sources		**PM_{10}**	**$PM_{2.5}$**	**CO**	**VOC**	**NO_x**	**SO_x**
Site Grading, Transmission Line, Power Block, and Solar Field Construction	Combustion exhaust	1.71	1.57	14.1	4.4	32.8	0.0004
	Fugitive dust	4.6	1.0				
Total Onsite Emissions		*6.3*	*2.6*	*14.1*	*4.4*	*32.8*	*0.0*
Offsite Emission Sources							
Commuter Vehicles & Delivery Trucks (offsite travel to site)	Combustion exhaust	3.0	2.5	54.7	13.1	42.5	0.1
	Fugitive dust	23.5	4.0				
Total Offsite Emissions		*26.4*	*6.4*	*54.7*	*13.1*	*42.5*	*0.1*
Total Construction Emissions		32.7	9.0	68.8	17.5	75.4	0.1

5.2.2.2 Operational Emissions

The proposed Project consists of two solar power stations, each augmented with a biomass combustion facility. Each plant is sized for a nominal 53.4 MW net of solar generation, complemented by up to 40 MW net of biomass generated production to supplement solar production when not fully charged by solar input, or independently during non-solar hours. The biomass facility at each plant consists of two 20 MW combustor trains, that can be operated independently. The primary fuel source for the biomass combustors is anticipated to be 50% agricultural wood waste, comprised primarily of wastes collected during clearing or pruning of local orchards, and 50% municipal green wastes, comprised primarily of clippings and collected wood materials from local municipalities. The combustion of waste wood, is expected to emit more air contaminants than the agricultural wood waste; thus only the emissions and impacts from the

waste wood combustion were examined in this analysis. The biomass combustion equipment will consist of a fluidized bed system that is ideal for combusting a fuel such as waste wood.

The primary sources of criteria air pollutants emissions from SJS 1&2 would be the four biomass combustors, although additional emissions would occur due to ancillary sources, including the following stationary sources:

- twelve natural gas burners (three burners located in each of the biomass combustors for use during unit cold startups only),
- two 2-cell evaporative cooling towers,
- two diesel emergency generators,
- two diesel firewater pumps, and
- fugitive particulate emissions from the unloading and handling of the biomass, lime, limestone and fly ash.

Emissions are also expected from the operation of mobile sources associated with the routine operations of the Project. Those include emissions from:

- the biomass loader (essentially a front-end loader),
- heavy trucks delivering biomass, limestone, lime and ammonia and removing fly ash,
- trucks used in cleaning the solar reflector mirrors (one water truck per plant), and
- commuter vehicles bringing the workers to and from the Project.

Emissions from the biomass combustor will be reduced by adding limestone to the fluidized bed combustor to control acid gas emissions. The following pollution control equipment will also be installed with each biomass combustor:

- An SNCR system in the combustor to reduce NO_x emissions;
- A multi-clone and baghouse for particulate reduction;
- A dry scrubber for chloride reduction;
- An SCR system to further reduce NO_x emissions; and,
- A wet scrubber for chloride and SO_x reduction.

Criteria pollutant emissions from the biomass combustors with these control technologies were provided by the equipment vendor, Energy Products of Idaho (EPI).

Worst-case estimates of hourly biomass combustor emissions were made by assuming that each combustor would operate under full load conditions with a maximum higher heating value (HHV) fuel energy input rate of 311 million British thermal units per hour (MMBtu/hr). For the annual emission

calculations, it was assumed that each biomass combustor would operate for a maximum of 75 percent of annual hours, or 6,570 hours per year. Maximum daily operational emissions are based on operation of each biomass facility at 100% capacity for 24 hours.

Emissions from the natural gas burners within the biomass combustors were estimated by the vendor (EPI) for NO_x, CO and VOC and using AP-42 Table 1.4-2 for Natural Gas Combustion for the remaining pollutants. The burners will be used only during combustor cold startup, thus it is anticipated that each burner will be operated up to 14 hours per year. Three natural gas burners are associated with each combustor train, one 15 MMBtu/hr and two 50 MMBtu/hr burners. The burner exhaust emissions will be vented out of the combustor stacks. Emission factors and estimated maximum hourly and annual emissions per three burner combination per combustor train are summarized in Appendix B-3, Operation Emission Calculations.

Particulate emissions from the cooling towers were calculated from the circulating water rate, total dissolved solids and the drift elimination rate. An analysis of water collected from an existing onsite well was used to determine the maximum total dissolved solids that might be in any water entering the cooling tower. For the annual emission calculations, it was assumed that both cooling towers would operate continuously for a maximum of 8,760 hours per year.

Combustion emissions from the two diesel-fired emergency generators and two firewater pump engines were estimated using the EPA stationary diesel engine Tier 2 emission limits and the maximum power rating for each engine. The diesel-fired emergency generators were each assumed to run at full rated capacity (1,000 kilowatt [kW]) for one hour per month for testing. The diesel-fired firewater pumps were each assumed to run at full-rated capacity (250 horsepower [hp]) for one hour per week for testing. Actual emergency use of the diesel engines was not included.

Fugitive particulate matter emissions from the unloading and handling of the biomass, limestone, lime and fly ash were estimated using EPA AP-42 aggregate handling emission factors and using the design control efficiency provided by the biomass facility equipment supplier.

One 100 hp diesel front-end loader will be used to augment the electric conveyor system delivering biomass to the combustors. Combustion emissions from the biomass loader were estimated using emission factors from CARB's Off-Road Model. The emissions from the biomass loader will be emitted through the two baghouse vents on the roof of the biomass storage facility. The potential reduction in emissions due to the rooftop baghouse controls were not accounted for in the emissions estimates for this equipment. Annual emissions estimates assume operation for 75% of annual hours.

Combustion emissions will also occur during the regular cleaning of the solar reflector mirrors due to operation of two mobile diesel water trucks, one truck per solar field. The diesel particulate combustion emissions from these trucks were estimated using the emission factor from CARBs EMFAC2007 for on-road 8500 lb trucks (Light-Heavy-Duty Diesel Truck). Dust emissions were estimated using the SCAQMD CEQA Handbook emission factor for vehicle travel on unpaved roads. The emissions from the water trucks were estimated based on 12 hours per day, 5 days per week, and 200 days per year operation schedule. The daily average total trip was assumed to be six miles for each water truck.

Combustion emissions from the heavy trucks delivering biomass, limestone, lime and ammonia to the site and removing ash from the site were calculated using emission factors from CARB's EMFAC2007 for on-road Heavy-Heavy-Duty Diesel Trucks. Emissions were estimated for both travel of these trucks onsite & offsite and from an assumed 15 minutes of idling per truck onsite while waiting to unload. Fugitive dust emissions from the delivery trucks were estimated using the SCAQMD CEQA Handbook emission factor for emissions from truck travel on paved roads. The emissions from the delivery trucks were estimated based on 12 hours per day, 5 days per week, and 200 days per year operation schedule. The miles traveled per round trip were assumed to be 1.4 miles on site and 120 miles for each delivery truck.

Combustion emissions from workers traveling to and from the Project were calculated using CARB's EMFAC2007 for On-Road Passenger Vehicles. Fugitive dust emissions were estimated using the SCAQMD CEQA Handbook emission factor for emissions from passenger vehicle travel on paved roads. It is assumed to have 60 employees working on the Project site everyday when the Project is in operation. The numbers of worker vehicles were estimated by using the carpooling ratio of 1.5 employees per vehicle. The emissions from the worker vehicles were estimated based on 4 hours per day and 365 days per year operation schedule. The miles traveled per round trip were assumed to be 50 miles for each worker vehicle.

Maximum annual emissions are calculated assuming the Project operates at 75% of biomass capacity on an annual basis. The estimated maximum annual emissions from all SJS 1&2 site sources are presented in Table 5.2-12. Detailed operational emission calculations can be found in Appendix B-3.

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Table 5.2-12
Maximum Annual SJS 1&2 Site Operations Emissions

	Annual Emission Rate (ton/yr)					
	NO_X	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Onsite Emission Sources						
Stationary Sources						
Combustion Emissions						
Fluidized Bed Combustors	47.91	81.58	12.90	49.48	102.03	102.03
Emergency Generators	0.169	0.093	0.026	0.0001	0.005	0.005
Fire Water Pumps	0.141	0.075	0.021	0.0001	0.004	0.004
Natural Gas Burners	0.159	0.128	0.004	0.007	0.019	0.019
Cooling Towers					1.61	1.61
Fugitive Dust Emissions						
Biomass, Limestone and Ash Handling					7.31E-04	1.11E-04
Total Onsite Stationary Source Emissions	*48.38*	*81.88*	*12.95*	*49.49*	*103.67*	*103.67*
Mobile Sources						
Combustion Emissions						
Biomass Handling Equipment	0.10	0.07	0.01	0.0001	0.01	0.01
Trucks Cleaning Solar Mirrors	0.01	0.01	0.001	1.03E-05	0.0006	0.0005
Delivery Trucks - Travel & Idling Onsite	2.56	1.12	0.529	0.002	0.107	0.101
Fugitive Emissions						
Trucks Cleaning Solar Mirrors					0.06	0.01
Delivery Trucks - Travel Onsite					4.53	0.77
Total Onsite Mobile Source Emissions	*2.66*	*1.20*	*0.54*	*0.00*	*4.71*	*0.89*
Total Onsite Emissions	***51.05***	***83.08***	***13.50***	***49.49***	***108.38***	***104.55***
Offsite Emission Sources						
Mobile Sources						
Combustion Emissions						
Delivery Trucks - Offsite Travel	138.59	60.54	37.21	0.15	8.09	7.64
Commuter Vehicles	0.72	2.69	0.24	0.01	0.12	0.10
Fugitive Emissions						
Delivery Trucks - Offsite Travel					270.74	45.75

Table 5.2-12
Maximum Annual SJS 1&2 Site Operations Emissions
(Continued)

	Annual Emission Rate (ton/yr)					
	NO_X	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Commuter Vehicles					2.34	0.39
Total Offsite Mobile Source Emissions	*139.31*	*63.22*	*37.45*	*0.15*	*281.29*	*53.89*
Total Offsite Emissions	***139.31***	***63.22***	***37.45***	***0.15***	***281.29***	***53.89***
Total Project Operational Emissions (ton/yr)	**190.36**	**146.30**	**50.94**	**49.65**	**389.67**	**158.45**

5.2.2.2.1 Combustor Startup Emissions

Each combustor requires a cold startup if it has not operated for over 48 hours. Emissions after shutdowns of less than 48 hours are expected to be substantially equivalent to those for normal combustor operations and are thus not considered separately in this analysis.

It is anticipated that cold starts will occur up to two times a year for each combustor. A cold startup consists of six hours when the natural gas burners operate prior to the introduction of biomass to warm up the fluidized bed. On the seventh hour of the startup, some biomass is introduced into the combustor along with the heat from the natural gas burners. In the eighth hour, the natural gas burners no longer are needed, the maximum quantity of biomass can be added and the pollution control systems become functional

The maximum hourly emissions during a startup occur in hour seven for NO_x and hour eight for all other pollutants and include the contributions from both biomass and natural gas combustion. These emissions are presented in Table 5.2-13 for each combustor train.

Table 5.2-13
Maximum Hourly Emissions during a Cold Startup For Each Combustor Train

Pollutants	Maximum 1-Hour Emission Rate during Startup per combustor train
	(lb/hr)
CO	23.25
SO_2	46.50
NO_X	34.52
PM_{10}	2.17
$PM_{2.5}$	2.17
VOC	4.96

5.2.2.2.2 Facility Commissioning

The commissioning of each fluidized bed combustor will entail several relatively short periods of operation prior to and during installation and testing of the pollution control technologies. During these test periods, emissions of all pollutants will be higher than during normal operations, because the control equipment will be either partially or completely inoperative.

The fluidized bed combustor commissioning activities can be broken down into six separate test periods as described below. The first test occurs without the baghouse, thus the PM emissions will be higher since no particulate capture from the baghouse will occur. In the second and successive tests the baghouse will be operational. The SNCR will be started in the second stage, providing some reduction in NO_x emissions. The NO_x emissions will be further reduced when the SCR is started in the third stage.

Based on information provided by EPI, Table 5.2-14 outlines the expected sequence of commissioning tests and the approximate emissions for each fluidized bed combustor during these tests.

Table 5.2-14
Commissioning Phases and Emissions for the First Biomass Combustor

Commissioning Test Phase	Duration of test (hours/day)	Duration of test (days)	Hourly Emission Rate (lb/hr)				Total Emissions (tons)			
			NO_x	SO_2	PM_{10}	CO	NO_x	SO_2	PM_{10}	CO
1. Stabilize combustor and boiler (include limestone feed)	10	3	75.60	13.02	316.20	21.60	1.13	0.20	4.74	0.32
2. Start spray dryer and baghouse, commission the CEMS and start SNCR	20	24	33.53	4.34	21.70	17.36	8.05	1.04	5.21	4.17
3. Start SCR	24	4	7.44	4.96	24.80	19.84	0.36	0.24	1.19	0.95
4. Start Wet Scrubber	24	4	9.92	2.98	12.40	19.84	0.48	0.14	0.60	0.95
5. Stabilize	24	10	2.98	2.98	6.20	4.96	0.36	0.36	0.74	0.60
6. Stabilize at full load	24	7	3.72	3.72	7.75	6.20	0.31	0.31	0.65	0.52
Total commissioning		**52**					**10.68**	**2.29**	**13.13**	**7.51**

During the commissioning tests the worst-case short-term emission rates of NO_x, SO_2 and CO will be greater than during either normal operations or combustor startup. Thus, short-term (1-hour, 3-hour, 8-hour, and 24-hour) impacts were examined in separate modeling analyses (see Section 5.2.2.5.2.3) As noted previously, the applicant is willing to accept a permit condition limiting combustor commissioning to one combustor train at any one time.

The commissioning of each successive combustor is anticipated to take less time; therefore progressively lower emission quantities are expected during commissioning of the second, third and fourth combustor trains. Table 5.2-15 summarizes the anticipated reduction in emissions for the commissioning of each successive combustor. This table also presents the maximum estimated emissions from the total commissioning of all four combustors. Actual test durations for individual combustor trains will vary, but total SJS 1&2 commissioning emissions are not expected to exceed the totals presented in Table 5.2-14.

Table 5.2-15
Total Emissions from the Combustor Commissioning

Source	% of Emissions from Commissioning each Combustor Relative to the First Combustor	Total Emissions (tons/yr)			
		NO_x	SO_2	PM_{10}	CO
Combustor 1	100%	10.68	2.29	13.13	7.51
Combustor 2	75%	8.01	1.72	9.85	5.63
Combustor 3	50%	5.34	1.14	6.57	3.76
Combustor 4	50%	5.34	1.14	6.57	3.76
Total SJS1&2 Commissioning Emissions		**29.38**	**6.29**	**36.11**	**20.66**

At the conclusion of the commissioning period, all subsequent operational emissions rates will be at the controlled rates for normal operations that were presented previously in this section. Continuous emissions monitoring system (CEMS) for NO_x and CO (plus oxygen) are expected to be operable by the second stage of the commissioning period (*i.e.,* when the SNCR is started) to document actual emissions during this and subsequent commissioning stages.

Appendix B-4, Commissioning Data presents supporting technical information and calculation spreadsheets used to develop the emission data for the various stages of commissioning.

5.2.2.3 Greenhouse Gas Emissions (GHG)

The assumptions regarding equipment usage and operating schedules that are used to estimate greenhouse gas (GHG) emissions from the construction and operation of the Project are the same as those described in the previous sections for criteria pollutants.

5.2.2.3.1 Construction GHG Emissions

GHG emissions for the construction equipment were estimated using the OFFROAD model emission factors for carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). CO_2 emission factors for on-road vehicles, such as worker vehicles and delivery trucks, were obtained from EMFAC2007. CH_4 and N_2O emission factors for on-road vehicle came from Table C.5 of the California Climate Action Registry (CCAR) General Reporting Protocol for the appropriate vehicle and fuel types.

Table 5.2-16, Total Construction Related Greenhouse Gas Emissions, presents the estimated greenhouse gas emissions from the total SJS 1&2 construction phases in metric tons (tonnes). Data are provided for each of the three greenhouse gases individually and for the combined emissions in CO_2 equivalents (CO_2e).

Table 5.2-16
Total Construction Related Greenhouse Gas Emissions

Total Construction Emissions of Greenhouse Gases (tonnes/year)				
Activity	**CO_2**	**CH_4**	**N_2O**	**CO_2e**
Onsite Combustion Emissions				
Diesel Construction Equipment	2714.5	0.3	0.0002	2721.9
Worker passenger vehicles	32.9	0.001	0.001	33.3
Subtotal of Onsite Emissions	***2747.4***	***0.4***	***0.002***	***2755.2***
Offsite Combustion Emissions				
Worker Passenger Vehicle – Combustion Emissions	5479.6	0.2	0.2	5555.1
Delivery Truck – Combustion Emissions	3164.7	0.1	0.04	3179.3
Subtotal of Offsite Emissions	***8644.3***	***0.3***	***0.3***	***8734.4***
Total Construction GHG Emissions	**11391.6**	**0.6**	**0.3**	**11489.6**

5.2.2.3.2 Operational GHG Emissions

Development of GHG emissions from the biomass combustors, used the assumption that 5% of the biomass would be contained in captured ash, with 95% of all carbon in the biomass fuel converted to CO_2 and released to the atmosphere.

The biomass that will be burned in the fluidized bed combustors incorporated CO_2 from the atmosphere while it was grown. The carbon taken in during plant growth will then be expelled during combustion of the biomass, resulting in a complete cycling of the CO_2 within a period of only a few years. Thus, the combustion of biomass at SJS 1&2 can be considered a carbon-neutral activity.

Small amounts of sulfur hexafluoride (SF_6) will be emitted as a result of leakage from the new circuit breakers associated with the project. Two 230kV breakers, each containing 135 pounds of SF_6, will be installed for the Project. A conservative leakage rate of 1 percent was assumed for purposes of estimating annual SF_6 emissions from the circuit breakers.

The OFFROAD2007 model was used to calculate GHG emission from the front-end loader. GHG emissions from the diesel engines were estimated using emission factors for stationary combustion sources from Tables C.6 and C.7 of the CCAR General Reporting Protocol. Emissions of methane and nitrous oxide (N_2O) for all on-road mobile sources were estimated using the emission factors from CCAR General Protocol Table C.5 for the appropriate vehicle and fuel types. Mobile source emissions of CO_2 for on-road vehicles were obtained using EMFAC2007.

Table 5.2-17 presents the estimated total annual emission GHG rate for the operational SJS 1&2 in CO_2e. Supporting calculation details for the greenhouse gas emissions estimates in this table are provided in Appendix B-5, Greenhouse Gas Emissions.

There are currently no established significance thresholds for environmental impacts resulting from GHG emissions in California. However, CARB approved a Mandatory GHG Reporting Regulation on December 6, 2007. Based on the projected emissions in Table 5.2-17, the project would be required to report

its GHG emission on an annual basis because it would be an electricity generating facility that emits greater than 2,500 tonnes of CO_2 per year.

Table 5.2-17
Project Operational Greenhouse Emissions

			Annual Emission Rate (tonnes/yr)				
			CO_2	CH_4	N_20	SF_6	CO_2e
Onsite Emission Sources							
	Stationary Sources						
		Fluidized Bed Combustor	1,094,241				1,094,241.4
		Emergency Generator	16.9	2.34E-03	1.67E-04		17.0
		Fire Water Pump	14.8	2.04E-03	1.46E-04		8.3
		Natural Gas Burners	273.2	5.24E-03	1.46E-03		273.7
		Circuit breakers				1.22E-03	29.3
	Total Onsite Stationary Source CO_2e Emissions						*1,094,569.7*
	Mobile Sources						
		Biomass Handling Equipment	10.1	1.15E-03	0.00E+00		10.1
		Trucks Cleaning Solar Mirrors	1.1	3.12E-04	1.56E-04		1.1
		Delivery Trucks - Travel & Idling Onsite	212.3	4.24E-03	2.12E-03		213.1
	Total Onsite Mobile Source CO_2e Emissions						*224.3*
Total Onsite CO_2e Emissions							*1,094,800.6*
Offsite Emission Sources							
	Mobile Sources						
		Delivery Trucks - Offsite Travel	13,962.4	3.63E-01	1.82E-01		14,026.3
		Commuter Vehicles	565.1	3.80E-02	4.53E-02		579.9
	Total Offsite Mobile Source CO_2e Emissions						*14,606.2*
Total Offsite CO_2e Emissions							*14,606.2*
Total Project Operational CO_2e Emissions (tonne/yr)							**1,109,407**

5.2.2.4 Air Quality Impact Analysis

The purpose of the air quality impact analysis is to determine whether criteria air pollutant emissions from the Project would cause or contribute significantly to a violation of a CAAQS or NAAQS. 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. 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 that have been evaluated for the SJS 1&2 Project include fugitive dust from grading and excavating disturbed areas and emissions associated with exhaust combustion products from diesel- and gasoline-fueled construction equipment. The impacts from operations are associated with the four biomass combustors and ancillary equipment. A fumigation modeling analysis was also performed to predict maximum ground-level concentrations from facility operations under specialized meteorological conditions that may produce short-term elevated ground-level pollutant concentrations. Potential impacts of non-criteria pollutant emissions from the project are evaluated in Section 5.16, Public Health and Safety.

The air quality modeling methodology used for the project was previously described in a modeling protocol submitted to CEC and SJVAPCD (URS Corporation [URS] 2008). See Appendix B-6, Air Quality Modeling Protocol, for a copy of the protocol and comments received on the protocol from SJVAPCD. The modeling approaches used to assess various aspects of the project's potential impacts to air quality are discussed below.

5.2.2.4.1 Model and Model Option Selections

The impacts of project construction and operational emissions on air pollutant concentrations in the area adjacent to the project site were evaluated using the U.S. Environmental Protection Agency (USEPA) American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) (Version 07026). AERMOD is appropriate for this application because it has the ability to assess dispersion of emission plumes from multiple point, area, or volume sources in flat, simple, and complex terrain 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.

Review of aerial photographs and U.S. Geological Survey (USGS) topographic maps indicates that the area surrounding the project is predominantly rural; therefore, rural dispersion coefficients were used in the modeling analyses for this project.

For the AERMOD simulations to evaluate construction and operational impacts of NO_2 concentrations, the ozone-limiting method (OLM) 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 year corresponding to the meteorological input record for the AERMOD simulations. These simulations used the ozone data from Hanford – S. Irwin Street Station for the year 2004, which is the same year for which the meteorological input data record was compiled (see Section 5.2.2.4.3).

5.2.2.4.2 Building Wake Effects

The effect of building wakes (*i.e.,* downwash) on the dispersion of exhaust plumes from the biomass combustors and ancillary equipment was evaluated in accordance with USEPA guidance (USEPA 1985). Downwash is not applicable to area and volume sources and therefore was not considered in the modeling of construction phase impacts to air quality. Data on the locations and dimensions of buildings within the project site that could potentially cause plume downwash effects for the Project were determined for different wind directions using the USEPA Building Profile Input Program – Prime (BPIP-Prime)

(Version 04274). Numerous structures were identified that might cause downwash from the various project emission sources and were included in the downwash analysis.

The results of the BPIP-Prime analysis were included in the AERMOD input files to enable downwash effects to be simulated. The AERMOD model considers direction-specific downwash parameters, as provided in the BPIP-Prime program. Input and output electronic files for the BPIP-Prime analysis are included with those from all other dispersion modeling analyses on the compact disks that accompany this AFC.

5.2.2.4.3 Meteorological Data

The meteorological data used in this analysis were recommended for this Application by staff of the San Joaquin Valley Air Pollution Control District (SJVAPCD 2008), and were downloaded from the District's website in an AERMOD input ready format. Despite the distance of the project site from the Hanford Municipal Airport, the terrain and land use similarities throughout this part of the San Joaquin Valley, and the lack of significant intervening terrain features between the airport and the site suggest that the selected meteorological data are reasonably representative of conditions at the project site.

The upper air meteorological data embedded in the Hanford meteorological AERMOD data set are from Oakland, California. This is the closest National Weather Service data and is appropriate for use in all of central and northern California for modeling purposes.

Per SJVAPCD recommendations, the modeling analyses for the Project used one year of hourly meteorological data collected at the Hanford Municipal Airport for the year 2004. The SJVAPCD has determined that the data for 2004 from the Hanford Municipal Airport predict the highest impacts relative to the other four years worth of data they have processed for that site and thus it is only necessary to use 2004 data for air permitting purposes.

Figure 5.2-3 presents the annual windrose developed from the 2004 Hanford hourly meteorological data record. Seasonal windroses based on the 2004 meteorological data are provided in Appendix B-1, Air Quality Data.

5.2.2.4.4 Receptor Locations

Receptors were placed at off-property locations to evaluate the impacts of the Project. Receptor spacing varies according to distance from the Project property boundary. To ensure that the locations of highest impacts were identified, the receptor spacing was closest at the Project property boundary and increased with distance from the boundary. Receptors were placed as far as 10 km from the Project boundary in all directions. The following receptor spacing was used in the modeling analysis:

- 25-meter spacing along the fence line and extending from the fence line out to 100 meters;
- 100-meter spacing from 100 meters to 1 kilometer beyond the property line;
- 500-meter spacing between 1 kilometer and 5 kilometers from the property line; and
- 1,000-meter spacing between 5 kilometers and 10 kilometers from the property line.

Figures 5.2-4 and 5.2-5 show the placement of near-field and far-field receptor points, respectively. During the air quality modeling analysis for operational Project emissions, if a maximum predicted concentration for a particular pollutant and averaging time is 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 uses 25-meter spacing and will extend to the next grid point in all directions from the original point of maximum concentration.

Because construction emission sources release pollutants to the atmosphere from short equipment exhaust stacks or from soil disturbances at ground level, maximum predicted construction impacts for all pollutants and averaging times will occur within the first kilometer from the Project boundary. Accordingly, only the portion of the above grid out to a distance of 1 km beyond the facility property line was used for the construction modeling.

5.2.2.4.5 Background Air Quality Data

The highest measured pollutant concentrations recorded during the last three years at the most representative monitoring stations near the Project site were selected to represent background air quality levels for the modeling assessment (see Section 5.2.1.2). These data were added to the predicted concentrations due to construction or operation of the SJS 1&2 to ensure that air emissions from the project will not cause or contribute significantly to an AAQS violation.

5.2.2.4.6 Construction Impact Modeling

Section 5.2.2.1 describes the development of Project construction emissions estimates over the planned 15-month construction period. 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 maximum short-term and annual activity levels. Emissions from worker commuter trips and heavy duty trucks delivering equipment and materials to and from the Project site during specific construction activities were also included. This workbook is included in Appendix B-2.

Worst-case modeling was conducted for short-term averaging times using all construction equipment from Month 6 for both combustion exhaust and fugitive dust emissions. Maximum annual impacts were modeled using combustion and fugitive dust emissions for Months 1-12 of the construction schedule.

All construction activities were assumed to occur during a 10-hour work day, five days per week. Short-term emission rates incorporated time-of-day emission factors with emission sources operating only between the hours of 7 a.m. and 5 p.m. Calculation of annual emissions was based on a summation over all construction activities for the consecutive 12-month period that would produce the highest emissions of targeted pollutants.

5.2.2.4.7 Operations Impact Modeling

Stationary onsite operational Project emissions data were input into the air dispersion model AERMOD. These include the emissions from the four biomass combustors, the cooling towers, the natural gas burners, diesel emergency generator engines, diesel firewater pump engines, and fugitive dust from the unloading and handling of the biomass, limestone, lime and ash. The stack parameters used in the

AERMOD model for the biomass combustor were provided by EPI for full load conditions. Stack parameters for the other sources were either provided from the design engineers or estimated using data from equipment of comparable design.

Air dispersion modeling was performed to evaluate the increase in ground-level pollutant concentrations resulting from the Project stationary source emissions during routine operations, and to compare the maximum predicted impacts, including background pollutant levels, with applicable short-term and long-term CAAQS and NAAQS. The AERMOD model predicted the increases in criteria pollutant concentrations at all receptors due to Project emissions only. Next, the maximum incremental increases for each pollutant and averaging time were added to the maximum background concentrations. The resulting total pollutant concentrations were then compared with the most stringent CAAQS or NAAQS.

5.2.2.4.7.1 Combustor Startup Modeling

The worst-case 1-hour NO_2, SO_2 and CO, 3-hour and 24-hour SO_2 and 8-hour CO impacts would occur during time periods that includes cold startups for all four combustors. Accordingly, modeling simulations were conducted to estimate the maximum concentrations for each pollutant and averaging time during a startup. The same combustor stack exhaust velocity and temperature as for normal operation are applicable to these worst-case periods. The hourly emission rates used in modeling maximum impacts due to all combustors in the startup conditions are presented in Table 5.1-13.

As stated previously, it is anticipated that each combustor will have up to two cold starts per year. Emissions from the combination of the combustor and the natural gas burners during these cold starts will be emitted from the combustor stacks. It is anticipated that by hour 7 of the startup, stack parameters will be similar to full load operations. Due to the short duration of each startup, modeling simulations were conducted to estimate the maximum 1-hour NO_2, SO_2 and CO, 3-hour and 24-hour SO_2 and 8-hour CO concentrations during a startup. Emissions of particulate matter are less during startup than normal operations; thus, PM concentrations were not predicted during startups.

Note that the elevated emissions characteristic of cold biomass combustor starts are only expected to occur during the relatively rare instances when the units have been shutdown for more than 48 hours. Emissions during startups after shorter periods of combustor downtime are expected to be very similar to those for normal operations and are thus not modeled separately in this analysis.

5.2.2.4.7.2 Combustor Commissioning Modeling

The commissioning of each fluidized bed combustor will entail several tests during which emissions of all pollutants will be higher than during normal operations. These emissions were outlined in Section 5.2.2.2.2.

Emissions of all pollutants will be the highest during the first testing phase; thus emissions from this phase of commissioning were analyzed by means of modeling. Concentrations for all pollutants and all averaging times of 24 hours and shorter were examined.

5.2.2.4.8 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 environment to an unstable inland environment (shoreline fumigation).

A fumigation analysis was performed using the USEPA model SCREEN3. The SCREEN3 model was used to calculate concentrations from inversion breakup fumigation; no shoreline fumigation was performed for the proposed project site that is not near a large body of water. A unit emission rate was used (1 gram per second) in the fumigation modeling to represent the Project emissions and the model results were given in terms of predicted maximum concentrations per unit emission rate that were then scaled using actual project emission emissions data to predict impacts for each pollutant. Stack parameters for one combustor were input into SCREEN3, although the resulting concentration was multiplied by the total of emissions from the four combustors. Inversion breakup fumigation concentrations were calculated for hourly and 3-hour averaging times using USEPA-approved conversion factors. These multiple-hour model predictions are very conservative since inversion breakup fumigation of a particular plume is a transitory condition that would most likely affect a given receptor location for only a few minutes at a time.

5.2.2.5 Modeling Results

5.2.2.5.1 Construction Impacts

Section 5.2.2.1 describes how the expected construction equipment schedule and information on disturbed acreage was used to estimate worst case emission (Month 6) conditions for the purpose of analyzing peak short-term effects to local air quality. Annual impacts were modeled using all emissions that would occur across the site during Months 1 through 12.

Table 5.2-18 presents the results of the construction model simulations for SJS 1&2. Maximum predicted concentrations of NO_2, CO and SO_2 during construction are below the applicable ambient air quality standards. Peak 24-hour and annual concentrations of PM_{10} are predicted to exceed the federal and state ambient standards for this pollutant, but Table 5.2-18 shows that these results are primarily caused by high background concentrations, with only relatively small contributions from the proposed construction activities. Supporting modeling files may be found on the digital video disc (DVD) that is submitted with this AFC. Some notes regarding the modeling results for specific pollutants are provided below.

For the construction phase of the project, the predicted maximum short-term and long-term impacts for all pollutants were predicted to occur close to the project site, with all peaks falling along or near the construction site boundary. This result reflects the relatively low source release heights that characterize construction equipment exhaust and dust-generating activities. Specifically, the predicted maximum annual impacts for SO_2, NO_2, PM_{10}, and $PM_{2.5}$ were predicted to occur along the northwestern portion of the main construction site.

The maximum 24-hour impacts for $PM_{2.5}$ and PM_{10} were predicted to occur along the southwestern corner of the main construction site and the 24-hour impacts for SO_2 were predicted to occur along the center of the western property line. The locations of predicted maximum 1-hour concentrations for CO, NO_2, and SO_2 were on the center portion of the eastern property line. The highest predicted 3-hour SO_2 concentration and the highest 8-hour CO concentration were approximately 100 meters beyond the northwest property line.

Table 5.2-18
Maximum Modeled Criteria Pollutant Impacts Due to SJS 1&2 Construction Emissions

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	
						East (m)	North (m)
Construction Impacts							
CO	1 hour	133.04	5016.0	5149.0	23,000	750424	4001837
	8 hour	25.52	3773.0	3799.0	10,000	748722	4002614
NO_2	1 hour[2]	200.98	137.24	338.2	339	750424	4001837
	Annual[2]	8.79	22.56	31.4	57	748807	4002000
PM_{10}	24 hour[3]	9.33	255.0	264.3	50	748824	4001013
	Annual[3]	1.10	46.8	47.9	20	748805	4002123
$PM_{2.5}$	24 hour[3]	1.98	143.2	145.2	35	748824	4001013
	Annual[3]	0.55	21.2	21.8	12	748807	4002025
SO_2	1 hour	0.22	626.40	626.6	655	750424	4001837
	3 hour	0.08	563.76	563.8	1,300	748722	4002614
	24 hour	0.02	83.52	83.5	105	748811	4001778
	Annual	0.01	18.27	18.3	80	748807	4002000

Notes:
[1]Background represents the maximum values measured at the monitoring stations described in previous sections, for 2005-2007.
[2]Results for NO_2 during construction used ozone limiting method (OLM) with ambient ozone data collected at the Hanford – S. Irwin Street Station for the year 2004.
[3]PM_{10} and $PM_{2.5}$ background levels exceed state standards.
μg/m³ = micrograms per cubic meter.
AAQS = Most stringent ambient air quality standard for the averaging period.
CO = carbon monoxide.
NO_2 = nitrogen dioxide.
OLM = ozone limiting method.
PM_{10} = particulate matter less than or equal to 10 microns in diameter.
$PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter.
SO_2 = sulfur dioxide.
UTM = Universal Transverse Mercator.

5.2.2.5.2 Operations Impact Modeling

As described previously, the emissions used in the model simulations for the total SJS 1&2 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.

5.2.2.5.2.1 Normal Operations

Modeled criteria pollutant impacts for the normal operations of the total SJS 1&2 Project are summarized in Table 5.2-19. As shown in this table, the maximum modeled concentrations due to the Project operational emissions would not cause a violation of any CAAQS or NAAQS and would not significantly contribute to the existing violations of the federal and state PM_{10} and $PM_{2.5}$ standards. In addition, the Project's operational emissions of non-attainment pollutants and their precursors will be offset to comply with SJVAPCD Rule 2201.

The locations of the predicted maximum impacts vary by pollutant and averaging time. The highest annual average concentrations for NO_2, PM_{10}, $PM_{2.5}$, and $SO_2$are expected to occur on the southeastern boundary line of the proposed Project site. The peak 1-hour NO_2 concentration is expected to occur approximately 230 meters west of the western site boundary line. The highest 1-hour SO_2 concentration is predicted at the location in the elevated terrain approximately 7,300 meters southwest of the facility. The maximum 1-hour value for CO is predicted to occur west of the Project boundary line. The peak 3-hour SO_2, 8-hour CO, 24-hour SO_2, 24-hour PM_{10} and 24-hour $PM_{2.5}$ are all predicted to occur at different locations on the southeast boundary line of the facility. Figure 5.2-6 shows the locations of the maximum predicted operational impacts for all pollutants and averaging times.

Table 5.2-19
Maximum Predicted Criteria Pollutant Concentrations from Total SJS 1&2 Project Operations

Pollutant	Averaging Period	Maximum Predicted Concentration	Background Concentration	Total Concentration	NAAQS	CAAQS	Above Most Stringent AAQS ?
		(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	
NO_2	1-hour	195.77	137.24	333.01	NA	339	No
	Annual	0.54	22.56	23.10	100	57	No
SO_2	1-hour	13.50	23.49	36.99	NA	655	No
	3-hour	4.33	15.66	19.99	1300	NA	No
	24-hour	2.23	10.44	12.67	365	105	No
	Annual	0.58	5.22	5.80	80	NA	No
CO	1-hour	192.58	5016	5208.58	40000	23,000	No
	8-hour	5.86	3773	3779.26	10000	10,000	No

Table 5.2-19
Maximum Predicted Criteria Pollutant Concentrations from Total SJS 1&2 Project Operations (Continued)

Pollutant	Averaging Period	Maximum Predicted Concentration	Background Concentration	Total Concentration	NAAQS	CAAQS	Above Most Stringent AAQS ?
		(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	
PM_{10}	24-hour	4.70	255	259.70	150	50	(Background is already above)
	Annual	1.22	46.8	48.02	NA	20	(Background is already above)
$PM_{2.5}$	24-hour	4.70	143.2	147.90	35	NA	(Background is already above)
	Annual	1.22	21.2	22.42	15	12	(Background is already above)

5.2.2.5.2.2 Combustor Startup Impacts

Table 5.2-20 shows that during the brief combustor cold startup periods, the predicted concentrations resulting from four combustors starting up simultaneously along with all concurrent operation of all other project are below the AAQS for all non-attainment pollutants. Combustor emissions of PM_{10} and $PM_{2.5}$ are expected to be lower during these startup events than during normal operations. Consequently, additional modeling for these pollutants is not reflected in Table 5.2-20.

Table 5.2-20
Maximum Predicted Criteria Pollutant Concentrations During Startup of the Four Combustors Plus Ancillary Sources

Pollutant	Averaging Period	Maximum Predicted Concentration	Background Concentration	Total Concentration	NAAQS	CAAQS	Above Most Stringent AAQS ?
		(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	
NO_2	1-hour	195.77	137.24	333.01	NA	339	No
SO_2	1-hour	146.58	23.49	170.07	NA	655	No
	3-hour	34.17	15.66	49.83	1300	NA	No
	24-hour	4.16	10.44	14.60	365	105	No
CO	1-hour	192.58	5016	5208.58	40000	23,000	No
	8-hour	8.30	3773	3781.70	10000	10,000	No

5.2.2.5.2.3 Combustor Commissioning Impacts

Table 5.2-21 shows the results of the model simulations for the combustor commissioning. The values represented in this table are the highest concentrations for the indicated averaging times that are predicted by AERMOD to result due to the worst-case commissioning emissions for each individual combustor; no other sources would be operating during combustor commissioning. Table 5.2-21 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. Maximum PM_{10} and $PM_{2.5}$ impacts for commissioning will add to existing violations of the applicable ambient standards, but project emissions of these pollutants will be need to be offset with approved emission reduction credits.

Table 5.2-21
Maximum Predicted Criteria Pollutant Concentrations during per Combustors during Commissioning

Pollutant	Averaging Period	Maximum Predicted Impact	Background Concentration (red ones mean old numbers, need update)	Total Concentration	NAAQS	CAAQS	Above Most Stringent AAQS?
		(µg/m³)	(µg/m³)	(µg/m³)	(µg/m3)	(µg/m3)	
NO_2	1-hour	78.39	137.24	215.63	NA	339	No
SO_2	1-hour	13.50	23.49	36.99	NA	655	No
	3-hour	4.64	15.66	20.30	1300	NA	No
	24-hour	26.94	10.44	37.38	365	105	No
CO	1-hour	22.40	5016	5038.40	40,000	23,000	No
	8-hour	5.71	3773	3779.11	10,000	10,000	No
PM_{10}	24-hour	26.23	255	281.23	150	50	(Background is already above)
$PM_{2.5}$	24-hour	26.23	143.2	169.43	35	NA	(Background is already above)

5.2.2.5.3 Fumigation Impacts

Potential worst-case fumigation impacts were modeled according to the method described in Section 5.2.2.4.8. The SCREEN3 modeling results obtained with a unit emission rate were multiplied by the actual Project emission rates to obtain the 1-hour NO_2, CO and SO_2 concentration values presented in Table 5.2-22. The 1-hour values are multiplied by the USEPA conversion factor of 0.9 to estimate the maximum 3-hour concentration for SO_2. As shown in Table 5.2-22, the resulting incremental concentration predictions for fumigation conditions are well below the state and federal AAQS.

Table 5.2-22
Project Operations Fumigation Impact Summary

Pollutant	Source	Inversion Impact (µg/m³)	Distance to Maximum Impact (meters)
NO_2 1 hour	Combustors	7.5	6728
CO 1 hour	Combustors	12.8	6728
SO_2 1 hour	Combustors	7.7	6728
SO_2 3 hour[1]	Combustors	6.9	6728

Notes:
[1] SO_2 1-hour results multiplied by 0.9 to convert to 3-hour average.
% = percent
µg/m3 = micrograms per cubic meter
CO = carbon monoxide
NO_2 = nitrogen dioxide
SO_2 = sulfur dioxide

5.2.2.5.4 Impacts for Non-attainment Pollutants and their Precursors

The emission offset program described in the SJVAPCD Rules and Regulations was developed to implement the Clean Air Act requirement to ensure a net air quality improvement when new sources locate within the district. Project impacts on the concentration levels of non-attainment pollutants (PM_{10}, $PM_{2.5}$ and O_3) and their precursors (SO_x, NO_x, and VOC) will be fully mitigated by emission offsets, as required by EPA and SJVAPCD regulations. The offsets have not been accounted for in the modeled impacts noted above. Thus, the net impacts of the Project emissions will actually be somewhat lower than has been indicated in the foregoing presentation of model results.

5.2.3 Cumulative Impacts

CEC requirements specify that an analysis is 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 or can be expected to do so in the near future. Information requests have been made to SJVAPCD to obtain data on new projects planned within six miles from the proposed site. The resulting list of projects will be submitted to CEC for final determination of which new projects need to be evaluated by cumulative modeling.

Additional dispersion modeling will be submitted as an addendum to this AFC at a later date. Such a cumulative analysis would use the AERMOD model with the same meteorological input data set and either the same receptor grids used for modeling SJS 1&2 impacts or an expanded grid to include areas surrounding other new sources. Decisions regarding which other sources are to be included and the manner in which these sources will be represented for modeling will be made in consultation with CEC and SJVAPCD.

5.2.4 Mitigation Measures

5.2.4.1 Construction Mitigation Measures

The Project will implement all of the SJVAPCD recommended mitigation measures outlined below, to control emissions during the construction phase of the Project from both fugitive dust and equipment combustion exhaust when feasible.

AIR-1: The following mitigation measures are proposed to control exhaust emissions from the diesel heavy equipment used during construction of SJS 1&2:

- Regular preventive maintenance to prevent equipment engine emission increases due to inefficient fuel combustion;
- Use of low sulfur and low aromatic fuel meeting California standards for motor vehicle diesel fuel; and
- Use of low-emitting gas and diesel engines meeting state and federal emissions standards (Tiers I, II, and III) for construction equipment,

AIR-2: The following mitigation measures are proposed to control fugitive dust emissions during construction of the Project:

- Use of either water application, chemical dust suppressant application, or other suppression technique to control dust emissions from onsite unpaved road travel and unpaved parking areas;
- Cover all trucks hauling soil, sand, and other loose materials or require all such trucks to maintain at least two feet of freeboard;
- Limit traffic speeds on all unpaved site areas to 5 mph;
- Install sandbags or other erosion control measures to prevent silt runoff to roadways;
- Replant vegetation in disturbed areas as quickly as possible;
- Use wheel washers or wash off tires of all trucks exiting construction site; and
- Mitigate fugitive dust emissions from wind erosion on areas disturbed by construction activities (including storage piles) by application of either water, chemical dust suppressant, or other suppression technique.

5.2.4.2 Operational Emissions Offsets

Section 4.5.3 of SJVAPCD Rule 2201 will require that project operational SJS 1&2 Project emissions above 10 tons per year of NO_x or VOC, 100 tpy of CO, 14.6 tpy of PM_{10} and 27.375 tpy of SO_x be offset by emission reductions achieved at other sources. Per Section 4.6.1 of this rule, offsets for CO are not required if it can be demonstrated by modeling that the project's emissions will not cause or contribute to violations of the ambient standards for that pollutant. Modeling results presented in Section 5.2.2.4, Modeling Results, provide this demonstration for CO. Thus, offsets for this pollutant are not proposed.

Based on emissions data presented in Section 5.2.2.2, Operational Emissions, annual emissions of NO_x and VOC would exceed the offsets trigger of 10 tpy for the proposed level of operation. In addition, the projected PM_{10} and SO_x emissions would exceed the respective thresholds of 14.6 tpy and 27.375 tpy. According to Rule 2201 Section 4.7.2, offsets need to be provided for the expected quantity of emissions in excess of these offsets thresholds, including the application of a distance factor that accounts for the distance between the project requiring offsets and the location of the emission reductions used to generate ERCs. For purposes of this analysis, the required distance factor for all pollutants is assumed to be 1.5, based on the premise that available ERCs will most likely be from emission reductions occurring more than 15 miles from the SJS 1&2 site.

Section 4.5.3 of Rule 2201 states that the required offset amounts for stationary sources that remain constant throughout the year be expressed in pounds per year, whereas offsets are calculated in pounds per quarter for seasonal sources and projects with emission rates that are not uniform throughout the year. The operation of the biomass combustors at SJS 1&2 will not be uniform throughout the year, and will thus be required to provide quarterly emissions offsets. In order to estimate quarterly project emissions and offset requirements, the estimated combined annual emissions of biomass combustors, gas burners and cooling towers of the two biomass plants (see Table 5.2-12) were distributed among the four calendars quarters in proportion to the expected quarterly biomass production levels in MW-hours, as shown in Table 5.2-23. The estimated ERC quantities that will be required to comply with SJVAPCD offset rules, including distance factors, are listed in Table 5.2-24 under the header “SJVAPCD Criteria”.

Table 5.2-23
Projected Hourly Total Biomass Production (MW-hours)

Hour	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1		1,030	1,141	1,104	1,141	1,104	1,141	1,141	1,104	1,141	1,104	1,141
2	1,141	1,030	1,141	1,104	1,141	1,104	1,141	1,141	1,104	1,141	1,104	1,141
3	1,141	1,030	1,141	1,104	1,141	1,104	1,141	1,141	1,104	1,141	1,104	1,141
4	1,141	1,030	1,141	1,104	1,141	1,104	1,141	1,141	1,104	1,141	1,104	1,141
5	1,141	1,030	1,141	1,104	1,141	1,104	1,141	1,141	1,104	1,141	1,104	1,141
6	1,141	1,030	1,141	1,104	1,141	1,104	1,141	1,141	1,104	1,141	1,104	1,141
7	1,141	1,030	1,141	1,104	798	703	933	1,141	1,104	1,141	1,104	1,141
8	1,141	1,030	1,070	732	237	170	354	466	721	1,060	1,095	1,141
9	1,141	874	815	505	35	-	62	166	417	698	942	1,141
10	1,101	791	698	349	-	-	-	-	260	532	898	1,099
11	1,075	749	651	336	-	-	-	-	162	465	851	1,054
12	1,083	807	574	307	-	-	-	-	160	384	850	1,078
13	1,095	783	572	389	-	-	-	-	158	371	839	1,077
14	1,131	795	639	444	-	-	-	-	207	416	881	1,085
15	1,141	882	736	467	-	-	-	-	273	461	929	1,107
16	1,141	941	785	461	38	-	-	36	339	510	1,027	1,141
17	1,141	1,030	822	599	27	-	147	243	540	662	1,104	1,141
18	1,141	1,030	1,016	752	258	82	195	447	674	993	1,104	1,141
19	1,141	1,030	1,141	1,017	582	429	523	781	1,104	1,141	1,104	1,141
20	1,141	1,030	1,141	1,104	1,141	1,038	1,141	1,141	1,104	1,141	1,104	1,141
21	1,141	1,030	1,141	1,104	1,141	1,104	1,141	1,141	1,104	1,141	1,104	1,141
22	1,141	1,030	1,141	1,104	1,141	1,104	1,141	1,141	1,104	1,141	1,104	1,141
23	1,141	1,030	1,141	1,104	1,141	1,104	1,141	1,141	1,104	1,141	1,104	1,141
24	1,141	1,030	1,141	1,104	1,141	1,104	1,141	1,141	1,104	1,141	1,104	1,141
Month Total	27,160	23,107	23,208	19,605	14,523	13,461	14,762	15,828	18,264	21,381	24,873	27,035
Total Per Quarter	1st quarter			2nd quarter			3rd quarter			4th quarter		
	73,475			47,589			48,853			73,289		

Table 5.2-24
Estimated Emissions Offsets Requirements for SJS 1&2

Calendar Quarter	Project Emissions (tons)	Project Emissions (lbs)	SJVAPCD Criteria			CEC Criteria			**Higher**
			Offset Requirement		ERCs Required (tons)[2]	Offset Requirement		ERCs Required [3] (tons)	**ERCs Required (tons)**
			Trigger Threshold (lb/year) [1]	**Trigger? (Y/N)**		**Trigger Threshold (lb/year)**	**Trigger? (Y/N)**		
NO_x									
1Q	14.78	29,565			17.67			14.78	**17.67**
2Q	9.71	19,411			11.60			9.71	**11.60**
3Q	9.95	19,907			11.90			9.95	**11.90**
4Q	14.75	29,492			17.62			14.75	**17.62**
Annual Total	**49.19**	**98,376**	**20,000**	**Y**	**58.78**	**0**	**Y**	**49.19**	**58.78**
VOC									
1Q	3.92	7,837			1.35			3.92	**3.92**
2Q	2.55	5,096			0.88			2.55	**2.55**
3Q	2.61	5,230			0.90			2.61	**2.61**
4Q	3.91	7,817			1.35			3.91	**3.91**
Annual Total	**12.99**	**25,980**	**20,000**	**Y**	**4.49**	**0**	**Y**	**12.99**	**12.99**
PM_{10}									
1Q	31.25	62,506			40.28			31.25	**40.28**
2Q	20.39	40,788			26.29			20.39	**26.29**
3Q	20.92	41,849			26.97			20.92	**26.97**
4Q	31.17	62,350			40.18			31.17	**40.18**
Annual Total	**103.75**	**207,492**	**29,200**	**Y**	**133.72**	**0**	**Y**	**103.75**	**133.72**
SO_x									
1Q	15.19	30,385			10.44			15.19	**15.19**
2Q	9.96	19,923			6.85			9.96	**9.96**
3Q	10.22	20,435			7.02			10.22	**10.22**
4Q	15.15	30,310			10.42			15.15	**15.15**
Annual Total	50.53	101,053	54,750	Y	34.73	0	Y	50.53	**50.53**

Notes

1. Refer to SJVAPCD Rule 2201, Table 4-1, Emissions Offset Threshold Levels.
2. Quantity of ERCs required depends on distance factor applicable to individual emission reduction sources. Values shown here correspond to a range of distance factors from 1.2/1 to 1.5/1. Distance factor applied in calculating SJVAPCD NO2, VOC, PM10, and SOx ERC requirements are all assumed to be 1.5 (original location of emission offsets15 miles or more from the new or modified emissions unit's stationary source).
3. CEC requires all emissions of nonattainment pollutants and precursors to be offset on a 1 to 1 ratio

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In its role as lead agency under the California Environmental Quality Act (CEQA), CEC uses different criteria for determining the minimum mitigation requirements for offsetting emissions from new power plants. For previous projects, the CEC policy has been to require offsets for the full emission quantities of all non-attainment pollutants and their precursors on at a least a 1 to 1 basis, *i.e.,* without including a distance factor. Based on this approach, the SJS 1&2 offset requirements would be the total annual emissions for each of the following pollutants: NO_x, VOC, $PM_{10,}$ and SO_2. The distribution of these totals by calendar quarter is shown in Table 5.2-24 under the header "CEC Criteria".

The amounts of annual NO_x, VOC, $PM_{10,}$ and SO_2 ERCS required by CEC were distributed among the calendar quarters by the same method described above. Then the higher of the quantities calculated according to the SJVAPCD and CEC offsetting criteria for each pollutant and each quarter are assumed to represent the project's offset requirements. These values are listed in the bold font on the right side of Table 5.2-24.

The applicant will purchase ERCs in sufficient quantity to comply with SJVAPCD and CEC requirements. Section 4.8 of SJVAPCD Rule 2201 specifies distance ratios that must be used in determining the quantities of ERCs to be provided for a new source. If the location of the offsetting emission reduction is less than 15 miles from the new source, the ratio for a major source is 1.3 to 1. If the original location of the offsetting emission reduction is 15 miles or more from the new source, the applicable offset ratio is 1.5 to 1. As described in Section 5.2.6, LORS Compliance, the distance factor used in calculating NO_x and VOC emissions will be 1.5 regardless of the actual distances from ERC sources because of a forthcoming change to SJVAPCD rules related to the District's impending designation as an Extreme Non-Attainment area with respect to the federal 8-hour ambient ozone standard.

SJVAPCD rules allow the use of certain interpollutant offsets trades, whereby the offset requirements for a particular pollutant, such as PM_{10}, may be met by means of ERCs for other pollutants that contribute to first pollutant's formation. For example, the applicant is aware that the use of SO_x credits at a ratio of 1.87 to 1 has been allowed in lieu of PM_{10} credits for several recent power projects in the Southern San Joaquin Valley. A similar strategy may be pursued for the SJS 1&2, owing to the current tight market for PM_{10} ERCs in the Valley.

The applicant has been active in pursuing ERCs for the project. The ERC bank maintained by SJVAPCD currently contains quantities of NO_x, VOC, SO_x and PM_{10} that are well in excess of the SJS 1&2 offset requirements. Discussions are ongoing with various ERC brokers.

5.2.5 Best Available Control Technologies (BACT)

In accordance with the requirements of SJVAPCD rules, the proposed Project will be required to use BACT to minimize emissions from the proposed emission sources which include the biomass combustors, the diesel emergency generator engines, the diesel firewater pump engines and the cooling towers.

Biomass Combustors

Each 20 MW biomass combustor will be equipped with several emission control systems to minimize emissions from its exhaust stack. Crushed limestone will be added to the biomass fuel fed into the combustor to reduce SO_x emissions. The limestone is added directly to the fluidized bed chamber and bonds with sulfur present in the fuel, forming calcium sulfates that are removed from the system in the ash product. An SNCR

will be located in the vapor space above the fluidized bed and uses injected ammonia to reduce NO_x. In the exhaust gas stream, a multi-clone (a series of cyclones) is proposed for initial particulate removal. Hydrated lime will be injected into the dry scrubber for control of acid gases (HCl and SO_x) before the exhaust gas flows through a baghouse for further particulate control. The entrained lime will coat the fabric of the baghouse as it is removed from the exhaust stream, further reducing acid gases as the exhaust gas flows through the baghouse. A selective catalytic reduction system (SCR) is proposed for additional NO_x reduction before a wet scrubber provides a final means of removal for ammonia, acid gas, and particulate emissions.

The permitting manager at SJVAPCD stated that the Sierra Pacific Biomass Plant has an SCR for NO_x control, which is the BACT achieved in practice for a fluidized bed biomass combustor. A search of the SJVAPCD BACT determination clearinghouse was made but this control has not yet been included. Table 5.2-25 presents the relevant BACT determinations listed in the SJVAPCD clearinghouse, and the proposed BACT emission levels for the biomass combustors.

Table 5.2-25
Summary of Proposed BACT for the Biomass Combustors

SJVAPCD BACT Guideline 1.3.2 Fluidized Bubbling Bed Biomass Combustor (11/21/02)			SJS 1&2 Proposed BACT	
Pollutant	**Control Technology**	**Controlled Emission Level**	**Controlled Emission Level**	**Technology**
NO_x	Ammonia Injection	0.1 lb/MMBtu	0.012 lb/MMBtu	Limestone injection, SNCR (ammonia injection), SCR, baghouse, mulitclone, wet scrubber, hydrated lime dry scrubber.
CO	__	183 ppmvd	20 ppmvd	
VOC	__	0.024 lb/MMBtu	0.003 lb/MMBtu	
SO_2	Limestone Injection	23 ppmvd	5 ppmvd	
PM_{10}	baghouse	0.045 lb/MMBtu	0.025 lb/MMBtu	

Notes:
BACT = Best Available Control Technology.
CO = carbon monoxide.
NO_x = nitrogen oxides.
PM_{10} = particulate matter less than or equal to 10 microns in diameter.
VOC = Volatile organic compounds.
SO_2 = sulfur dioxide.
ppmvd = parts per million , dry vapor
lb/MMBtu = pounds per million British Thermal Units

Biomass Combustion Engines

40 CFR part 89 and CCR Title 13 and Title 17 require certified EPA TEIR III emergency internal combustion engines, but engines compliant with Tier III standards are currently commercially unavailable. A search of the CARB BACT determination clearinghouse was made and recent BACT determinations for internal combustion engines are presented in Table 5.2-26a. The equipment proposed for the SJS 1&2 satisfies the emission requirements of recent BACT determinations for similar equipment in several different regulatory jurisdictions within California, as presented in Table 5.2-26b.

Table 5.2-26a
Summary of Recent California BACT Determinations for Diesel Internal Combustion Engines

Name	Location	Application Date	Rating (Hp)	Control Technology	Emission Limit (g/bhp-hr)			
					VOC	NO_x	CO	PM_{10}
East Los Angeles College	Monterey Park, CA	12/2003	160	Engine design	0.09	3.9	0.45	0.22
Los Angeles County	Downey, CA	12/2003	160	Engine design	0.12	4.2	0.44	0.14
Los Angeles County Probation Facility	Los Angeles, CA	8/2002	240	Engine design	NA	4.2	0.44	0.14
Johnson Power Systems	Los Angeles, CA	8/2002	764	Engine design	0.03	6.19	0.37	0.04

Notes:
Hp = horsepower.
g/bhp-hr = grams per brake horsepower – hour.
NA = data not available.
Emissions corrected to 3 percent O_2.

Internal Combustion Engines

Table 5.2-26b
Proposed BACT for SJS 1&2 Diesel Internal Combustion Engines

Equipment	Rating (Hp)	Control Technology	Emission Limit (g/bhp-hr)			
			VOC	NO_x	CO	PM_{10}
Firewater Pump Engine	250	Engine design	0.10	4.8	0.59	0.14
Diesel Emergency Generator	1341	Engine design	0.22	3.74	0.79	0.023

Notes:
Hp = horsepower.
g/bhp-hr = grams per brake horsepower – hour.
Emissions corrected to 3 percent O_2.

Cooling Towers

SJS 1&2 will include a wet surface air cooled condenser/cooling tower at each Plant. A search of the SJVAPCD BACT determination clearinghouse was made and the only BACT determination for induced draft cooling tower was cellular type drift eliminator. The proposed BACT for the SJS 1&2 cooling towers is a high efficiency drift eliminator guaranteed to limit drift emissions to no more than 0.0005% of the cooling water circulating rate. This control efficiency has been determined to be BACT for several recent power plant permitted within the San Joaquin Valley.

5.2.6 LORS Compliance

The applicable LORS related to the potential air quality impacts from the SJS 1&2 are described below. These LORS are administered (either independently or cooperatively) by the SJVAPCD, EPA Region IX, the CEC, and the CARB.

5.2.6.1 Federal

The federal Clean Air Act (CAA) of 1970, 42 United States Code 7401 *et seq*., as amended in 1977 and 1990, is the basic federal statute governing air pollution and its control. The provisions of the CAA that are potentially relevant to this Project are listed below and their applicability is discussed in the following sections:

- Air Quality Control Regions;
- National Ambient Air Quality Standards;
- Prevention of Significant Deterioration Requirements;
- New Source Review Requirements;
- New Source Performance Standards;
- Maximum Achievable Control Technology Standards;
- Federally Mandated Operating Permits; and
- Risk Management Plan.

Applicable requirements of the State of California and the local SJVAPCD are discussed in Section 5.2.6.2 and 5.2.6.3, including regulations that apply to both construction and operations.

5.2.6.1.1 Air Quality Control Regions

Because air pollution is a regional problem and not limited to political or state boundaries, the CAA established Air Quality Control Regions (AQCR). This is a method of dividing the country into regional air basins. The proposed project site is located in Fresno County and is part of the San Joaquin Valley Intrastate Air Quality Control Region. (Title 40 CFR Part 81.165).

5.2.6.1.2 National Ambient Air Quality Standards

EPA, in response to the federal CAA of 1970, established federal NAAQS in 40 CFR Part 50. The current federal NAAQS include primary and secondary standards for seven "criteria" pollutants. These criteria pollutants are O_3, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$ and Pb.

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

The 1990 Clean Air Act Amendments (CAAA) established attainment deadlines for all designated areas that were not in attainment with the federal NAAQS. The short-term standards for CO, NO_2, SO_2 and Pb are written terms of air concentrations that are not to be exceeded more than once per year. Long-term (annual) standards for these pollutants are never to be exceeded. The current federal standards for O_3, PM_{10} and $PM_{2.5}$ are expressed in terms of concentrations that may not be exceeded more than a certain percent of the time. Specifically, compliance with the ozone standard is achieved when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than 0.075 ppm. 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 $\mu g/m^3$ is equal to or less than one. The 24-hour standard for $PM_{2.5}$ is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than 35 $\mu g/m^3$.

The State of California has adopted CAAQS that are in some cases more stringent than the federal NAAQS and which regulate the allowable air concentrations of additional pollutants. The state and federal Ambient Air Quality Standard (AAQS) relevant to the Project are summarized in Table 5.2-27, National and California Ambient Air Quality Standards.

Table 5.2-27
National and California Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS[1]		CAAQS[2]
		Primary[3,4]	Secondary[3,5]	Concentration[3]
Ozone (O_3)	1-Hour	Revoked[6]	Same as Primary Standard	0.09 ppm (180 µg/m^3)
	8-Hour	0.075 ppm (147 µg/m^3)[11]		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)[10]	Annual Average	0.053 ppm (100 µg/m^3)	Same as Primary Standard	0.03 ppm (57 µg/m^3)
	1-Hour	-		0.18 ppm (339 µg/m^3)
Sulfur Oxides (SO_2)	Annual Average	0.030 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[7]		20 µg/m^3
Fine Particulate Matter ($PM_{2.5}$)[8]	24-Hour	35 µg/m^3	Same as Primary Standard	-
	Annual Arithmetic Mean	15 µg/m^3		12 µg/m^3
Lead (Pb)[12]	30-Day Average	-	-	1.5 µg/m^3
	Quarterly Average	0.15 µg/m^3	Same as Primary Standard	-
Hydrogen Sulfide (HS)	1-Hour	No Federal Standards		0.03 ppm (42 µg/m^3)
Sulfates (SO_4)	24-Hour			25 µg/m^3
Visibility Reducing Particles	8-Hour (10 am-6 pm, 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.
Vinyl Chloride[9]	24-Hour			0.01 ppm (26 µg/m^3)

Table 5.2-27
National and California Ambient Air Quality Standards
(Continued)

Pollutant	Averaging Time	NAAQS[1]		CAAQS[2]
		Primary[3,4]	Secondary[3,5]	Concentration[3]

Reference: EPA-NAAQS (http://www.epa.gov/air/criteria.html); CARB-CAAQS (http://www.arb.ca.gov/aqs/aaqs2.pdf).

Notes:

$\mu g/m^3$ = micrograms per cubic meter.

mg/m^3 = milligram per cubic meter.

ppm = parts per million.

[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 $\mu g/m^3$ 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.

[2] California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM_{10}, $PM_{2.5}$, and visibility-reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[3] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[5] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[6] On June 15, 2005, the 1-hour ozone standard (0.12 ppm) was revoked for all areas except the 8-hour ozone nonattainment Early Action Compact (EAC) Areas. The state of California currently does not have any EAC areas.

[7] Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the agency revoked the annual PM_{10} standard in 2006 (effective December 17, 2006).

[8] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 $\mu g/m^3$ (effective December 17, 2006).

[9] California ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[10] On Tuesday, February 19, 2008, the California Office of Administrative Law approved amendments to the regulations for the State Ambient Air Quality Standard for nitrogen dioxide (NO_2). The new standards become effective on March 20, 2008.

[11] US EPA strengthened the new 8-hour average ozone standard from 0.08 ppm to 0.075 ppm on March 12, 2008 (effective May 27, 2008).

[12.] US EPA strengthened the lead standard from 1.5 $\mu g/m^3$ to 0.15 $\mu g/m^3$on October 15, 2008.

The EPA, 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 federal and state AAQS. 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 proposed project site is designated a federal nonattainment area for O_3 and $PM_{2.5}$ based on air quality monitoring data showing exceedances of the federal standards. As of September of 2008, EPA re-designation the San Joaquin Valley attainment for PM_{10}. The proposed project vicinity is designated a state nonattainment area for O_3, $PM_{2.5}$, and PM_{10} based on air quality monitoring data showing exceedances of the state standards Table 5.2-28 presents the attainment status (both federal and state) for Fresno County.

As mentioned above, both EPA and CARB are involved with air quality management in the San Joaquin Valley Air Basin, along with SJVAPCD. The respective areas of responsibility for these agencies in this regard are described below.

Table 5.2-28
Attainment Status for the Fresno County with respect to Federal and California Ambient Air Quality Standards

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

Source: National Area Designations and Proposed 2006 State Area Designations, CARB (http://www.arb.ca.gov/desig/adm/adm.htm)

Notes:

CO = carbon monoxide
NO_2 = nitrogen dioxide
SO_2 = sulfur dioxide
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter

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 federal NAAQS. The State of California falls under the jurisdiction of EPA Region IX, which is headquartered in San Francisco. EPA requires that all states submit State Implementation Plans (SIPs) that describe how the federal NAAQS will be achieved and maintained in all federal nonattainment areas. Attainment plans must be approved by CARB before they are submitted to EPA.

Regional or local air quality management districts, such as SJVAPCD are responsible for preparation of plans for attainment of federal and state standards. 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 federal and state AAQS. This AQMP is submitted to CARB, which then compiles AQMPs from all air districts within the state into the SIP. The air districts are responsible for maintaining 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 federal and state AAQS.

5.2.6.1.3 Prevention of Significant Deterioration (PSD) Requirements

In addition to the ambient air quality standards described above (NAAQS), the federal Prevention of Significant Deterioration (PSD) program (40 CFR Part 52.21) has been established to protect deterioration of air quality in those areas that already meet national ambient air quality standards. 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 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 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 shown in Table 5.2-29. 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, and analyses to estimate the source's impacts on ambient air quality and air quality related values (AQRVs), *i.e.,* visibility, acid deposition and effects on soils and vegetation.

The SJS 1&2 operational emissions of all pollutants would be well below the PSD threshold of 250 tpy. Thus, the Project would not trigger federal PSD requirements.

Table 5.2-29
PSD Emission Threshold Triggers for New Stationary Sources

Pollutant	Significant Thresholds (tpy)	Project Emissions (tpy)	PSD Triggered by Project?
CO	100	<250	No
SO_2	40	<250	No
NO_x	40	<250	No
PM_{10}	15	<250	No
VOCs	40	<250	No

Source: 40 CFR Part 51.166 - Prevention of significant deterioration of air quality

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

5.2.6.1.4 New Source Review Requirements

The Federal 40 CFR Part 51 and SJVAPCD New Source Review (NSR) rule (Regulation II, Rule 2201) establish the criteria for siting new and modified emission sources, and are applicable to the project. SJVAPCD has been delegated authority by USEPA for NSR rule development and enforcement according to the terms of Rule 2201. There are three basic requirements within the NSR rules. First, BACT must be applied to any new source with potential emissions above specified threshold quantities (TQs). Second, all potential emission increases of nonattainment pollutants or precursors from the proposed source above specified thresholds must be offset by real, quantifiable, surplus, permanent, and enforceable emission decreases in the form of ERCs. Third, an ambient air quality impact assessment must be conducted to confirm that the project does not cause or contribute significantly to a violation of a NAAQS or CAAQS or jeopardize public health.

5.2.6.1.5 New Source Performance Standards

New Source Performance Standards (NSPS) have been established by 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. 40 CFR 60 Subpart Db, Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units, applies to new industrial steam generating units that have a maximum design heat input capacity of 100 MMBtu/hr or greater. The each proposed biomass combustor has a design heat input capacity of about 311 MMBtu/hr, and is thus subject to this NSPS. The only applicable emission limits of Subpart Db is: the particulate standard of 0.030 lb/MMBtu (wood fired boiler with annual capacity factor greater than 30 percent).

In addition, the requirements of 40 CFR 60 Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines are applicable to the diesel engine drivers for the two emergency generators and two firewater pumps. The standards for NO_x plus NMHC, CO and PM that apply to the 1341 horsepower generator engines are identical to the federal Tier 2 standards. The applicable standards for the 250 horsepower firewater pump engines depend on the model year of the equipment. Starting with the 2009 model year, emission limits for these engines are identical to the Tier 3 standards.

5.2.6.1.6 Maximum Achievable Control Technology (MACT)

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

A major source of HAP emissions is any stationary source that emits any single HAP at 10 tons or more per year or any combination of HAPs at a rate of 25 tons or more per year. The combined SJS 1&2 biomass combustor plants will constitute a major source of HAPs, and are thus required to meet the emission limits and control requirements specified in any applicable NESHAPS (also referred to as Maximum Achievable Control Technology or MACT standards). Estimates of toxic air contaminant emissions, including HAPs, from SJS 1&2 facility sources, are presented in Section 5.16, Public Health and Safety

The specific MACT standard that is potentially applicable to the new biomass combustors/boilers is 40 CFR 63 Subpart DDDDD, National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters. Based on the expected fuel type and annual capacity factor of the proposed biomass combustors, the Subpart DDDDD MACT emission limits applicable include the following:

1. 0.025 lb/MMBtu of fuel energy input for PM,
2. 0.02 lb/MMBtu of fuel energy input for Hydrogen Chloride,
3. 0.000003 lb/MMBtu of heat input or Mercury, and
4. 400 ppm by volume on a dry basis corrected to 7 percent oxygen (30-day rolling average) for CO.

A facility subject to these emission limits is required to operate the control equipment used to achieve them in accordance with the following requirements:

- For wet scrubbers, the minimum pressure drop and liquid flow-rate must be maintained at or above the operating levels established during the performance tests that demonstrated compliance with the applicable emission limit for particulate matter and mercury.
- For fabric filters (baghouses), a bag leak detection system must be installed and operated according to §63.7525 and the fabric filter must be operated such that the bag leak detection

system alarm does not sound more than 5 percent of the operating time during each 6-month period;

- For dry scrubbers used to control HCl and mercury emissions, the. minimum sorbent injection rate must be maintained at or above the operating levels established during the performance tests that demonstrated compliance with the applicable emission limits for HCl and mercury.
- For any other particulate or mercury control system, plume opacity must be maintained at a level less than or equal to 10 percent (1-hour block average).

5.2.6.1.7 Federally Mandated Operating Permits

Title V of the CAA requires EPA to develop a federal operating permit program that is implemented under 40 CFR Part 70. This program is administered by SJVAPCD under Regulation II, Rule 2520. Each major source (as defined in SJVAPCD rules), Phase II acid rain facility, and certain other source types designated by EPA must obtain a Part 70 permit. Permits must contain emission estimates based on potential to emit, identification of all emissions sources and controls, a compliance plan, and a statement indicating each source's compliance status. The permits must also incorporate all applicable federal requirements. The project will be a major source according to the definition in Rule 2520 and will be subject to the Title V Operating Permit requirements.

5.2.6.1.8 Risk Management Plan

Regulations (40 CFR Part 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 a listed regulated substance to develop a Risk Management Plan (RMP), 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 SJS 1&2 Project SNCR and SCR NO_x control systems, is a listed substance and its Threshold Quantity for solutions of 20 percent and greater is 20,000 pounds of solution. The proposed SCR systems for the SJS 1&2 biomass combustors will use 19 percent aqueous ammonia and thus will not trigger the federal RM.P requirements. However, as described in the discussion of California LORS, the quantity of aqueous ammonia expected to be on-site will exceed the thresholds of the California Accidental Release Prevention (CalARP) program, which will require preparation of an RMP in any case.

5.2.6.2 State of California

The CARB was created by the Mulford-Carrell Air Resources Act in 1968. The primary responsibilities of the CARB are (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 state's ambient air quality standards; (4) to review the operations of the local air pollution control districts; and (5) to review and coordinate the SIPs for achieving federal ambient air quality standards.

5.2.6.2.1 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 achieve attainment of the NAAQS by reducing emissions. CARB reviews the SIP. The relevant SJVAPCD Rules and Regulations that have been incorporated into the SIP are presented below under the local LORS. (Section 5.2.6.3).

5.2.6.2.2 California Clean Air Act

In 1989, CAAQS, including stringent enforcement of the NAAQS and additional standards for visibility-reducing particles, sulfates, and hydrogen sulfide (California Health & Safety Code section 39606). In general the state standards for specific pollutants are more stringent than the NAAQS. Local districts prepare air quality plans to demonstrate how the ambient air quality standards will be attained.

5.2.6.2.3 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. CARB identifies and prioritizes the pollutants to be considered for identification as toxic air contaminants. 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 and adds to the 189 HAPs named by the CAAA. If necessary, CARB develops air toxics control measures to reduce emissions.

5.2.6.2.4 Air Toxics Hot Spots Program

This program was created in 1987 as required by the California Health and Safety Code Section 44300 (originally Assembly Bill 2588 – Air Toxics "Hot Spots" Information and Assessment Act.). Implementation of the program has led to development of a statewide inventory of air toxics emissions from stationary sources. Affected facilities must prepare: (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 are found to pose a significant health risk must prepare and implement risk reduction plans. This requirement is applicable only after the start of operations. The health risk assessment presented in Section 5.16, Public Health, indicates that air toxics impacts from the proposed project would be less than the significance levels used for AB2588 .analyses.

5.2.6.2.5 California Accidental Release Prevention (CalARP Program)

The California Accidental Release Prevention (CalARP) Program includes the federal Accidental Release Prevention Program [Title 40, Code of Federal Regulations (CFR) Part 68], with certain additional state-specific features pursuant to Article 2, Chapter 6.95, of the Health and Safety Code (HSC). The purpose of the CalARP Program is to prevent the accidental release of listed regulated substances. Stationary sources with more than a threshold quantity of a regulated substance are required to determine the potential for and impacts of accidental releases from that covered process. The owner or operator of a

stationary source may be required to develop and submit a risk management plan (RMP), which is similar to that described above in Section 5.2.6.1.8. The proposed project will store and handle aqueous ammonia reagent for the SCR NO_x control systems to trigger the CalARP requirements for at least a Level 1 analysis under this program. The requirements will include an off-site consequence analysis (OCA) using dispersion modeling to determine the maximum levels of airborne ammonia that would occur in the vicinity of the site in the event of worst-case and typical accidental release scenarios. Section 5.15, Hazardous Materials Management, includes such a modeling analysis and demonstrates that the mitigation measures that will be incorporated in the facility design will prevent off-site ammonia concentrations from exceeding the levels of concern that are defined in that section.

5.2.6.2.6 Determination of Compliance, Authority to Construct and Permit to Operate

Under Regulation II, Rule 2010, 2070, and 2201, SJVAPCD administers the air quality regulatory program for the construction, alteration, replacement, and operation of new power plants. As part of the AFC process, the project will be required to obtain a preconstruction Determination of Compliance (DOC) from the SJVAPCD. Regulation II, Rule 2201 incorporates other SJVAPCD requirements regarding how sources 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 SJVAPCD 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. Projects that are reviewed under the CEC Application process require the local air district (in this case, SJVAPCD) to provide CEC with a preliminary and final DOC (equivalent to an ATC) prior to licensing of the new power plant. The CEC license then essentially serves s the serves as an ATC permit. Once the power plant commences operations and demonstrates compliance with the Conditions of Certification, SJVAPCD will issue a PTO. The PTO specifies conditions that the facility must meet to comply with all applicable air quality rules, regulations, and standards.

5.2.6.2.7 Power Plant Sitting Requirements

CEC has been charged with assessing the environmental impacts of each new power plant under the California Environmental Quality Act (CEQA), and identifying 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 demonstrated, a new power plant can only be approved, if it will comply with all federal, state, and local air quality rules, regulations, standards, guidelines, and ordinances that govern its construction and operation. A project must demonstrate that facility emissions will be appropriately controlled to mitigate any potentially significant impacts due to the project. A required element of this demonstration is evidence that the proposed power plant will not jeopardize attainment and maintenance of the state and federal AAQS. Cumulative impacts, impacts due to pollutant interaction, and impacts associated with non-criteria pollutants must also be evaluated.

5.2.6.2.8 CEC and CARB Memorandum of Understanding

This Memorandum of Understanding establishes requirements of the CEC to assure protection of environmental quality during AFC review.

5.2.6.2.9 Consistency with State Requirements

State law invests 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 proposed project is under the local jurisdiction of the SJVAPCD. Compliance with District rules and regulations will ensure compliance with state air quality requirements.

5.2.6.2.10 Regulation For The Mandatory Reporting Of Greenhouse Gas Emissions

The CARB approved a regulation for the mandatory reporting of greenhouse gas emissions from major sources on December 6, 2007, pursuant to the California Global Warming Solutions Act of 2006. CARB filed the final rulemaking package with Office of Administrative Law (OAL) on October 16, 2008. Under the final regulation order, the new Subchapter 10, Article 2, Sections 95100 to 95133, Title 17, California requires operators of electricity generating facilities that emit greater than or equal to 2,500 metric tonnes of CO_2 to report and submit to CARB data on annual greenhouse gas emissions for the preceding year, beginning in 2009 (*i.e.,* 2008 data), and each subsequent calendar year. The proposed project would be required to report its GHG emissions annually after it has been operated.

5.2.6.3 Local

The SJVAPCD is the local district with authority to implement and enforce air quality regulations. The SJVAPCD prepares an Air Quality Plan to define its strategies for attaining the state and federal ambient air quality standards, and its relevant control measures for implementing those strategies (Health and Safety Code Section 40914).

- Local districts have principal responsibility for:
- Developing plans for: meeting the NAAQS and CAAQS;
- Developing control measures for non-vehicular sources of air pollution necessary to achieve and maintain both state and federal air quality standards;
- Implementing permit programs established for the construction, modification, and operation of air pollution sources;
- Enforcing air pollution statutes, regulations and prohibitory rules governing non-vehicular sources; and
- Developing programs to reduce emissions from indirect sources.

The following paragraphs outline the SJVAPCD rules and regulations that apply to the project.

Rule 1080, Stack Monitoring.

The rule outlines facility requirements for continuous monitoring equipment from any facility emitting pollutants for which emission limits have been established. The SJS 1&2 will be constructed and operated to comply with the requirements of Rule 1080.

Rule 1081, Source Sampling.

The rule outlines facility design requirements for source sampling from any facility emitting pollutants for which emission limits have been established. The SJS 1&2 will be constructed and operated to comply with the requirements of Rule 1081.

Rule 1100, Equipment Breakdown.

This rule details the notification and corrective action requirements necessary in an equipment breakdown situation. As operator of the project, SJS 1&2 LLC will comply with these requirements.

Rule 2010, Permits Required.

An ATC and PTO will be required for the project (for power plants engaged in the CEC licensing process, the PDOC/FDOC process described previously replaces the ATC). SJS 1&2 LLC will submit the required application materials for these permits to SJVAPCD.

Rule 2201, New and Modified Stationary Source Review.

This rule outlines the emission standards, offset requirements and conditions, the required demonstrations that the new source or modification will not cause or contribute to violations of the AAQS, procedures for power plants under the CEC process, methods for calculating project emissions, and required air quality analysis procedures. Compliance with the specific provisions of this rule is discussed below.

BACT

An applicant must apply BACT to any new or modified emissions unit that has a potential to emit 2 lb per day or more of any pollutant. The SJVAPCD maintains a list of current BACT standards for specific source categories, which is posted on the District's website. The largest sources of pollutant emissions from the project will be the biomass combustors, which will be fired exclusively on green waste and agricultural prunings. The combustors will be equipped with a SNCR and SCR for the control of NOx, wet and dry scrubbers to control acid gases and particulates, respectively, and baghouses/multicyclone for additional removal of particulate emissions. Aqueous ammonia ($NH_{4O}H$) at a solution strength not to exceed 20 percent in water will be used as the reagent for the SNCR and SCR control systems. NH_3 slip will be limited to 5 parts per million by volume on a dry basis (ppmvd). Details regarding the proposed BACT levels for the project combustors and other sources are presented in Section 5.2.4.

Testing of the planned emergency equipment (diesel engine drivers for two firewater pumps and two generators) will be conducted for a period of up to one hour to confirm the equipment's operability. Such tests of the firewater pump engine and emergency generator will occur once per week and once per month, respectively. BACT for these engines are defined by the federal and California Tier 3 standards for the firewater pump engine and the Tier 2 standards for the generator engine.

Emissions Offset Requirements

Rule 2201 requires that offsets be provided for a new stationary source with a potential to emit equal to or exceeding the levels shown in Table 5.2-30 and describes the methods for determining the quantities of ERCs needed to offset emissions from a new stationary source.

Table 5.2-30
SJVAPCD Offset Thresholds

Pollutant	lb/yr
VOC	20,000
NO_x	20,000
SO_x	54,750
PM_{10}	29,200
CO (attainment areas)	200,000

Notes:
CO = carbon monoxide
lb/yr = pounds per year
NO_x = oxide(s) of nitrogen
PM_{10} = particulate matter less than 10 microns in diameter
VOC = volatile organic compounds
SO_x = sulfur oxide(s)

As described in Section 5.2.2.2, annual emissions from the operational SJS 1&2 will exceed the offset triggers for NO_x, VOC, CO, SO_2 and PM_{10} if the facility is permitted for the annual operating hours requested in this Application. However, offsets for CO will not be required because, as demonstrated by the modeling results presented in Section 5.2.2.3.7, the project's emissions of this pollutant will not cause or contribute to a violation of the ambient CO standards

The operation of the biomass combustors at SJS 1&2 will not be constant throughout the year; thus, offsets will need to be provided on a quarterly basis. Information on the required offset amounts for the SJS 1&2 operations and on the applicant's progress to date in obtaining the required numbers of ERC is provided in Section 5.2.4.2.

Compliance with Ambient Air Quality Standards.

Emissions from a new or modified stationary source may not cause or contribute to a violation of an ambient air quality standard. Dispersion modeling conducted for the purposes of demonstrating compliance with this rule must be consistent with the requirements contained in the most recent edition of EPA Guidelines on Air Quality Models, unless the Air Pollution Control Officer finds that such modeling methods are inappropriate for a particular application. In such cases, the Air Pollution Control Officer may designate an alternate model only after allowing for public comments and only with the concurrence of the CARB or the EPA.

As described in Section 5.2.2.4, Modeling Results – Compliance with Ambient Air Quality Standards, an air quality modeling analysis has been conducted to demonstrate that the project will not cause or make worse the violation of any air quality standard.

Power Plants

Section 5.8 of Rule 2201 applies to all power plants that would be constructed in the SJVAPCD and for which a Notice of Intention (NOI) or AFC has been accepted by the CEC. It describes the actions to be taken by SJVAPCD in order to provide information to CEC and CARB to ensure that the project will conform to the District's rules and regulations. After the Application has been submitted to CEC and other responsible agencies, including SJVAPCD, the Air Pollution Control Officer is required to conduct a DOC review. This determination consists of a review identical to that which would be performed if an Application for an ATC had been received for the power plant. If the information contained in the AFC does not meet the requirements of this regulation, then the Air Pollution Control Officer is required to so inform the CEC within 20 calendar days following receipt of the AFC. In such an instance, the AFC is considered to be incomplete and returned to the applicant for resubmittal.

Certification of Conformity

A new or modified source that is subject to the requirements of Rule 2520 may choose to apply for a certificate of conformity with the procedural requirements of 40 CFR Part 70 for a Federal Operating Permit. A certificate of conformity will allow changes authorized by the ATC permit (or DOC) to be incorporated in the Part 70 permit as administrative permit amendments.

Rule 2520, Federally Mandated Operating Permits.

This rule provides an administrative mechanism for issuing operating permits for new and modified sources of air contamination accordance with the federal requirements of 40 CFR Part 70.

Rule 3010/3020, Permit Fees.

This rule and the fee schedules in rule 3020 establish the filing and permit review fees for specific types of new sources, as well as annual renewal fees and penalty fees for existing sources.

Rule 3110, Air Toxics Fees.

This rule applies to facilities subject to the requirements of the Air Toxics "Hot Spots" Information and Assessment Act (Sections 44340 and 44383 of the California Health and Safety Code [CHSC]) and to facilities subject to National Emission Standards for Hazardous Air Pollutants (NESHAPs) issued pursuant to Section 112 of the federal CAA.

Rule 3135, Dust Control Plan Fee.

This rule recovers the District's cost for reviewing dust control plans and conducting site inspections to verify compliance with such plans.

Rule 3170, Federally Mandated Ozone Nonattainment Fee.

The purpose of this rule is to satisfy requirements specified in Section 185 and Section 182(f) of the CAA. This rule applies to major sources of NO_x and VOC. The fees required pursuant to this section are

additional to the permit fees and the fees required under other rules and regulations. This rule will cease to be effective when the Administrator of EPA designates the SJVAPCD to be in attainment of the federal 1-hour standard for O_3.

Rule 4001, New Source Performance Standards.

This rule incorporates the federal NSPS from 40 CFR Part 60.

Rule 4002, National Emission Standards for Hazardous Air Pollutants.

This rule incorporates the federal NESHAPs from Part 61 and Part 63, Chapter I, Subchapter C, Title 40 CFR.

Rule 4101, Visible Emissions.

This rule applies to the opacity of discharges from any single source. Emissions from the sources of the project will be below threshold opacity levels described in this rule.

Rule 4102, Nuisance.

This rule states that there shall be no discharge of such quantities of any pollutant or material which could cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health, or safety of any such persons or the public or which cause or have a natural tendency to cause injury or damage to business or property.

Rule 4201, Particulate Matter Concentration.

This rule applies to the discharge of PM into the atmosphere. The relevant limit for the project is expressed in Rule 4201, which states that no person shall release or discharge into the atmosphere from any single source operation dust, fumes, or total suspended PM, in excess of 0.1 grains per dry standard cubic foot of gas as determined by following test methods: PM concentration – EPA Method 5; Stack gas velocity – EPA Method 2; Stack gas moisture – EPA Method 4. The SJS 1&2 biomass combustors will comply with this requirement, with a maximum PM10 emission rate of approximately 0.013 grains per dry standard foot of exhaust gas.

Rule 4301, Fuel-burning Equipment.

This rule limits the emission levels of NO_x, SO_2, and fuel combustion contaminants (particulates) from any fuel-burning equipment unit. The specific limits are 140 lb per hour of NO_x, calculated as NO_2, 200 lb per hour of SO_2, 0.1 grains per cubic foot of gas calculated to 12 percent of CO_2 at dry standard conditions, and 10 lb per hour of combustion contaminants. The operational emissions data presented in Section 5.2.2.2 demonstrate that the SJS 1&2 biomass combustors will easily comply with these emission limits.

Rule 4801 – Sulfur Compounds.

This rule limits the emissions of sulfur compounds to less than 0.2 percent by volume on a dry basis averaged over 15 consecutive minutes by using EPA Method 8 and CARB Method 1-100. The operational emissions data presented in Section 5.2.2.2 demonstrate that the SJS 1&2 biomass combustors will easily comply with this emission limit.

Rule 8021, Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities.

This rule limits fugitive dust emissions from construction, demolition, excavation, extraction, and other earthmoving activities such that opacity levels are kept to no more than 20 percent.

Rule 8041, Carryout and Trackout.

This rule that requires the limiting of carryout and trackout dust emissions from sites is applicable to construction of the project.

Rule 8051, Open Areas.

This rule applies to any open area of 3.0 acres or more in rural areas with at least 1,000 square feet of disturbed surface area. Dust emissions must be kept below 20 percent opacity.

Rule 8061, Paved and Unpaved Roads.

This rule limits the emission of fugitive dust from roads to no more than 20 percent opacity through different control measures. Depending on traffic levels, the road must meet certain width requirements.

Rule 8071, Unpaved Vehicle/Equipment Traffic Areas.

This rule limits the emission of fugitive dust to no more than 20 percent opacity through different control measures.

Table 5.2-31 summarizes the LORS pertaining to air quality aspects of the project, and references the subsection where the project's compliance with each requirement is discussed.

Table 5.2-31
Applicable Air Quality Laws, Ordinances, Regulations, and Standards

LORS	Applicability	Section
Federal		
40 CFR Part 50	NAAQS	Section 5.2.2 and Section 5.2.6f.1
40 CFR Part 51	Federal New Source Review program is delegated to SJVAPCD	Section 5.2.6.1
40 CFR Part 52.21	The Project does not trigger PSD requirements	Section 5.2.6.1
40 CFR Part 60	Subpart Db emission NSPS limits are applicable to the biomass combustors; Subpart IIII NSPS limits are applicable to the diesel engine drivers for the emergency generators and firewater pumps.	Section 5.2.6.1
40 CFR Part 63	Subpart DDDDD MACT standard applies to biomass combustors	Section 5.2.6.1
40 CFR Part 68	Federal Risk Management Plan not triggered	Section 5.2.6.1
40 CFR Part 70	Federally mandated operating permit is required	Section 5.2.6.1
	Acid Rain permit is required	Section 5.2.6.1
40 CFR Part 81.165	Air Quality Control Regions	Section 5.2.6

Table 5.2-31
Applicable Air Quality Laws, Ordinances, Regulations, and Standards
(Continued)

LORS	Applicability	Section
State		
California Health & Safety Code section 39606	CAAQS	Section 5.2.1.2 and Section 5.2.6.2
Toxic Air Contaminant Identification and Control Act	Toxic Air Contaminant Program	Section 5.2.6.2 and Section 5.16
California Health and Safety Code Section 44300	Air toxics "Hot Spots" Program	Section 5.2.6.2 and Section 5.16
California Administrative Code, Title 14, Section 15002(a)(3)	Power plant siting requirements	Section 5.2.6.2
California Administrative Code, the proposed new Subchapter 10, Article 2, sections 95100 to 95133, title 17. (California Global Warming Solutions Act of 2006)	Regulation For The Mandatory Reporting Of Greenhouse Gas Emissions	Section 5.2.6.2.10
Local		
SJVAPCD Regulation I, Rule 1080	Stack monitoring	Section 5.2.6.3
SJVAPCD Regulation I, Rule 1081	Source sampling	Section 5.2.6.3
SJVAPCD Regulation I, Rule 1100	Equipment breakdown	Section 5.2.6.3
SJVAPCD Regulation II, Rule 2010	Permits required (ATC and PTO)	Section 5.2.6.3
SJVAPCD Regulation II, Rule 2201	New and modified stationary source review (BACT, Offset, and Air Quality Modeling)	Section 5.2.2, Section 5.2.4 and Section 5.2.6.3
SJVAPCD Regulation II, Rule 2520	Federally mandated operating permits	Section 5.2.6.3
SJVAPCD Regulation III, Rule 3010/3020	Permit fees/fee schedules	Section 5.2.6.3
SJVAPCD Regulation III, Rule 3110	Air toxics fees	Section 5.2.6.3
SJVAPCD Regulation III, Rule 3135	Dust control plan fee	Section 5.2.6.3
SJVAPCD Regulation III, Rule 3170	Federally mandated O_3 nonattainment fee	Section 5.2.6.3
SJVAPCD Regulation IV, Rule 4001	Rule incorporates federal NSPS by reference	Section 5.2.6.3
SJVAPCD Regulation IV, Rule 4002	Rule incorporates federal MACT standards by reference	Section 5.2.6.3
SJVAPCD Regulation IV, Rule 4101	Visible emissions	Section 5.2.2 and Section 5.2.6.3
SJVAPCD Regulation IV, Rule 4102	Nuisance	Section 5.2.6.3
SJVAPCD Regulation IV, Rule 4201	PM concentrations	Section 5.2.2 and Section 5.2.6.3
SJVAPCD Regulation IV, Rule 4301	Fuel-burning equipment	Section 5.2.2 and Section 5.2.6.3
SJVAPCD Regulation IV, Rule 4801	Sulfur compounds	Section 5.2.2 and Section 5.2.6.3

Table 5.2-31
Applicable Air Quality Laws, Ordinances, Regulations, and Standards
(Continued)

LORS	Applicability	Section
SJVAPCD Regulation VIII, Rule 8021	Construction, demolition, excavation, extraction, and other earthmoving activities	Section 5.2.6.3
SJVAPCD Regulation VIII, Rule 8041	Carryout and trackout	Section 5.2.6.3
SJVAPCD Regulation VIII, Rule 8051	Open areas	Section 5.2.6.3
SJVAPCD Regulation VIII, Rule 8061	Paved and unpaved roads	Section 5.2.6.3
SJVAPCD Regulation VIII, Rule 8071	Unpaved vehicle/equipment traffic areas	Section 5.2.6.3

5.2.7 Agencies and Agency Contacts

Agency contacts regarding this air quality assessment of the proposed project were as listed in Table 5.2-32:

Table 5.2-32
Agency Contact List for LORS

	Agency	Contact	Address	Telephone
1	Air Quality – California Energy Commission	Kevin Golden Mechanical Engineer,	1519 Ninth Street Sacramento, CA 95814	(916) 654-4287
2	Air Quality – San Joaquin Valley Air Pollution Control District	David Warner and David Swaney Permit Services Managers, Central Region	1990 E. Gettysburg Ave. Fresno, CA 93726 Central Region	(559) 230-6000
4	Air Quality – California Air Resources Board	Michael Tollstrup, Chief, Project Assessment Branch Stationary Source	P.O. Box 2815 Sacramento, CA 95812	(916) 322-6026

5.2.8 Permits Required and Permitting Schedule

Table 5.2-33
Applicable Permits

• Responsible Agency	• Permit/Approval	• Schedule
• San Joaquin Valley Air Pollution Control District (SJVAPCD)	• Authority to Construct/Permit to Operate	• Application to be filed concurrent with AFC filing. 180 day application review period will be requested.

• • •

Under Regulation II, SJVAPCD regulates the construction, alteration, replacement, and operation of new power plants. For power plants under the siting jurisdiction of the CEC, the SJVAPCD issues a pre-construction Determination of Compliance in lieu of an ATC. The DOC is incorporated into the CEC license. When the proposed project commences operation and demonstrates compliance with the DOC, SJVAPCD will issue a PTO. The PTO specifies conditions that the air pollution source must meet, including all applicable DOC requirements. The final DOC should be issued within 6 months after receipt of complete applications.

5.2.9 References

California Air Resources Board, Ambient Air Quality Data Summaries (ADAM) http://www.arb.ca.gov/adam/welcome.html.

California Air Resources Board, Area Designations Maps / State and National, http://www.arb.ca.gov/desig/adm/adm.htm, September 11, 2007.

California Air Resources Board, California Ambient Air Quality Standards, http://www.arb.ca.gov/research/aaqs/aaqs2.pdf, June 26, 2008.

California Air Resources Board, Risk Management Guidance for the Permitting of New Stationary Source Diesel-Fueled Engine, 2000

California Climate Action Registry (CCAR) General Reporting Protocol, Reporting Entity-Wide Greenhouse Gas Emissions, Version 3.0, April 2008.

California Code of Regulations Title 14, Guidelines for Implementation of the California Environmental Quality Act, http://ceres.ca.gov/ceqa/guidelines, July 2007.

California Office of Emergency Services, 2007. California Health and Safety Code.

Code of Federal Regulation, Title 40, Protection of Environment, Revised July 1, 1999.

National Climatic Data Center (NCDC), http://www.ncdc.noaa.gov/oa/ncdc.html

South Coast Air Quality Management District. CEQA Air Quality Handbook. April 1993.

San Joaquin Valley Unified Air Pollution Control District (SJVAPCD), 2007. Air Quality Modeling Meteorological Data and Ozone Data, 2004.

San Joaquin Valley Air Pollution Control District (SJVAPCD), 2008. Rules and Regulations of the San Joaquin Valley Air Pollution Control District.

URS Corporation. 2006. Application For Certification, Panoche Energy Center.

URS Corporation. 2008 Modeling Protocol for the San Joaquin Solar 1 & 2, Fresno County, California. Prepared by URS Corporation for submittal to the San Joaquin Valley Unified Air Pollution Control District and the California Energy Commission. October 7, 2008.

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

U.S. EPA (U.S. Environmental Protection Agency), AP-42 Compilation of Air Pollutant Emission Factors, Fifth Edition, 1995.

U.S. EPA, AirData, http://www.epa.gov/air/data/index.html, October 5, 2007.

U.S. EPA, National Ambient Air Quality Standards (NAAQS), http://www.epa.gov/air/criteria.html, October 15, 2008.

U.S. EPA, User's Guide to the Building Profile Input Program (Revised), EPA-454/R-93-038, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. February, 1995.

Western Regional Climate Center (WRCC), Climate Historical Summaries, Station 041864, Coalinga, 1971-2000.

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Air Quality** Project: San Joaquin Solar 1&2 Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (1)	...provide a discussion of the existing site conditions, the expected direct, indirect and cumulative impacts due to the construction, operation and maintenance of the project, the measures proposed to mitigate adverse environmental impacts of the project, the effectiveness of the proposed measures, and any monitoring plans proposed to verify the effectiveness of the mitigation.	Section 5.2.1 Section 5.2.3 Section 5.2.4		
Appendix B (g) (8) (A)	The information necessary for the air pollution control district where the project is located to complete a Determination of Compliance.	Section 5.2.1		
Appendix B (g) (8) (B)	The heating value and chemical characteristics of the proposed fuels, the stack height and diameter, the exhaust velocity and temperature, the heat rate and the expected capacity factor of the proposed facility.	Section 5.2.2.2 Appendix B-3		
Appendix B (g) (8) (C)	A description of the control technologies proposed to limit the emission of criteria pollutants.	Section 5.2.5		
Appendix B (g) (8) (D)	A description of the cooling system, the estimated cooling tower drift rate, the rate of water flow through the cooling tower, and the maximum concentrations of total dissolved solids.	Section 5.2.2.2 Appendix B-3		
Appendix B (g) (8) (E)	The emission rates of criteria pollutants and greenhouse gases (CO_2, CH_4, N_2O, and SF_6) from the stack, cooling towers, fuels and materials handling processes, delivery and storage systems, and from all on-site secondary emission sources.	Section 5.2.2.2 Appendix B-3		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Air Quality** Project: San Joaquin Solar 1&2 Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (8) (F)(i)	A description of typical operational modes, and start-up and shutdown modes for the proposed project, including the estimated frequency of occurrence and duration of each mode, and estimated emission rate for each criteria pollutant during each mode.	Section 5.2.2.2.1 Appendix B-3		
Appendix B (g) (8) (F)(ii)	A description of the project's planned initial commissioning phase, which is the phase between the first firing of emissions sources and the commercial operations date, including the types and durations of equipment tests, criteria pollutant emissions, and monitoring techniques to be used during such tests.	Section 5.2.2.2.2 Appendix B-3		
Appendix B (g) (8) (G)	The ambient concentrations of all criteria pollutants for the previous three years as measured at the three Air Resources Board certified monitoring stations located closest to the project site, and an analysis of whether this data is representative of conditions at the project site. The applicant may substitute an explanation as to why information from one, two, or all stations is either not available or unnecessary.	Section 5.2.1		
Appendix B (g) (8) (H)	One year of meteorological data collected from either the Federal Aviation Administration Class 1 station nearest to the project or from the project site, or meteorological data approved by the California Air Resources Board or the local air pollution control district.	Section 5.2.1 Appendix B-1 Modeling CD/DVD		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Air Quality** Project: San Joaquin Solar 1&2 Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (8) (H) (i)	If the data is collected from the project site, the applicant shall demonstrate compliance with the requirements of the U.S. Environmental Protection Agency document entitled "On-Site Meteorological Program Guidance for Regulatory Modeling Applications" (EPA - 450/4-87-013 (August 1995)), which is incorporated by reference in its entirety.	N/A		
Appendix B (g) (8) (H) (ii)	The data shall include quarterly wind tables and wind roses, ambient temperatures, relative humidity, stability and mixing heights, upper atmospheric air data, and an analysis of whether this data is representative of conditions at the project site.	Section 5.2.1 Appendix B-1		
Appendix B (g) (8) (I)	An evaluation of the project's direct and cumulative air quality impacts, consisting of the following:	Section 5.2.2.4 Section 5.2.3 Modeling CD/DVD		
Appendix B (g) (8) (I) (i)	A screening level air quality modeling analysis, or a more detailed modeling analysis if so desired by the applicant, of the direct criteria pollutant impacts of project construction activities on ambient air quality conditions, including fugitive dust (PM_{10}) emissions from grading, excavation and site disturbance, as well as the combustion emissions [nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), and particulate matter less than 10 microns in diameter (PM_{10}) and particulate matter less than 2.5 microns in diameter (PM2.5)] from construction-related equipment;	Section 5.2.2 Appendix B-2 Modeling CD/DVD		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Air Quality** Project: San Joaquin Solar 1&2 Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (8) (I) (ii)	A screening level air quality modeling analysis, or a more detailed modeling analysis if so desired by the applicant, of the direct criteria pollutant (NO_x, SO_2, CO, PM_{10}, and $PM_{2.5}$) impacts on ambient air quality conditions of the project during typical (normal) operation, and during shutdown and startup modes of operation. Identify and include in the modeling of each operating mode the estimated maximum emissions rates and the assumed meteorological conditions;	Section 5.2.2 Appendix B-3 Modeling CD/DVD		
Appendix B (g) (8) (I) (iii)	A protocol for a cumulative air quality modeling impacts analysis of the project's typical operating mode in combination with other stationary emissions sources within a six mile radius which have received construction permits but are not yet operational, or are in the permitting process. The cumulative inert pollutant impact analysis should assess whether estimated emissions concentrations will cause or contribute to a violation of any ambient air quality standard; and	Section 5.2.2.4 Appendix B-4		
Appendix B (g) (8) (I) (iv)	An air dispersion modeling analysis of the impacts of the initial commissioning phase emissions on state and federal ambient air quality standards for NO_X, SO_2, CO, PM_{10}, and $PM_{2.5}$.	Section 5.2.2 Appendix B-2 Modeling CD/DVD		
Appendix B (g) (8) (J)	If an emission offset strategy is proposed to mitigate the project's impacts under subsection (g)(1), provide the following information:	Section 5.2.4.2		
Appendix B (g) (8) (J) (i)	The quantity of offsets or emission reductions that are needed to satisfy air permitting requirements of local permitting agencies (such as the air district), state and federal oversight air agencies, and the California Energy Commission. Identify by criteria air pollutant, and if appropriate, greenhouse gas; and	Section 5.2.4.2		

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (8) (J) (ii)	Potential offset sources, including location, and quantity of emission reductions;	Section 5.2.4.2		
Appendix B (g) (8) (K)	A detailed description of the mitigation, if any, which an applicant may propose, for all projects impacts from criteria pollutants that currently exceed state or federal ambient air quality standards, but are not subject to offset requirements under the district's new source review rule.	Section 5.2.4		
Appendix B (i) (1) (A)	Tables which identify laws, regulations, ordinances, standards, adopted local, regional, state, and federal land use plans, leases, and permits applicable to the proposed project, and a discussion of the applicability of, and conformance with each. The table or matrix shall explicitly reference pages in the application wherein conformance, with each law or standard during both construction and operation of the facility is discussed; and	Table 5.2-31		
Appendix B (i) (1) (B)	Tables which identify each agency with jurisdiction to issue applicable permits, leases, and approvals or to enforce identified laws, regulations, standards, and adopted local, regional, state and federal land use plans, and agencies which would have permit approval or enforcement authority, but for the exclusive authority of the commission to certify sites and related facilities.	Table 5.2-32, Table 5.2-33		
Appendix B (i) (2)	The name, title, phone number, address (required), and email address (if known), of an official who was contacted within each agency, and also provide the name of the official who will serve as a contact person for Commission staff.	Table 5.2-32		

Adequacy Issue: Adequate ____ Inadequate ____

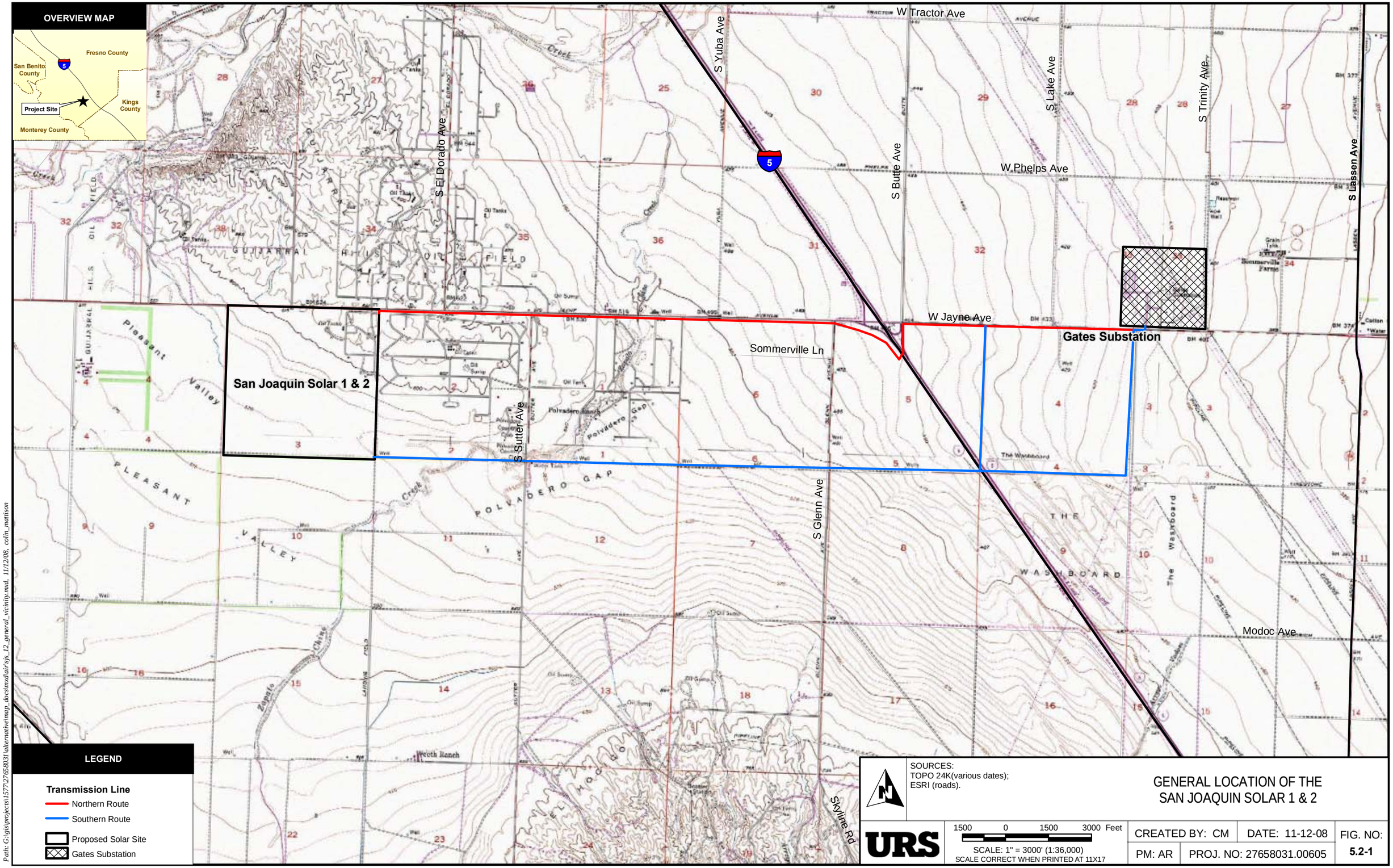
DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Air Quality** Project: San Joaquin Solar 1&2 Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (i) (3)	A schedule indicating when permits outside the authority of the commission will be obtained and the steps the applicant has taken or plans to take to obtain such permits.	Section 5.2.8		



SOURCES:
TOPO 24K(various dates);
ESRI (roads).

GENERAL LOCATION OF THE
SAN JOAQUIN SOLAR 1 & 2

URS

1500 0 1500 3000 Feet
SCALE: 1" = 3000' (1:36,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: CM	DATE: 11-12-08	FIG. NO:
PM: AR	PROJ. NO: 27658031.00605	5.2-1

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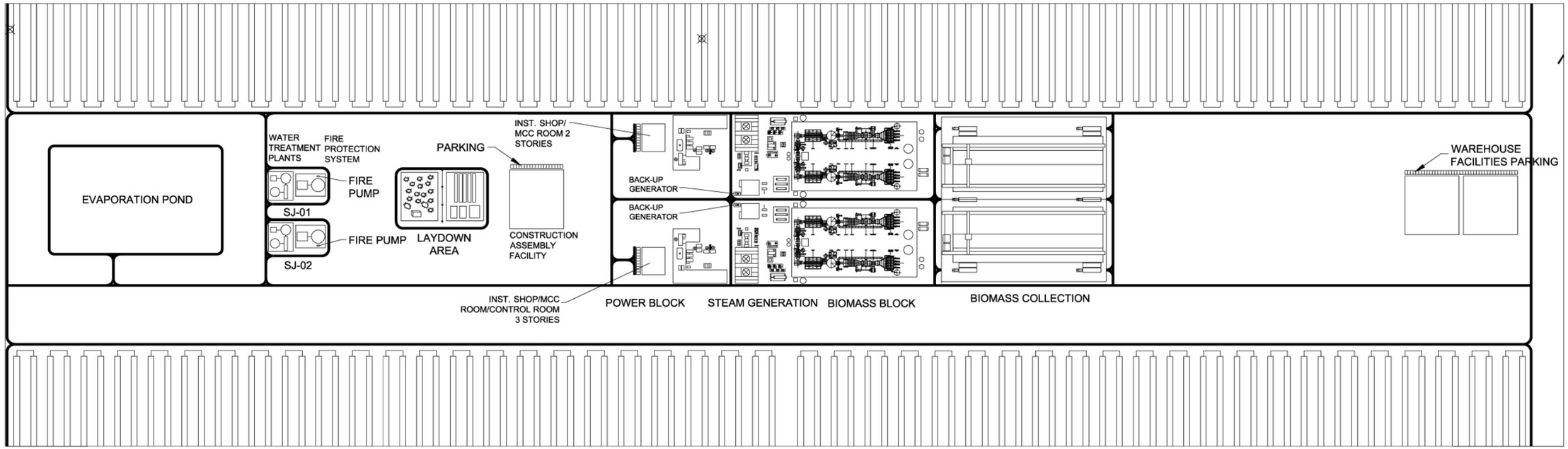
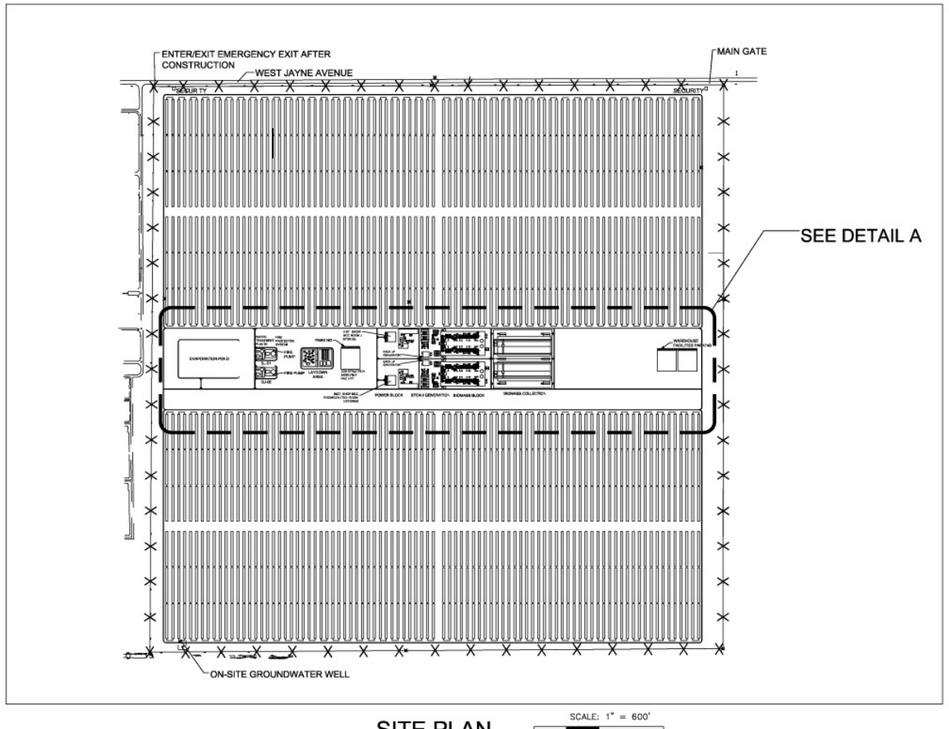


DETAIL A

SCALE: 1" = 150'
−150 −75' 0' 150'



SITE PLAN

SCALE: 1" = 600'
−600 −300' 0' 600'

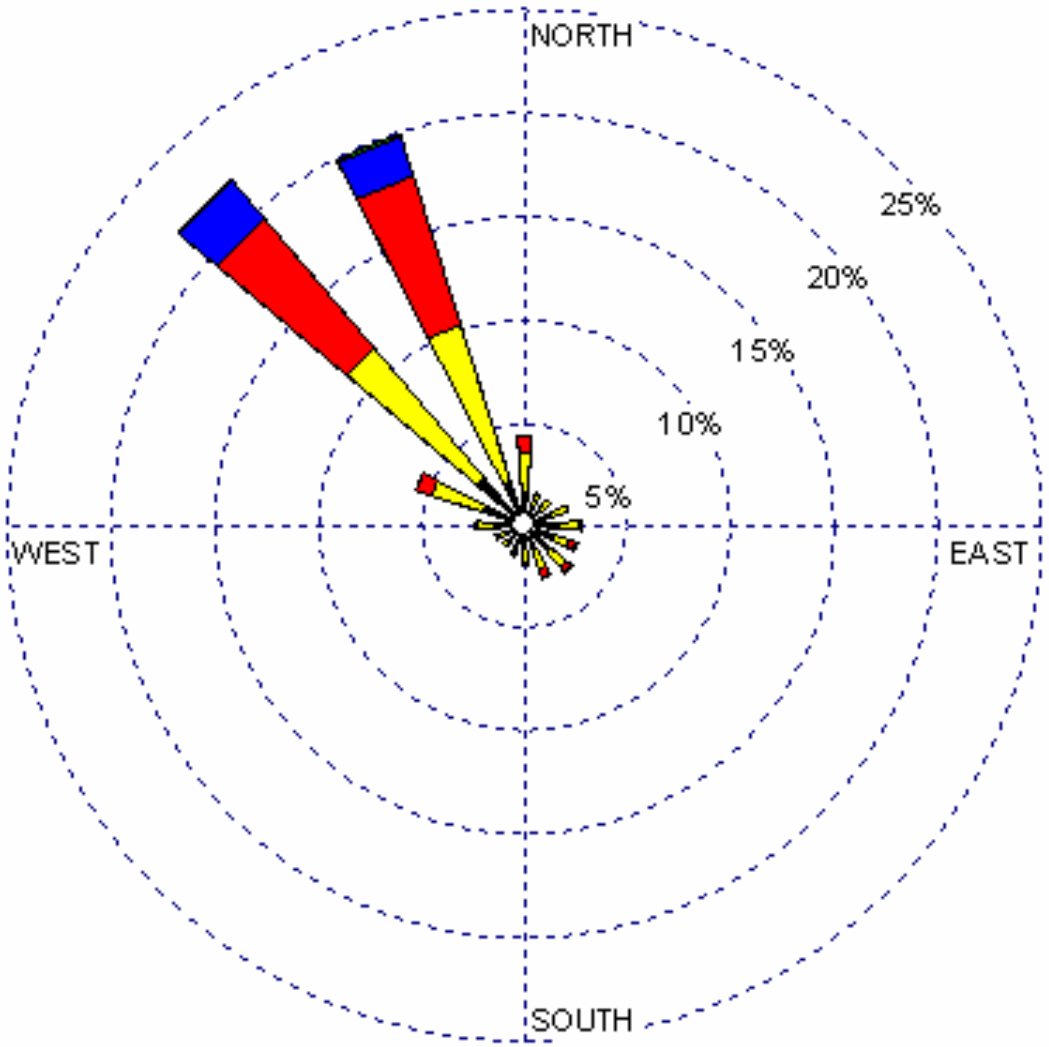
LEGEND

- FENCE LINE/PROPERTY BOUNDARY
- UTILITY ROAD
- ON-SITE GROUNDWATER WELL

SOURCE:
Ford, Davis and Bacon (drawing 2008)

SITE PLAN
SAN JOAQUIN SOLAR 1 & 2

URS	NO SCALE	CREATED BY: CM	DATE: 11-10-08	FIG. NO:
		PM: AR	PROJ. NO: 27658031	5.2-2



WIND SPEED
(Knots)

- >= 22
- 17 - 21
- 11 - 17
- 7 - 11
- 4 - 7
- 1 - 4

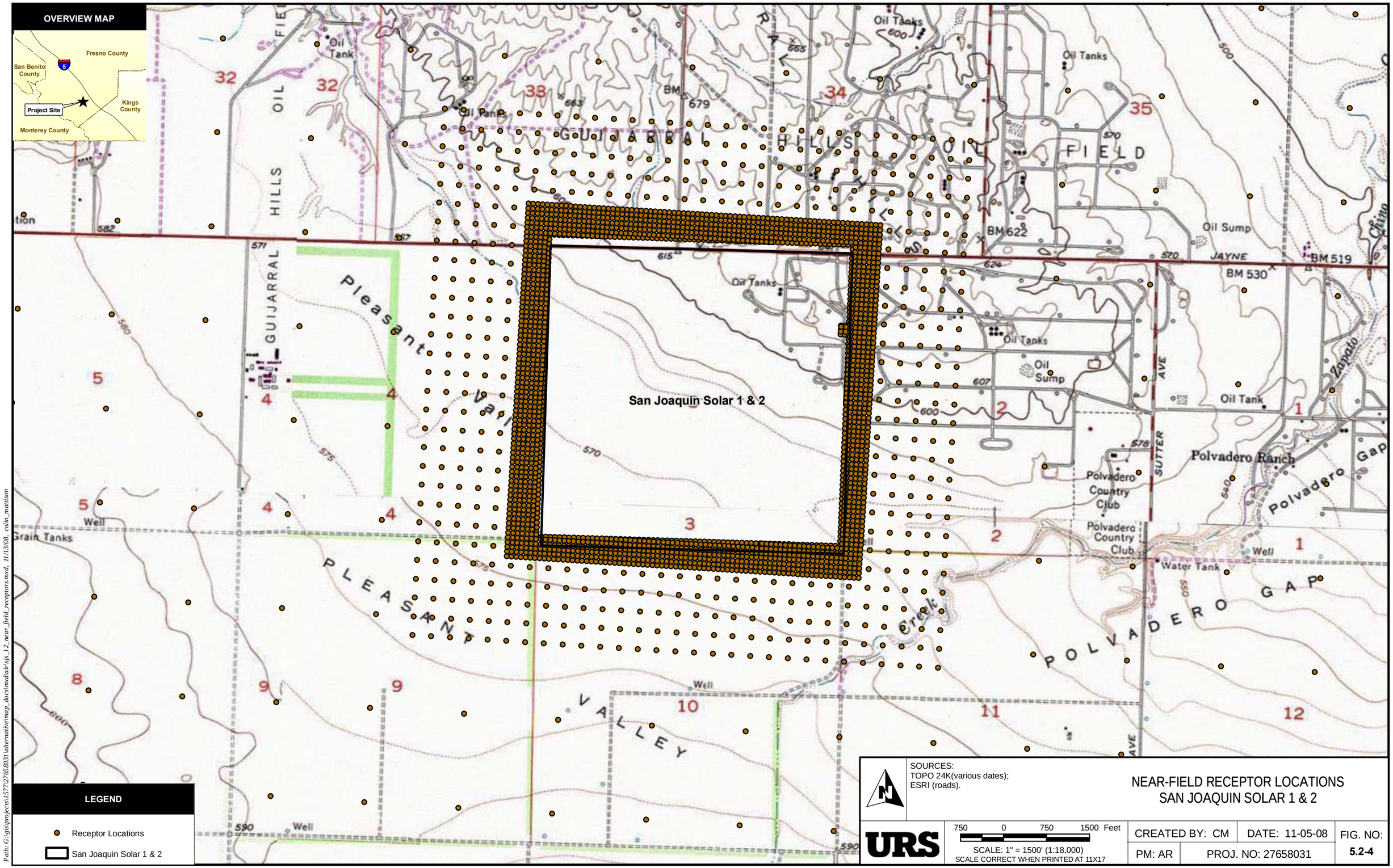
Calms: 21.90%

2004 Annual windrose for Hanford Municipal Airport

Displays wind speed, direction (blowing from)

ANNUAL WIND ROSE FOR
HANFORD MUNICIPAL AIRPORT (2004)

URS	NO SCALE	CREATED BY CM	DATE: 10-31-08	FIG. NO:
		PM: AR	PROJ. NO: 27658031.00500	5.2-3



SOURCES:
TOPO 24K(various dates);
ESRI (roads).

NEAR-FIELD RECEPTOR LOCATIONS
SAN JOAQUIN SOLAR 1 & 2

URS

750 0 750 1500 Feet
SCALE: 1" = 1500' (1:18,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: CM	DATE: 11-05-08	FIG. NO:
PM: AR	PROJ. NO: 27658031	5.2-4

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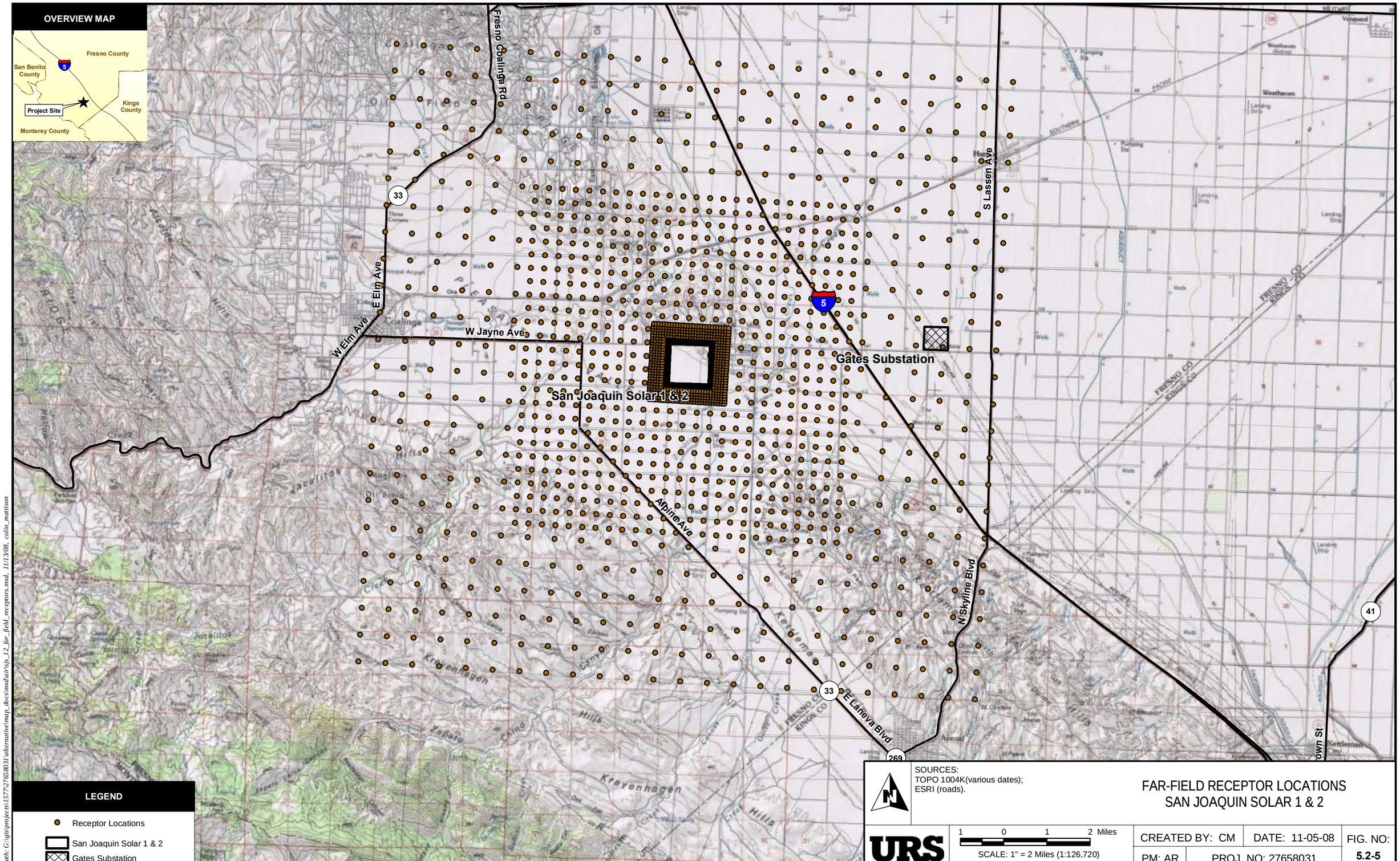

SOURCES:
TOPO 1004K(various dates);
ESRI (roads).

FAR-FIELD RECEPTOR LOCATIONS
SAN JOAQUIN SOLAR 1 & 2

URS

1 0 1 2 Miles
SCALE: 1" = 2 Miles (1:126,720)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: CM	DATE: 11-05-08	FIG. NO:
PM: AR	PROJ. NO: 27658031	5.2-5

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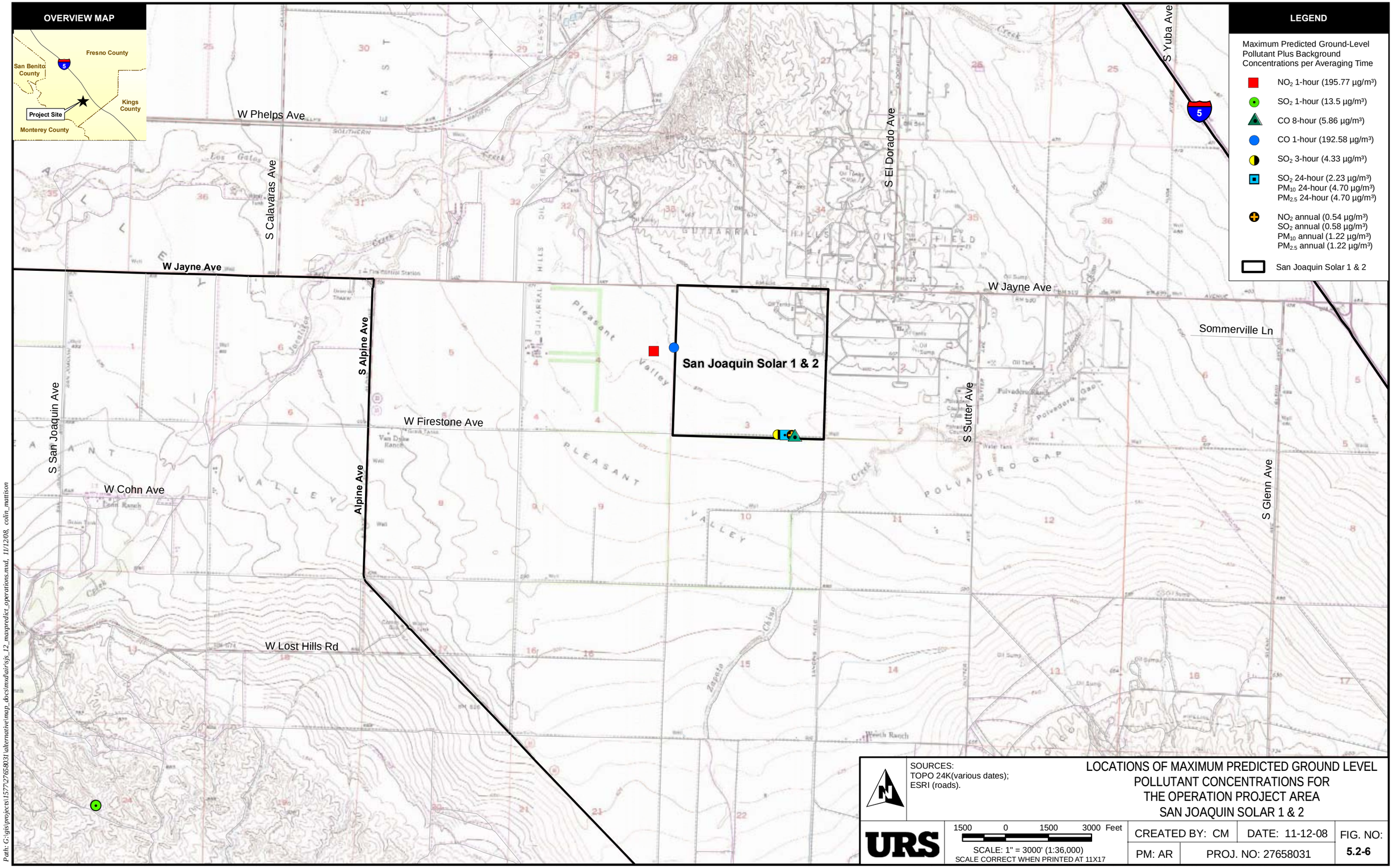

SOURCES:
TOPO 24K(various dates);
ESRI (roads).

LOCATIONS OF MAXIMUM PREDICTED GROUND LEVEL POLLUTANT CONCENTRATIONS FOR THE OPERATION PROJECT AREA SAN JOAQUIN SOLAR 1 & 2

URS

1500 0 1500 3000 Feet

SCALE: 1" = 3000' (1:36,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: CM	DATE: 11-12-08	FIG. NO:
PM: AR	PROJ. NO: 27658031	5.2-6

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